

# Arab American University Faculty of Graduate Studies

# The Strategy of Addressing the Variance Between the Outputs of Higher Education and the Needs of the Labor Market in Palestine (ICT sector) in Light of National and International Strategic Perspectives

Prepared By

# Mona Al-Imam Al-Ansari

Supervised By

# Dr. Amjad Shehadeh

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# **Thesis approval**

The Strategy of Addressing the Variance Between the Outputs of Higher Education and the Needs of The Labor Market in Palestine (ICT sector) in light of national and international strategic perspectives

This thesis was defended successfully on 15/6/2021 and approved by

**Examination Committee:** 

1. Supervisor: Dr. Amjad Shehadeh

2. External examiner: Dr. Safa Nasserledin

3.Internal Examiner: Dr. Mohammad Omran

Signature

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## **Declaration**

I declare that this Master dissertation has been composed by me and is based on my own work, unless stated otherwise. I confirm that this master's thesis is my own work and I have documented all sources and material used; no other person's work has been used without due acknowledgement.

All references and verbatim extracts have been quoted, and all sources of information, including graphs and data sets, have been specifically acknowledged. To my best knowledge, this Master dissertation has not been accepted in any other previous application for a degree, in whole or in part.

Name: Mona Al-Imam Al-Ansari

Date: 15/6/2021

Signature:

# Dedication

With love and gratitude, I dedicate this humble research to my deceased father, Rafiq Al-Imam, who blessed my life, raised me, protected me, and taught me the meaning of giving and caring. May he rest in peace.

I also dedicate it to my five children, hoping that I have set a good example for them.

I dedicate this work and give special thanks to my research supervisor Dr. Amjad Shehadeh.

I also dedicate this research to every woman in the world who strives for success and self-fulfillment, despite the heavy burdens and tremendous responsibilities.

I also dedicate it to my husband, siblings, and family.

Finally, I dedicate it to all my friends and all those who supported me in this effort.

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#### Abstract

This study objective was to assess the strategy of addressing the variance between the outputs of higher education and the needs of the labor market in Palestine (ICT sector) in light of national and international strategic perspective. It is a qualitative study which was conducted in two phases using Semi-structured interview for both of them. The first phase aimed to examine the gap between the outputs of higher education and the needs of the labor market in the ICT sector. The interviews included 6 ICT academic supervisors and 15 fresh graduates or expected graduates in 4 local universities, 4 ICT companies, in addition to the chairman of (PITA). The results of this phase revealed the existence of the gap, which is caused by: The weakness of updating the curricula, tools and programs in universities in line with the continuous development of ICT labor market, the weakness of the Palestinian ICT market to meet the global trends and poor coordination with the higher education institutions, and students' weakness regarding the skills needed by labor market. In the second phase, the results of the first phase were presented to the decision-makers in each of: MNE, MOHE, MOL and the MTICT. Policies and strategies of these institutions were discussed. Among the most important findings are the following: There is no clear strategic thinking regarding ICT sector by policy makers, lack of comprehensiveness integrated strategic plans for this sector, poor coordination between all stakeholders, weak formation of the HEC as there is no representation for the most important institutions in it, the accreditation and quality assurance system for higher education institutions is conventional, weakness and fragility of the labor market as a result of the chaotic situation and the absence of laws to regulate it, in addition to the lack of in-depth statistics and studies whether for ICT higher education or for ICT labor market. The study concluded several recommendations, the most important of which are: Develop a strategic thinking about the future of ICT sector in Palestine, embrace the ICT sector as a priority on the national policy agenda as a vital sector to enhance the economical and societal development, restructure HEC and engage the ICT sector as a permanent and essential part of it, establish units in the MOL to study, analyze the labor market and monitor its trends and needs according to the active productive sectors (i.e. ICT sector), review the accreditation and quality mechanisms of ICT programs. At the end, the researcher proposed an outline for a strategy is for ICT sector.

# Abbreviations

- MTICT = Ministry of Telecommunication and Information Technology
- ICT = Information and Communication Technology
- IT = Information Technology
- MNE = Ministry of National Economy
- ILO= International Labor Organization
- TVE= Technical and Vocational Education
- NGOs = Non-Governmental Organizations
- OECD= Organization for Economic Cooperation and Development
- CEDEFOP= European Centre for the Development of Vocational Training
- CAD= Computer-Aided Design
- CAM= Computer-Aided Manufacturing Program
- AQAC= Accreditation and Quality Assurance Commission
- HEC= Higher Education Council
- PITA= Palestinian Information Technology Association
- SFIA= Skills Framework for the Information Age
- IMDA= Infocomm Media Development Authority

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# **Chapter I:**

### Introduction

#### **1.1 Introduction**

Rapid scientific progress and the revolutions that accompany it, such as the Fourth Industrial Revolution and the communication and information revolution, have made the labor market in great demand for people with high skills and competencies to meet its requirements around the world, this means that policies should be discussed to overcome this issue, (CEDEFOP, 2010). The inadequacy of education outputs to labor market demands is one of the global phenomena that deserve investigation to come up with a radical solution, as it directly leads to negative economic and social effects and is considered as one of the causes of unemployment. The labor market no longer needs graduates of high degree holders without having the necessary skills, knowledge, mastery and the ability to achieve and develop. In short, any development in labor market must be matched with an equivalent development in the efficiency of higher education institutions.

The issue of high unemployment rate, population growth, low productivity, declining competitiveness and increasing number of graduates without access to jobs that meet their specialties and qualifications, are major challenges to all community members including political stakeholders, national strategy makers, government institutions, private sector institutions, and nongovernmental organizations and others.

Although Palestine is a state under occupation and suffers from difficult situations economically, socially, etc., it still has a competitive advantage which is: education, It is still noticed that this education is based on quantity and does not serve scientific and technological development and creativity to meet the needs of the labor market and enable graduates to get employment opportunities (Shtayyah, 2004).

As a result of the rapid progress, we are witnessing today in the field of inventions and innovations, the traditional means used in the work are no longer able to keep pace, nor contribute to the national development effectively. Therefore, there is a need to create opportunities for the continuous education of the individual and to provide him with knowledge and skills compatible with the developments of modern science and technology, in response to the requirements of comprehensive development in all areas of life (Marji, 2016: 27).

There are eleven accredited universities teaching ICT and delivering about two thousand new ICT graduates to the Palestinian market each year (Mercy Corps, Market Mapping of the Palestinian ICT sector 2009). Despite this number which was perceived as being more than what the market demanded; it was evident that there was not enough ICT fresh graduates with the right skills for the Palestinian ICT sector. (Cisco Pioneers Market Development Approach in Palestine 2012)

This indicates that the ICT sector is facing a big challenge where the market is small and most organizations suffer weak financial capabilities which limits any growth achievements in addition to lack of technical skills to bring out the latest technologies which limits the competition among a rapidly developing sector worldwide. Skills are the essential ingredient for the advancement of the Palestinian ICT sector. Without the attraction, retention and extension of skills, it won't be possible to sustain the development of the sector. (Cisco Pioneers Market Development Approach in Palestine 2012)

It is a reciprocal correlation between education and economic development and is supposed to be taken into account when planning a realistic, structured approach in the field of vocational preparation (Badrakhan, 2011: 14).

The estimation of manpower needs depends on the existence of economic objectives determined by the planners, and on the productive assumptions associated with the objectives. The planners define the projections of manpower needs by economic sector, occupational group and educational level, and then translate the total demand for manpower into educational goals (Mahasneh, 2010: 138).

In order to achieve the objectives of professional programs that seek to meet the needs of individuals and society on the one hand and provide qualified productive humans on the other hand, the relationship between educational and training institutions and production and business institutions must be strengthened in order to achieve the concept of real partnership that achieves mutual interests between them, to contribute to activating the role of the educational and training institution to carry out its functions and objectives according to the needs and requirements of the labor market. The educational and training institutions must be provided with material and moral support to ensure the efficient and effective functioning of the educational and training process. (Alabd Al-Razzaq, 2013: 6)

The problem of bridging the gap between the outputs of higher education and the needs of the labor market is still present. The unemployment rate remains high, and the Palestinian economy continues to suffer or even getting worse. Although there are some efforts to resolve this problem, it has not reached the required solution. It is important to know why these efforts are not feasible or insufficient to find a radical solution, particularly at the policy level.

As the Palestinian ICT sector reports impressive growth over the last few years and attracts broader global interest, it has become very important for the sector to constantly update, maintain and develop the skill level of the ICT labor force to sustain growth. This study is conducted to identify the skills that the Palestinian ICT companies need, but may not have, to carry out their job effectively in order to maintain their success in a challenging and ever-changing market. The study is also attempting to give a comprehensive view of all the present issues contributing to the skills Gap in the ICT sector in Palestine.

#### 2.1 Statement of the problem

During preparation for the subject, the researcher visited the Ministry of Education and Higher Education and the Ministry of Labor. In each ministry, a bright image was given, as if there is no problem. But by reading the official statistics and comparing them, it was found that there is a real problem. It turned out that each institution puts plans and tries to find solutions within their available means. It has been shown that all sectors, public and private institutions operate in remote islands. There is no comprehensive planning process or clear networking mechanisms to develop a unified national strategy that defines a specific vision and objectives towards development promotion in all sectors generally, and in education and higher education sector, the industry sector including ICT sector, and the working force fields particularly.

Despite the efforts made by the Palestinian National Authority since its establishment in 1994 until this day, the problems of higher education did not end, despite the increase in the number of educational institutions and the rise in the number of graduates in parallel with the high rate of unemployment. According to the Palestinian Central Bureau of Statistics' survey (Labor Force Survey for 2018) the unemployment rate in Palestine reached 30.8% in 2018 which were distributed as 18% in the West Bank and 52% in the Gaza Strip. One of the reasons was the increasing number of graduates of specialties that did not fulfill the labor market demands. On the other hand, Palestinian labor market has been suffering from the shortage of number of graduates of certain specializations, especially in the technical, technological and services sectors. The Palestinian economy also suffers from the dependency on the Israeli economy, which therefore affects the Palestinian labor market negatively and undermines its development opportunities accordingly. (Shtayyah, 2004).

The size of the gap in Information Technology Sector can be clarified through a comparison between the two tables shown next page. The first shows the Unemployment rate in Palestine, intermediate diploma or higher, by specialization, region and gender, 2017, which was included in the study by the Palestinian Central Bureau of Statistics, (Characteristics of Education among Individuals of the Palestinian Society 2007, 2017). This study showed that «The unemployment rate in the ICT field in Palestine was 25.0% (20.4% of males and 37.1% females). The unemployment rate in the ICT specialization in the West Bank in 2017 was about 13.1% (8.1% males, 24.8% females), while in Palestine the Gaza Strip, where the unemployment rate in this specialty is 43.8% (38.3% male, 61.8% female)".

The second table shows the number of graduates according to specialization and gender as reported in the (Statistical yearbook of higher education institutions 2016-2017) of the Ministry of Education and Higher Education.

	Palestine			W	'est Ban	ık	Gaza Strip			
Specialization	Both genders	Male	Female	Both genders	Male	Female	Both genders	Male	Female	
Education	25.4	15.1	32.0	11.4	3.6	16.4	40.1	27.0	48.8	
Art	27.5	19.8	42.7	17.5	10.3	30.5	49.7	38.9	76.8	
Humanities	41.4	23.7	64.8	19.4	8.0	39.1	49.2	30.2	72.2	
Languages	46.7	26.0	62.9	26.1	8.5	41.2	65.9	44.0	81.4	
Social and behavioral sciences	19.5	12.6	33.6	11.4	6.1	21.0	32.3	21.9	57.7	
Press and media	36.0	30.9	49.3	16.6	12.0	25.6	47.2	40.4	68.1	
Business and management	27.9	21.4	43.0	14.9	8.7	27.8	45.4	37.3	67.7	
Law	26.6	20.4	47.0	14.4	9.6	28.8	39.2	31.1	69.1	
Biological and related sciences	41.7	15.8	58.8	30.5	8.2	45.0	55.3	24.9	75.7	
The environment	17.5	11.6	26.0	12.8	5.1	21.4	24.7	19.4	36.7	
physics	33.1	18.8	53.7	22.8	7.9	41.5	47.6	32.3	75.0	
Mathematics and statistics	50.2	28.6	70.1	30.9	9.5	51.7	65.5	44.6	84.3	
Communications and information technology	25.0	20.4	37.1	13.1	8.1	24.8	43.8	38.3	61.8	
Engineering and engineering	20.6	18.3	37.3	11.5	9.1	28.4	38.5	36.2	56.1	
Manufacturing and processing	26.3	18.0	47.5	16.8	9.4	35.3	47.7	36.9	76.1	
Architecture and construction	22.8	20.4	33.0	12.6	10.5	20.6	39.4	35.5	60.7	
Agriculture	19.7	16.8	37.3	11.2	7.6	30.4	37.4	34.8	58.8	

Table (1): Unemployment rate in Palestine, intermediate diploma or higher, by specialization, region and gender, 2017

Program	Traditional University		University Colleges		Community Colleges		Open Education		Total	
	F	T	F	Т	F	F	F	Т	F	Т
Education	4565	5885	183	265	373	406	3822	4757	8943	11313
Arts &Humanities	2059	2998	294	455	114	179	0	0	2467	3632
Social Science& Journalism	1552	2603	83	181	50	133	810	1109	2495	4026
Business, Administration &	2964	7060	466	870	950	1622	2730	4384	7110	13936
Law										
Natural Sciences,	1025	1337	0	0	25	43	0	0	1050	1380
Mathematics& Statistics										
Information	418	976	109	190	82	210	281	467	890	1843
&Communication										
Technologies										
Engineering, Manufacturing	1076	3071	6	123	126	594	0	0	1208	3788
& Construction										
Agriculture, Forestry,	125	275	8	15	0	0	18	47	151	337
Fisheries & Veterinary										
Health & Welfare	1918	2840	349	626	378	471	0	0	2645	3937
Services	56	186	4	14	16	54	0	0	76	254
Total	15758	27231	1502	2739	2114	3712	7661	10764	27035	44446

Distribution of Graduates according to Program (ISCED classification) and Gender

Palestine is a special case, given the political situation that affects all aspects of life, especially the economic aspect. The occupation of the land and its resources and the arbitrary measures of controlling the crossings and the export and import movements, apart from the arrests, assassinations and demolition of houses, have made Palestine halt to walk towards development establishing an independent state. Israel attempts to control another resource, the human resource, by neglecting and exploiting it through the opening of the Israeli labor market, particularly in the field of agriculture and construction, with relatively high wages; have led many students to drop out of school and move to the Israeli labor market, driven by despair and inability to bear the burdens of life or lack of ability to find jobs that suit their qualifications or skills. The Palestinian labor markets suffer from the practices of the occupation authorities on the one hand and internal problems, the most important of which is the lack of qualified workers.

Some sectors affect Palestinian labor market, such as industry and agriculture, as they are the two major productive sectors, in addition to the technology sector and tourism, as two service sectors. Many other stakeholders relate the gap problem to the insufficient role of business incubators, investors, factory owners, agricultural landowners, etc.

The Information and Telecommunications Technology (ICT) sector plays an important role in accelerating growth and development in many countries, and increased access to its products and services has become one of the most important indicators of economic progress. The sector is particularly important to development of human capital in countries that seek to build a knowledge- and information-based economy. There is a general agreement among Palestinian development experts that the future of the Palestinian economy will depend to a large extent on success in building human capital and applying it to the production of goods and services with high value-added.

This provides the background for the study; to investigate the development of the Information Technology sector, in order to provide policy recommendations that foster its growth and its ability to meet the skills required for the Palestinian labor market.

#### **3.1 Study questions**

This study is divided into two phases:

Phase 1: Finding out whether there is a gap between the outputs of Higher education institutions in Information Technology and labor market needs of the same sector, this stage aims to address higher education institutions and the industry (ICT companies)

**Main Question for phase 1:** Is there a gap between the outputs of information technology higher education outputs and the labor market needs of the same field?

#### Sub questions:

What are the main causes of this gap if it exists?

Is there any kind of participation from the industry (ICT companies) to add practical training within the universities curriculum in this specialization?

- Is there cooperation between ICT companies and local universities to review, evaluate and participate in the given ICT courses at the universities in terms of relevance and modernity?
- Does the quality of education provided by the universities cope with the rapid and accelerated progress of science and labor market field?

Phase 2: This phase aims to present the results and findings of previous stage by interviewing policy makers in relevant government institutions.

**Main Question for phase2:** Is there a comprehensive integral strategy to address the variance between the outputs of higher education and the needs of the labor market by policymakers in the Information Technology sector in the Occupied Palestinian Territories / West Bank?

#### Sub-questions:

- If there is a strategy, why it is not working well? If there is no strategy, why not?
- To what extent there is cooperation between the relevant government institutions to bridge the gap between the outputs of higher education and the needs of the labor market for the ICT sector?
- How Information Technology sector is represented in the Higher Education Council and what is the coordinating role of the council between higher education institutions and labor market institution?
- What are the criteria for accrediting programs for the ICT specialization, and are they accredited based on market needs?
- What is role of Ministry of labor in bridging the gap between higher education outputs and labor market needs for the ICT sector in particular?
- What national and international perspectives that address the variance between higher education outputs and labor market needs for ICT sector.

#### 4.1 Study objectives

The study seeks to contribute to the assessment and identification of a number of strategies and policies set by policymakers, which are related to supplying the Palestinian ICT sector with the labor force that possesses the required qualifications and competencies, which allow them to enter the job market easily and enable them to deal with production variables in order to enhance business companies to produce highly competitive goods.

This study also aims at examining the quality of the provided ICT higher education, and whether it copes with the rapid progress of science and labor market. This study also aims to verify the extent of cooperation between all parties from the public and private sectors and all the stakeholders to support the information technology sector, and to involve them in planning for this globally vital sector.

The research also aims to contribute to the socio-economic development of the Palestinian society by presenting policies and alternatives and presenting them to decision makers for adoption, so as to address the most important problems surrounding the development of technological education, which contributes, first, to reduce the unemployment rates of young graduates, and secondly to increase the share and contribution of Palestine in the market Information technology and global technology, raising the national product, which will have a positive impact on the quality of life of the Palestinian citizen.

#### 5.1 Study importance and value

Many studies and reports were conducted regarding the labor market and higher education needs problem. A study conducted by the Palestinian Center for Policy Research and Strategic Studies (MASARAT) entitled "The Crisis of Higher Education in the West Bank and the Gaza Strip, showed that weakness of the higher education system due to the lack of clarity and the absence of a unified national strategy that determines the quality of education and its purpose in accordance with the policies and strategies of the Palestinian economy that should be integrated with labor market demands. The absence of these policies has led to an increase in the number of universities in different regions of Palestine, with repeated specialization among them, and the absence of academic competition between them. Therefore, having a job in the public sector, became the safest opportunity for many graduate's despite of low income and low productivity, which made the Palestinian Authority spend a great part of its budget in favor of the employees of public sector, that consumed a large part of the state budget at the expense of development projects to promote the National economy and the revitalization of the labor market (Bader & et al., 2016).

Haskel & Martin study (2001) said that the lack of skills is associated with a lack of education, which failed to deal with technological change based on skill. One concept closely related to the lack of skills is the skills gap. This refers to a case where the level of workers' skills, especially in terms of knowledge and capabilities, is lower than the levels required by employers.

In their study, (Larouche, Boccanfuso & Trandafir, 2015) aimed to show to what extent improvements in university education affect access to the labor market, they found that the rate of highly skilled young workers increased by 9% over that of older workers. They also found that policies in developing countries at most focus on education because of high illiteracy rates because education is an essential pillar of economic and social development.

In their research to study the "variance between university education -including higher education- and labor market in Catalonia", (Corominas, Saurina and Villar, 2010) found that the claim for high technical qualifications surpasses the skills that encourage employers, and that there is a gap in the differences between the level of education and the demands of the labor market based on obtained efficiencies. The researchers recommended the need to develop a system or mechanism to urge universities to adapt to changes in terms of competency and the need for the labor market in particular. Emphasis should be placed on studies produced by competent specialists, which may be difficult to study within the University.

(Bubtanah, 2001) study that presented a model of cooperative education, which provides periods of work and study in the facilities of the industrial and commercial sectors, work is provided to students in production sites and institutions such as facilities at the University of North Eastern Britain. He also gave another example of research and development companies such as University of Strathclyde and Cambridge, England, and Stanford Research University, where students employ applied research and technology transfer to develop production.

Weaver & Osterman (2017), in their study entitled: "skill demands and mismatch in U.S. manufacturing", said that one of the most recurrent claims is that employees lack the skills that workers demand. The researchers manage this problem by presenting and analyzing the survey results which conducted by US manufacturing firms, to measure the employer's tangible skill requirements and employ expertise directly in a representative survey at the industrial level. The results indicate that the demand for higher skills is generally modest, and that (3) quarters of manufacturing enterprises do not show signs of employment difficulties. Data showed that institutions that are members of groups or require highly specialized skills have the highest probability of long-term vacancies. The researchers explain these findings as an indication that it is important to think about factors that complicate supply-demand interaction such as failure of aggregation and communication/ coordination rather than simply focusing on inadequate labor supply.

From the above-mentioned studies, it is obvious that the relationship between Higher Education Outputs, and Labor Market demands is a global issue, although the size and shape of this issue varies from region to another depending on social, economic, political and other conditions, the root of the problem is one.

The importance of the study lies in the attempt to uncover the roots of the problem of ICT higher education and the labor market. Many previous studies were conducted on this subject, but most of them dealt with the problem on practical and procedural basis, not on the policy and planning level. This study will examine the policy planning process for the ICT sector that is intertwined with education, and labor market to achieve integration and inclusiveness with the decision-makers and policy makers themselves.

The researcher will also present deep subjective options and recommendations, after discussing the issue with policy makers and decision makers.

The importance of the study lies in the following points:

- Assessing the national strategy regarding ICT sector.
- Verifying the existence of a comprehensive national strategy for the information technology sector and its effectiveness.
- Verifying the existence of a complete coordination and cooperation between all stakeholders to find concrete unified and integrated efforts to support this sector in both educational and practical terms.
- Demonstrating the mechanisms for directing ICT education on a developmental basis in a way that qualifies graduates for the labor market.
- Clarifying the importance of matching the outcomes of ICT education with the needs of the labor market.
- Clarifying the causes of the gap and suggesting solutions to overcome this issue.

## **Chapter II:**

## **Theoretical Background & Empirical Studies**

#### **2.1 Theoretical Background**

#### 2.1.1 Labor market in Palestine

The Palestinian labor market shows a significant weakness in the absorption of the labor force, which caused a large surplus, and as a result of the prevailing conditions, closures and siege in the West Bank and Gaza Strip, this surplus was unable to work in the occupied Palestinian territories in 1948 or abroad, which increased the burden of the Palestinian labor market. (Sabra & Eid, 2018)

The indicators of the most important features of the Palestinian labor market include labor force participation rates, unemployment and the distribution of workers among different economic sectors. (Falah, 2016)

#### 2.1.1.1 Participation in the labor force

According to the results of the 2014 Labor Force Survey, the number of labor force participants was Million and two hundred and fifty-five thousand individuals, representing 45.8% of the total ages 15 years and over. The results of the survey indicated that there is a slight variation in the labor force participation rate between the West Bank and the Gaza Strip, which reached 46.6 % in the West Bank. Compared to 44.4% in Gaza Strip. (Falah, 2016).

This ratio is similar to that of the Mediterranean countries North Africa, for example, 49% in Egypt, 42% in Jordan, 48% in Lebanon, 49% In Turkey. In comparison with the developed countries, there is a large gap, where the labor force participation rate in the OECD countries reached 71.2%. (Falah, 2016)

Moreover, according to the results of the Labor Force Survey of 2016, the number of labor force participants reached about (1341, 000) persons, of whom (844,600) in the

West Bank with a percentage of (45.6%), and (496,400) in the Gaza Strip with a percentage of (46.1%). Furthermore, about (35.6%) of wage employees in the private sector are paid less than the minimum wage (1450 NIS) in Palestine, (17.4%) in the West Bank and (69.2%) in Gaza Strip. (PCBS, 2016)

The following table contains statistics about **participation in the labor force** between 2015 and 2019:

Labor force participation rate of individuals aged 15 years and above by region					
Year	West Bank	Gaza			
2015	46.0	44.8			
2016	45.4	45.1			
2017	45.8	45.2			
2018	46.1	45.4			
2019	46.4	44.3			

Table (2): Participation in the labor force between 2015 and 2019

**Source:** PCBS, 2019-2020

#### 2.1.1.2 Distribution of employees by employment status and across economic sectors

According to the 2014 Labor Force Survey data, wage employees constitute the largest proportion of the total number of workers at 64.6% in the West Bank and 75.5% in the Gaza Strip. Employers make up 7.3% in the West Bank compared to 4% in the Gaza Strip, while the rest occupy the self-employed segment.

Regarding the distribution of workers by economic activity, the data indicate that the services sector dominates the structure of the Palestinian economy. Traditional services such as government services and internal trade are the main component of this sector (Falah 2013).

As for the other economic sectors, the industrial sector employs about 15.8% of the total workers in the West Bank, compared to 5.3% in the Gaza Strip. The disparity in employment between the two regions in the construction sector stands at 7% in the Gaza

Strip, compared to 11.5% in the West Bank. On the other hand, the agricultural sector employs 10.5% of the workers, with a slight disparity between the West Bank and Gaza Strip. Agriculture is one of the largest female employers; it is second only to the services sector. (Falah, 2016)

 Table (3): Percentage distribution of employed individuals aged 15 years and above by gender and economic activity, 2015-2019

Gender	Economic activity	2015	2016	2017	2018	2019
	Agriculture, Hunting & Fishing	7.8	7.1	6.5	6.2	5.9
	Mining, Quarrying & Manufacturing	13.3	13.7	13.5	13.8	13.3
S	Construction	18.3	19.3	20.0	20.9	20.6
[a]	Commerce, Hotels & Restaurants	22.6	22.6	23.3	23.6	24.7
Μ	Transportation, Storage & Communication	6.8	7.1	7.3	6.9	6.6
	Services & Other Branches	31.2	30.2	29.4	28.6	28.9
	Agriculture, Hunting & Fishing	13.1	9.0	7.7	6.8	6.7
	Mining, Quarrying & Manufacturing	10.8	10.9	10.7	9.0	6.9
les	Construction	0.5	0.6	0.9	0.3	0.5
ma	Commerce, Hotels & Restaurants	11.1	11.9	11.9	11.0	11.1
Fe	Transportation, Storage & Communication	1.1	1.9	2.4	2.2	1.7
	Services & Other Branches	63.4	65.7	66.4	70.7	73.1

#### **Source:** (PCBS, 2019)

It is clear from the table above that there are clear structural imbalances in the structure and composition of the Palestinian labor market, with weakness in its general indicators, and this is reflected in the imbalance between males and females, and indicators of the different economic sectors, in addition to the obvious duality between the labor market indicators in each of the West Bank and the Gaza Strip.

#### 2.1.1.3 Unemployment

Unemployment means non-employment; a major economic problem faced by societies, especially Arab societies, and is one of the most dangerous forms of instability and cohesion of Arab society. The causes of unemployment vary from community to society and even within a community vary from region to region, where there are economic,

social and political reasons, but all affect society and exacerbate the problem of unemployment. (Saidi, 2019)

Unemployment is defined as forced - or sometimes optional - disruption of a part of the labor force in a society, despite the capacity of the workforce, and its willingness to work and produce. (Al- Astal, 2014)

The international labor organization (ILO) defines the unemployed as "an individual who is over a certain age without a job and is able, willing and looking for work at a prevailing wage level but not finding it." (Saidi, 2019)

#### **2.1.1.4 Types of unemployment:**

There are many types of unemployment, including:

- 1. Frictional unemployment: It means the presence of individuals in a state of unemployment as a result of the time spent in the search for work without finding the right job for them, also called transitional unemployment, because it occurs because of the continuous movement of workers between regions, and different occupations resulting from changes in the national economy (Al- Astal, 2014).
- 2. Structural Unemployment: It is defined as the kind of unemployment that refers to the disruption that affects part of the labor force due to structural changes in the national economy, and lead to a state of incompatibility between job opportunities and job seekers. These changes may be due to the introduction of new technological systems, the production of new goods, or a change in the structure of demand for products (Ehrenberg & Smith, 2012).
- **3. Periodic unemployment:** It occurs as a result of fluctuations in the economic cycles that occur, in particular, in the advanced capitalist economies from time to time when the economy moves from a state of recovery and prosperity to a state of deflation and stagnation, and thus a total inability of the economy to provide employment for anyone who is looking for it, because the demand for labor is derived from the demand for goods and services.
- **4. Seasonal unemployment:** Also known as temporary unemployment, which occurs because of the seasonality of some economic activities and sectors where

the demand for labor is increasing in the season, and less demand for labor outside the season, such as tourism and agricultural sector, which leads to unemployment in the periods of time that occur Off season (Al- Astal, 2014).

- **5. Optional unemployment:** It means that there are a number of individuals who are able to work, but who are not willing to work. This may be due to the presence of strong labor unions that determine the real wage of the worker at a higher level than the equilibrium wage.
- 6. Compulsory unemployment: It arises when a worker is forced to leave his or her job for one reason or another, for example, if a project declares bankruptcy, or a factory closes its doors and dismisses its workers or some of them involuntarily, even though the worker is willing and able to work and is satisfied with the prevailing wage level (Skenderi & Uka, 2015).

Unemployment in Palestine is a unique situation resulting from the accumulation of complex components of both Israeli and Palestinian policies through the economic occupation policies that worked to inflict the Palestinian economy on the Israeli economy, destroy the structures of this economy, and limit the possibilities of its development and progress, and policies against the Palestinian working class in Palestine. The lack of Palestinian social protection laws, the absence of adequate development planning, and the lack of policies to address the current and emergency circumstances, did not contribute to the formulation of strategic planning based on a future vision that addresses the problems of Palestinian society. (Abdul Haq, 2015)

Unemployment rates in Palestine directly reflect the continued inability of the labor market to absorb the surplus labor, a situation that threatens to continue to worsen and perpetuate the phenomenon of unemployment as a feature of the Palestinian labor market and reflects the failure of the prevailing employment policies. (Abdul Haq, 2015)

The data of the 2014 Labor Force Survey indicate that there are high levels of unemployment, with a total rate of about 27% of the total workforce. The unemployment rate varies sharply between the West Bank (17. 7%) and the Gaza Strip (44%). This disparity is due to the negative impact of the recent war waged by the Israeli occupation on the Gaza Strip, in which many economic establishments were destroyed.

This is in addition to the negative and complex impact of the economic siege imposed by the Israeli occupation authorities after the Hamas takeover of the Gaza Strip in 2007 and the closure of the Gaza Strip, and the closure of the Egyptian side, almost completely, of land crossings with the Gaza Strip after the overthrow of the Muslim Brotherhood in Egypt in 2013. (Falah, 2016)

The number of unemployed in 2016 reached about (360,500) in Palestine, with a percentage of (26.9%), of whom (41.7%) in Gaza Strip and (18.2%) in the West Bank. (PCBS, 2016)

#### 2.1.1.5 Obstacles and challenges of vocational and technical education in Palestine:

The economy in Palestinian is small, weakened and basically split because of the long Israeli occupation. Furthermore, the economy grows unstably and slowly, and experiences structural deformations, and high rates of unemployment, and poverty. Moreover, Palestinian employees and employers as well suffer from skills disparities. An example of this phenomenon is the high rate of unemployment amongst graduates of universities, in comparison with technical and vocational education (TVE) and lower levels of education graduates. A very low rate of joining in TVE programs is a sign of skills disparities. (Abdullah, 2015)

Technical and Vocational Education (TVE) in Palestine suffers from many serious shortcomings and faces a number of challenges that make it unable to respond to the optimal response expected from it. (Abdullah, 2015)

The most important of these challenges are:

• Environmental and social constraints represented in the inferior view of the vocational and technical education and its graduates, and its association with handicrafts in people's minds, where people confuse technical education with handicrafts. In addition to not absorbing the local labor market for many college graduates. In addition to the low salaries and bonuses system and incentives applied in the benefits of workers and graduates of these technical colleges. (Al-Ayoubi, 2008)

- There is a common picture in Palestinian society that students entering the vocational field are unable to go to scientific or literary flows or attend university education. Thus, these students are considered "lesser" than those who finish university. This picture that TVET students are not qualified disheartens capable students to join TVET centers. Another disincentive aspect is that proficient employees with no kind of TVET re distinguished from TVET graduates when they engage in the labor market at an early time, because they obtain market experience and knowledge, and are therefore favored by employers and customers. (Abdullah, 2015)
- Lack of a clear and integrated strategy for vocational and technical education that takes into account the social, economic and psychological conditions of society, and links the needs of society with the outputs of technical education. In addition to the lack of follow-up to modern technological developments in developed societies and benefit from them. (Al- Ayoubi, 2008)
- The pace of change in occupations and jobs. While economic and social growth create many occupations and jobs at new professional levels, and what is caused by scientific and technical progress to change the specifications of the performance of occupations and jobs, the institutions of vocational and technical education are unable to follow the changes in society, science and technology, and unable to absorb new disciplines, professions and the renewal of the content of education it requires, to change the specifications of its students so as to acquire new skills and methods to perform occupations and jobs. (Al- Ayoubi, 2008)
- The absence of an integrated media program to educate the community and direct it towards the importance of technical education in the overall economic and social development, in addition to the dominance of theoretical and applied university education on the minds of secondary school graduates and their parents. (Al-Ayoubi, 2008)
- There are many bodies supervising vocational and technical education institutions including the Ministry of Education and Higher Education, the Ministry of Health, the Ministry of Labor, the private sector, secondary schools of vocational education and technical colleges, vocational training institutions and international organizations (UNRWA), and non-governmental organizations (NGOs), without

real coordination or cooperation among them. All this has created overlays and shortage in the technical and vocational education and training system. Moreover, Palestinian TVET absences strong participation of private sector in curriculum formulation and in the provision of apprenticeships training and learning. (Abdullah, 2015)

• Obstacles received by funding and material needs of technical colleges such as the construction of buildings, the provision of equipment and laboratories and others. Where the material needs of technical education far exceeds the needs of theoretical education because it relies on modern equipment and laboratories in return for little material return for this education. (Al- Ayoubi, 2008)

Consequently, student registration in TVET remains very little. For example, less than 2.0% of secondary education students (only in the agricultural and industrial fields) joined in programs of TVET in the 2013/2014 academic year. (Abdullah, 2015)

In spite of all these difficulties, the TVET system continues to play a key role in resolving the problem of unemployment in Palestine. Nevertheless, TVET centers should be more reactive to the needs and requirements of the labor market, and thus more able to efficiently establish vocational schools as an actual choice after graduation from high school. (Abdullah, 2015)

#### 2.1.1.6 The vocational and technical universities and colleges in Palestine:

The emergence of vocational and technical colleges has been linked to the increasing number of high school graduates, which, for one reason or another, has not been able to be absorbed by universities, as well as the important changes and developments witnessed by the Palestinian society in information systems, transportation networks, communications, media, transport, industry and other fields, which reinforced the need for human frameworks capable of facing the requirements of economic and social change, and in turn , placed the technical colleges with important responsibilities and duties in achieving the requirements of economic and social development plans, and local and national labor market needs. In addition to the role of these colleges in providing young people with the types of skills, training and expertise in various fields in order to enable them to work and achieve their ambitions and the needs of their community, at a time of increasing local demand for crafts of a professional and technical nature. (Hamdan, 2013)

These factors posed a strong challenge for institutions of higher education to absorb these variables through the development of patterns, methods and systems of education, and work to establish new educational institutions to prepare and qualify vocational and technical cadres of medium level, to bridge the gap between the skilled worker and university specialist in the pyramid of the workforce, and contribute in community development. (Hamdan, 2013)

#### 2.1.1.7 Programs offered by the technical colleges in Palestine:

The data of the registration and admission departments of the Technical Colleges indicate that they include 9 main areas and programs covering 34 professional and technical specializations. Some of these specializations are computer and electromechanical technology, telecommunications, industrial electronics, architectural drawing, architecture, maintenance of office machines, radio and television technology, computer drawing and design, programming, systems and programming analysis, databases, office automation, accounting and television and radio arts. (Hamdan, 2013)

#### 2.1.1.8 The developments and events that require focus on skills:

In light of the explosion of knowledge and rapid scientific and technological advancement and the opening of intellectually, socially and cognitively and the emergence of new needs for large human sectors, the most important concern for knowledge, and a strong desire to understand the universe and uncover the unknown in it, the university has become required to spread education and technology on a larger scale. In response to a set of challenges faced by the development of educational technologies and increasing demand, which means that educational processes have responded in one way or another to the development of educational processes to suit the emergence of economic blocs, the phenomenon of globalization and the growth of new industries have led to investment in the fields of knowledge and scientific research, in addition to economic competition in international markets. Thus, higher education is required more than ever to work on improving the educational processes of human

investment to the maximum extent possible, through the development of skills and the development of new disciplines that suit the requirements of the era, with ensuring the graduation of human resources with the necessary skills to deal with all the developments and variables that Witnessed by the present era. (Al-Dalou, 2016)

#### 2.1.1.9 Education commodification:

A commodity is anything that can be bought, sold and exchanged on a market from food to counseling services-. (Currie-Knight, 2019)

Education commodification is the transformation of education into consumer goods that are sold and bought and subjected to the law of supply and demand. The price sometimes goes down and sometimes goes up. Some people are able to access them, others are unable to reach them, and in some cases these goods are cheated like any other commodity, and their ultimate goal is to make a profit. Education commodification often provide a favorable environment for the emergence of personal ambitions, individual gains, the tyranny of self-interest over the collective interests, and the pursuit of rapid wealth, regardless of the lawfulness and legitimacy of the means. (Soraty, 2003)

The phenomenon of education commodification is spread through various aspects such as the spread of private lessons, the establishment of private schools and universities, and the spread of some forms of commodity in the curriculum, examinations and educational research. Educational commodification is due to economic, cultural, political, social, and philosophical reasons, in addition to the impact of globalization. Educational commodification has the most important repercussions of distorting the values of students, weakening the principle of equal educational opportunities, alienation of students, and weakening the educational process. (Soraty, 2003)

#### **2.1.1.10** The industrial sector in Palestine:

Industrialization is the backbone of modern economic development. It is the productive activity capable of achieving a qualitative shift in the course of economic and social renaissance due to the nature of the controversial interaction between industrial productive activity and civilized economic, social and political development in society, where there is no difference on the importance and priority of reliance on industrialization in the process of comprehensive civilization development, but the difference lies in the quality of the industries to be started, and thus the industrial sector is one of the most important productive sectors of any country where it plays a major role with the rest of the production sectors in increasing GDP and absorbing labor on the one hand, and the provision of domestic product instead of relying on imported goods on the other, because of the economic and social importance of the state. (Nasrallah & Awwad, 2004)

The Palestinian industrial sector is considered one of the important economic sectors in Palestine. It is the main sector through which economic development can be promoted, encouraging local industries, compensating for imported industrial goods, and producing export goods with competitive advantage. (Ahmad, 2017)

#### 2.1.1.11 Types of Palestinian Industries: (Abu Karsh, 2006)

- 1. Crafts and handicrafts: The traditional industries in Palestine occupy a special importance among the various productive sectors, given the heritage and economic dimensions represented by this industry. The main types of traditional industries in Palestine include:
  - Plastic porcelain.
  - Rugs and manual carpets.
  - Crustaceans
  - Manual glass.
  - Olive wood products.
  - Wax.
  - Pottery.
  - Seashell products.
  - Mosaics.
  - Palestinian Embroidery.
  - Bamboo.

- Traditional jewelries.
- **2. Transformative Industries:** The main types of manufacturing industries in Palestine are:
  - Clothing and fabric.
  - Leather and tanning.
  - Chemical industries.
  - Pharmaceutical industries.
  - Food industry.
  - Wood and furniture.
  - Cement industry.
  - Plastic and rubber
- **3. Strategic industries: (quarries, crushers and saws):** The stone industry is the main strategic industry in Palestine. Together with the saw-making industry, it is one of the Palestinian industries that play an important role in meeting the domestic demand of the construction sector on the one hand and in the traditional Palestinian exports on the other.

# 2.1.1.12 Development of the number of industrial establishments and the contribution of the industrial sector in employment

An important indicator of any economic activity is the number of establishments operating in it, and its contribution in the employment of workers. Industrial activity is characterized by the absorption of labor, which works mostly throughout the year, it is paid and it also works to train and raise the efficiency and experience of workers compared to agricultural or service activity. The development strategy often relies on industrialization as the main solution to absorb the labor force, thus providing permanent new job opportunities for the unemployed, especially in developing countries, but the industrial sector in Palestine is still contributing less to the employment and absorption of labor than neighboring countries. (Abu Safia, 2017)

Year	Number of	Number of	Percentage of employees in th				
	establishments	employees	industrial sector (%)				
2000	14.509	76.918	14.2				
2001	14.506	69.569	13.8				
2002	14.179	65.526	12.7				
2003	13.693	60.185	12.5				
2004	12.690	58.979	12.6				
2005	12.211	58.242	12.9				
2006	11.351	49.990	12.3				
2007	14.508	61.690	12.5				
2008	14.539	59.641	12.3				
2009	15.322	67.052	12.1				
2010	15.617	65.538	11.4				
2011	17.090	72.022	11.8				
2012	16.263	78.724	11.9				
2013	16. 201	79.566	12.2				
2014	17.057	86.253	12.6				

 Table (4): Number of industrial establishments and employees in industry sector in

 Palestine in the period between 2000- 2014:

Source: (Abu Safia, 2017)

#### 2.1.1.13 Constraints of the Palestinian industrial sector:

The Palestinian industrial sector faced and continues to face many difficulties and constraints related to the structure and size of the industry and the inability to create markets for its products, in addition to the problems of lack of necessary financing and equipment, industrial supplies and lack of raw materials for industry, in addition to high prices, and continuous and deliberate delays in delivery. The industrial sector also faces a decrease in efficiency and productivity on the one hand, and the high cost of production on the other, in addition to the apparent lack of vocational and technical expertise and the absence of organization and planning for the industrial sector. (Abu Safia, 2017)

The problems and constraints of the industrial sector can be classified into internal and external constraints.

#### • Internal constraints:

These obstacles are caused by problems in the Palestinian industrial sector itself and are not included in the Israeli occupation, which is often represented by the obstacles faced by developing countries in general. (Abu Safia, 2017)

They can be identified as follows:

- 1. Obstacles related to industrial inputs and supplies including: (Abu Safia, 2017)
- Obstacles related to access to raw materials: The problems of obtaining raw materials for Palestinian small industries are one of the most important problems that they have faced and still are. The majority of these institutions obtains the necessary raw materials from the Israeli entity at high prices, and the high cost of the product to these institutions and weakens its competitiveness resulting from it.
- Obstacles related to equipment and machinery: The industrial sector is facing a decline in the efficiency of production on the one hand, and the high cost of production on the other because most of the machinery and equipment used in factories are old or primitive in the field of technology, which causes disruption of these equipment, this increases the cost of maintenance. In addition to the obstacles faced by industrial establishments in importing modern machinery and equipment due to Israeli restrictions such as imposing customs duties on them and difficulties in clearance and security inspection.
- Small size of establishments operating in the industrial sector: There are 90% of establishments operating in the Palestinian industry employing less than five workers, and this small size affects the competitive position of the establishment.
- Inadequate plant sites and buildings: One of the main problems facing the Palestinian industry is the lack of sufficient industrial zones or cities to include all Palestinian industries. It was found that the production sites of the industrial facilities are located outside the industrial zones, and they are distributed and dispersed in commercial and residential areas.

#### 2. Constraints related to lack of funding:

The industry mainly faced many problems due to the absence of a banking system capable of financing the establishment of new industries or the development of existing industries during the years of occupation. As a result, Palestinian industrial establishments rely on self-financing which constitutes more than 33% of the existing industrial establishments. This has caused little investment in the industrial sector and the small size of the industrial facilities that have been established. (Abu Safia, 2017)

# **3.** Significant lack of vocational and technical expertise and lack of organization and planning for the industrial sector:

Technical expertise and technical progress are necessary to keep pace with the progress in production through the import and transfer of technology, which increases production capacity. There is a clear lack of technical expertise due to the lack of technical and vocational education institutions, in addition to the lack of coordination and regulation between industrial institutions. In addition to the absence of industrial planning that is essential for the real start of the industrial sector, and the neglect of the movement of invention and innovation, and the lack of systematic method to encourage inventions reflected negatively on the industry where invention in the industrial activity is an important element in the discovery of new ways to help in developing production and reducing its cost. (Abu Watfa, 2014)

Despite the importance of training in creating industrial development, there is no specific training strategy because of the lack of a budget for the Industrial Training Department of the Ministry of Industry, in addition to the small number of employees in it. It is clear that technical expertise and technical progress are necessary to keep up with the progress in production. However, there is a lack of technical and technical education institutions and specialized technical institutions and institutes that can be relied upon to produce the trained manpower needed to keep pace with the technical and technical progress necessary to develop the industrial sector. This is in addition to the absence of coordination and regulation between the industrial institutions and the absence of industrial planning necessary for a real and correct start for the industrial sector. Data of
the survey of small and medium enterprises to 6.69% of enterprises employing between 5-9 workers and 8.80% of enterprises employing 20-50 workers, indicate that the issue of low skill and experience of workers is a very important problem, that the low technical and vocational level of workers in the industrial sector in general reflects negatively on the quality of production and productivity. (Ahmad, 2017)

According to (Falah, 2019) there are three skills required for the Palestinian labor market in the industrial field, as follows basic skills through having sufficient levels of basic skills (literacy, numeracy, science and technology) is essential for young people to smoothly access the labor market and for adults to retain employment in high quality and stable jobs. Transversal skills such as (Critical and Innovative Thinking, Critical Thinking, Innovative Thinking, Creativity, Entrepreneurship etc.).

In addition to, skills mismatch which refers to a discrepancy between the demand and supply of skills on the labor market, in other words a situation in which the skills sought by employers are different from the skills offered by job-seekers or workers. If persistent, skills mismatch can lead to short- and long-term economic and social losses for individuals, employers and the society (Al-Dalou, 2016).

### • External obstacles resulting from the Israeli occupation policy:

The Israeli occupation adopted a series of destructive measures and policies aimed at destroying Palestinian industry. These obstacles caused by the occupation to the industrial sector can be summarized as follows: (Abu Watfa, 2014)

- 1. Imposition of exorbitant taxes on Palestinian products (such as production, income, value added), as well as tariffs on raw materials, resulting in higher production costs and lower profits.
- 2. Dumping local markets with Israeli products without restrictions to protect national industry.
- 3. Creating difficulties for the industry to import raw materials directly, forcing them to import them through Israeli agents.
- 4. The closure policy for security arguments in various forms such as restrictions on the movement of goods and services that limit the freedom of

economic transactions and increase their financial and administrative costs due to the high costs of transportation and production.

5. Obstacles placed by the occupation during the process of marketing Palestinian products abroad, often resulting in the loss of foreign markets.

## 2.1.2 Information Technology (ICT):

Information Technology (ICT) is a generic term that covers the acquisition, processing, storage and dissemination of information. It involves the application of computers and communication technology in the task of information handling, information and information flow from the generation to the utilization levels. It is restricted to systems dependent on microelectronics-based combination of computers and telecommunication technologies (Sun & et al., 2015).

Information Communication Technology (ICT) is similar to Information Technology (ICT) but focuses primarily on communication technologies. This includes the internet, wireless networks, cell phones and other communication mediums. ICTs are making dynamic changes in society. They are influencing all aspects of life. The influences are felt more and more at schools. Because ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individual needs, society is, forcing schools aptly respond to this technical innovation (Kundishora & Fzie, 2012).

## 2.1.2.1 Information communication technology (ICT) definition and relationship with industry:

According to (Ajayi, 2009), ICT can be defined as a technological means of collecting (inputting/ gathering), collating (processing/ analyzing), and conveying (outputting/ transferring) information via technology. (See figure 1)



Figure (1): ICT Description

According to UNESCO "ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters" (Ratheeswari, 2018).

Based on an international standard classification of activities (ISIC Rev. 3), the Organization for Economic Cooperation and Development (OECD), member countries agreed upon defining the Information and Communication Technology (ICT) sector in 1998, as "a combination of manufacturing and services industries that capture, transmit and display data and information electronically.

As a manufacturing product, ICT meets the condition throughout its function by information processing and communication, as well as passing it on and displaying it. Second, computer and devices (all hardware) manufacturing. Third, the use of electronic processing to measure, detect and/or record a physical phenomenon or to control physical process.

As a part services industry (ICT) fulfills the condition with its function of communication and information processing by electronic means.

### 2.1.2.2 Historical development of information technology:

Information Technology as a technical support for human thinking and communication has been evolving over thousands of years. New developments have been rapid over the last few decades. It is only recently that the term has been used as a collection term for the whole spectrum of technologies providing the ways and means to acquire, store, transmit, retrieve and process information (Mishra & et al., 2015).

According to Manfred Kochen, any technology develops in three stages in the first stage, technology enables people to do things, that they have been doing, but to do them better, cheaper and faster. In the second stage, technology provides new capabilities and enables people to do things that they had not been able to do previously. And in the third stage, technology becomes an integral part of people activities; it affects the way they do things and changes their lifestyle. Development in computer and communication technology has brought a new dimension to the program of information handling. The introduction of the microprocessor and microcomputers has made things easier. All these developments facilitate better and quicker services to the user (Ajayi, 2009).

### 2.1.2.3 Objectives of information technology:

The objectives of ICT are to provide better means of information of data messages in the form of written or printed records, electric, audio or video signals by using wires, cables and telecommunication techniques, ICT plays a vital role in information handling due to developments such as reduction in computing time, capabilities of files on video discs, use of T.V as readymade information screen, telecommunication and satellite communication facilities etc. The objectives of ICT can be categorized into the following four groups (Hawajreh & Sharabati, 2012).

- 1. Supporting technical functions associated with acquisitions, technical processing, and serial control.
- 2. Supporting information storage, retrieval and dissemination systems.
- Supporting management information services for libraries, especially analyzing library statistics.
- 4. It can best be used in service and orientation courses for practicing librarians, continuing education programs for faculty teachers of library and information science, correspondence studies and library extension services.

### 2.1.2.4 Components of information technology:

Information technology has the following components (Ibrahim & Huimin, 2017):

- 1. **Computer hardware:** This physical technology works with information. Hardware can be as small as a smart phone that fits in a pocket or as large as a supercomputer that fills a building. Hardware also includes the peripheral devices that work with computers, such as keyboards, external disk drives, and routers. With the rise of the Internet of things, in which anything from home appliances to cars to clothes will be able to receive and transmit data, sensors that interact with computers are permeating the human environment.
- 2. Computer software: The hardware needs to know what to do, and that is the role of software. Software can be divided into two types: system software and application software. The primary piece of system software is the operating system, such as Windows or iOS, which manages the hardware's operation. Application software is designed for specific tasks, such as handling a spreadsheet, creating a document, or designing a Web page.
- 3. **Telecommunications**: This component connects the hardware together to form a network. Connections can be through wires, such as Ethernet cables or fiber optics, or wireless, such as through Wi-Fi. A network can be designed to tie together computers in a specific area, such as an office or a school, through a local area network (LAN). If computers are more dispersed, the network is called a wide area network (WAN). The Internet itself can be considered a network of networks (Hawajreh & Sharabati, 2012).
- 4. **Databases and data warehouses**: This component is where the "material" that the other components work with resides. A database is a place where data is collected and from which it can be retrieved by querying it using one or more specific criteria. A data warehouse contains all of the data in whatever form that an organization needs. Databases and data warehouses have assumed even greater importance in information systems with the emergence of "big data," a term for the truly massive amounts of data that can be collected and analyzed (Ibrahim & Huimin, 2017).

5. **Human resources and procedures**: The final, and possibly most important, component of information systems is the human element: the people that are needed to run the system and the procedures they follow so that the knowledge in the huge databases and data warehouses can be turned into learning that can interpret what has happened in the past and guide future action.

### 2.1.2.5 Fields of information technology use:

Information Technology has applications in almost all aspects of life. Some of the important ones are (Patil, 2009):

- Science and Engineering: Scientific progress in fields like biotechnology is almost entirely dependent on the use of computers and other microprocessor-controlled devices. Using supercomputers, meteorologists predict future weather by using a combination of observations of weather conditions from many sources, a mathematical representation of the behavior of the atmosphere, and geographic data. Computer-aided design (CAD) and computer-aided manufacturing (CAM) programs have led to improved products in many fields, especially where designs tend to be very detailed. Computer programs make it possible for engineers to analyze designs of complex structures such as power plants and space stations.
- **Business & Commerce**: One of the first and largest applications of computers is keeping and managing business and financial records. Most large companies keep the employment records of all their workers in large databases that are managed by computer programs. Similar programs and databases are used in business functions like billing customers; tracking payments received and payments to be made; and tracking supplies needed, and items produced, stored, shipped, and sold. In fact, practically all the information companies need to do business involves the use of computers and Information Technology. Almost all the financial transactions in the world are done electronically. Newer technologies like m-commerce have enabled almost everybody to carry out routine financial transactions on the move (Patil, 2009).

With today's sophisticated hardware, software, and communications technologies, it is often difficult to classify a system as belonging uniquely to one specific application program. Organizations increasingly are consolidating their information needs into a single, integrated information system. Management Information System (MIS), with the Chief Information Officer (CIO) at its head, is a whole, new branch of enterprise management.

- Education: The advent of Information Technology has changed the meaning of the term "literate", with computer literacy being almost as important as basic literacy in many cases. Computer education is an essential course at the primary level in most schools across the world. With more information getting digitized every day, and the internet making it accessible to anyone across the world, students are increasingly relying on electronic sources of information rather than physical libraries for their needs. Instructional methodology has also undergone a sea change with use of images, animations, videos, presentations and elearning to complement traditional techniques (Vijayakumar &Vijayan, 2011).
- **Governance**: The concept of e-governance is one of the most novel applications of Information Technology whereby it is changing the lives of millions across the globe. Computerization of Government activities makes it easier to supervise and audit and makes the administration more responsive to the needs of society. It also bridges the divide between the Government and the people. Technologies like touch-screen kiosks help disseminate information on land records, photo identity cards, pending bills etc. and enable even illiterate people to take more informed decisions. India is leading the world in the effective use of ICT for elections (Ramey, 2012).
- Health: Information Technology plays an important role in medicine. For example, a scanner takes a series of pictures of the body by means of computerized axial tomography (CAT) or magnetic resonance imaging (MRI). A computer then combines the pictures to produce detailed three-dimensional images of the body's organs. In addition, the MRI produces images that show changes in body chemistry and blood flow. Most critical life support equipment are programmed to respond to changes in the patient's status in split-seconds,

thereby reducing the response time and risk of human error. Newer concepts like robotic surgery enable specialists to perform surgeries from remote locations. Genomic studies greatly depend on supercomputing power to develop technologies for the future (Vijayakumar &Vijayan, 2011).

• Entertainment: ICT has changed the lifestyle of most people. The convergence of various technologies has created various options for entertainment like games, streaming music and video, digital television broadcasts, satellite radio, animated movies etc. which can be accessed with the help of mobile phones, PDAs, notebook computers or on television either with a cable connection or wirelessly using newer-generation Wi-Fi, CDMA or GPRS technologies.

Information Technology plays a vital role in most of our daily activities. There is hardly anyone who has not been affected or influenced by ICT. With each passing day, newer applications of ICT are being developed which increase our interaction with and dependence on ICT-enabled devices. Therefore, understanding this technology and using it creatively is imperative to human progress (Ramey, 2012).

### 2.1.2.6 Challenges that face information technology in labor market in Palestine:

Despite the importance that information technology is gaining in the transformation that the world is witnessing, the maximum benefit from the services and applications of this technology is prevented by some obstacles that add to the lack of requirements for the application of information technology, including (Alhajj, 2015):

- Insufficient telecommunications infrastructure and Internet access.
- The high cost of ICT hardware due to the monopoly of its market by major companies such as MICROSOFT- IBM.
- Lack of awareness and culture about what information technology can provide.
- Lack of appropriate legal and regulatory frameworks.
- Existence of procedural and regulatory hurdles, and imposing higher fees on imports related to information technology
- Weak investment in the field of information and communication technology. Limited availability of necessary skills.

The study (Sham'a, 2017) concluded that there is a gap between the graduates and the labor market in the information technology sector, represented in:

- Lack of a clear database and information that helps students and directs them to study specializations appropriate to the labor market,
- Weak competency for graduates and limited computer and information technology skills.
- Lack of awareness among citizens about the educational system and the needs of the labor market, because families have the highest percentage of influence on their children when choosing an academic major.

Another issue that should be considered is what was portrayed in the analytical study by MASARAT Center entitled (Towards Policies for the Development of Technological and Entrepreneurial Education, 2018) indicated that the imbalance between Palestinian production of technology with its tools and the technology consumption, is an indication of a major problem, as the amount of payments for imported technology and technical goods exceeded the amount of its production and exportation to external markets. In 2017, the value of technology exports issued by Palestine reached less than four million dollars throughout the year, meanwhile, a large Palestinian company in this field imported technology and devices with the same value and even more. The spread of technology as a consuming material in the lives of Palestinians in terms of the vast owning of smart devices and applications, is not considered an indication of progress, but that progress is measured by the percentage of contribution to the manufacture and production of technological progress. The study also added that the development in the technical field, information technology and entrepreneurship is important to enable countries that suffer from a shortage in their economic and natural resources as the case of Palestine, which leads to a delay in economic and development. According to that study, the Palestinian reality is considered primitive in the field of technology compared to the huge progress in this field globally, technology in Palestine is not considered a national priority, whether in education and its methods or in the field of practical training, especially in the field of research and development and in the field of technology industry.

Palestinian Central Bureau of Statistics The Ministry The and of Telecommunication and Information Technology, declared in the press release on the eve of the International Day for Telecommunication and Information Society 17/05/2018, that according 2017 census data, the number of Palestinian establishments operating in the communications and information technology (ICT) sector, has reached (1008) establishment out of (158573) economic establishment operating in Palestine (the West Bank and Gaza Strip), and the number of workers in this sector reached (9200) workers, out of (444034) Palestinian workers in total in 2017. Meanwhile, number of ICT graduates in the same year (2017) has reached 1843 graduate according to the Ministry of Higher Education's (Statistical yearbook of higher education institutions 2016-2017). These figures show that the number of companies operating in the communications and information technology sector is relatively low given the total number of companies operating in all sectors in Palestine, which indicates the poor investment in this sector and the poor influence of this sector on Palestinian economy, that is quite obvious as the production of this sector accounted for 6.8% of the total production of the economic sectors in 2016 according to the earlier mentioned press release. And that the number of graduates is greater than the market capacity.

The 2017 Palestinian Central Bureau of Statistics census showed that 43.1% of households have a computer (Desktop or Laptop or Tablet and iPad) in Palestine and that 96.9% of households have mobile phone. This shows the great percentage of technology consumption.

#### **2.1.2.7** Skills required for the ICT labor market in the industrial field:

The availability of skills is one of the most important determinants of the performance of enterprises. It is one of the most important inputs to production, especially for enterprises that rely mainly on technology. Consequently, the lack of skills has negative implications for the foreseeable future on the ability of enterprises to meet production demands or use other inputs efficiently. (Falah, 2019)

Skills Panorama (skills intelligence provided by Cedefop), mentioned in their report (ICT technicians: skills opportunities and challenges 2016), that according to the skills and jobs survey, the five ICT skills for technicians are: advanced ICT skills,

moderate ICT skills, learning, problem solving, and job-specific which will back up employees in their career and deal with predicted future skill challenges. Adding to that, lifelong training programs are essential to make sure that the ICT workers stay in line with the ongoing and rapid technological development.



Figure (2): Most important skills required for ICT technicians, CEDEFOP's European skills and jobs survey

As for hard skills, the most important five hard skills were ranked starting from the highest importance to the less, and they are: cloud computing, artificial intelligence, analytical reasoning, people management, and finally user experience design. (Charlton, 2019)

In an article by World Economic Forum (WEF) in January, 2020 (The digital skills gap is widening fast. Here's how to bridge it), it was mentioned that Technology should be harnessed to enhance lifelong learning by developing training courses by the specialized industrial and technical companies for the sake of reskilling and upskilling their employees. Several online learning platforms such as Udemy and Coursera have been created to provide courses related to artificial intelligence and machine learning, among others, enabling users to control their training and develop the skills they think they need in their future profession (Milano, 2019).

The skills gap in all industries resulting from the fourth industrial revolution, which is based on innovation and rapid developments in multiple areas, including: nanotechnology, self-driving cars, renewable energy, the Internet of things, artificial intelligence, and others, will expand significantly. The emergence of new jobs that require high skills is inevitable, so how will we prepare ourselves for a successful professional and economic future with a high automation potential? The article states that soft skills should be taken considered as a basis to build upon. Hard skills can be trained in the work environment or by specialists, while soft skills are matters that have nothing to do with machines or algorithms. In the article, ten important soft skills are mentioned for the future of jobs, and they are: Complex problem solving, critical thinking, creativity, judgment and decision making, people management, negotiation, emotional intelligence, coordinating with others, cognitive flexibility and service orientation (Desjardins, 2018).

### **2.2 Empirical Studies**

### 2.2.1 Foreign Studies

A study conducted in Russia in 2015 by (Anastasia & et al.). This study indicated that the youth unemployment rate in recent decades has remained at a high level. These factors identify graduate research in different fields of the labor market. For detailed analysis, the following training fields were chosen: Economics, Human Resources Management, Information Technology, and Philology. The authors conducted studies using content analysis of employers' offers in these fields, interviewing adult students to determine their preferences regarding their future workplace, and analyzing a wide range of graduates in the Republic of Tatarstan in 2013. The study revealed that the most sought-after graduates of the fields of personnel management and economics the most paid are ICT specialists and personnel management. The study also revealed that quality of life of university students and young professionals remains insufficient. Students and graduates are faced with a lack of demand for them in the labor market. The seriousness of these problems is related not only to the level and duration of unemployment but also with decreased quality of work provided by the youth. Knowledge received at universities is often far from the modern practice of

employment. As a result, employers are not interested in attracting staff with no working experience because this leads to a longer period of adjustment, accompanied by additional costs.

Vishnjakov & et al., 2015 article analyzed the factors at the level of employee's education, in addition to identify the Russian labor market modern needs. The outcomes of the research presented in the paper outline trends and patterns of labor market development in Russia. The research also showed that due to change the current situation of the labor market, it is necessary to specify the basic tasks whose solution determines the potential for accelerating the development of innovation for the economy. In terms of employee's selection and training, whose knowledge, skills, competencies or level of professional qualifications are strictly in line with production requirements; establish constructive interaction mechanisms for work and education, to improve competence and reduce costs (time, financial, human) for the preparation process, including the job selection stage.

Furthermore, (Urevna, 2013) carried this article, the author addresses "the main problems that characterize the relationship between higher education and the labor market in modern Russian society". Particular attention is paid to how the knowledge gained during training at the university is reflected in the labor activity and the problems that accompany this process. In particular, in addition to talking about many problems such as the imbalance of supply and demand in the labor market, the implementation of professional choice in the conditions of marketing education and instability of the labor market, etc. Education must be sensitive to the needs of stakeholders, changes in different sectors of the economy, and be a social institution that provides a balance between supply and demand in the labor market. The researcher pointed out that the transformation of knowledge acquired at the university to professional practice plays a key role, where the first step is placed in the higher education system, and students expect to focus on practical training from the content of training in the chosen profession, but for this majority these expectations remain unfulfilled. Therefore, many do not know that they are able to prove themselves adequately in their additional professional activities.

(Ionela, 2012) study about "the role of lifelong learning in the growth of employment and labor efficiency", the study conducted in Romania. The paper introduced the role of lifelong learning in improving employment and work efficiency in general. The outcomes of the study showed that the development of lifelong learning programs for Romania is important because it will allow it to face the competitive labor market and learn about the growth in labor productivity, by improving the quality and efficiency of education and training systems. Developing a lifelong learning policy permanent training and retraining of work by developing and adapting skills to keep pace with the competition in the enlarged Union and the global economy, by keeping up with technological changes and increasing the share of the importance of knowledge in the value of production. The results of the study also showed that concrete measures to support lifelong learning in Romania should aim for better cooperation between universities and companies, better adaptation of training and retraining to the current demand in the labor market, and improvement of the curriculum; In line with the concept of continuous training, organizing training courses, attracting European funding to develop training programs, increasing cooperation between schools and universities in different countries, implementing training programs for workers, and increasing access to education by increasing the number of places available, increasing the access to education by increasing the number of places funded in colleges and universities and increasing financial support for continuing training programs.

Kozma & et al. (2012) conducted a study entitled "Dilemmas of Labor Market Needs and Higher Education: The Hungarian Case Study". This study aims to find out what students should be prepared for during university studies and how higher institutions of education should take into account the needs of companies, as a result of technical development and globalization. The results of the study showed that universities should build a system of planned and systematic measurements through which they can use observations from the experiences of both graduate students and the corporate sector. Through this process, the expertise and views of stakeholders in overtime work may be built and may improve the performance of higher education institutions. The new education system has created new opportunities to connect business and educational institutions. The efficiency of this collaboration can be improved through direct government support (for example, tax exemptions and cost compensation for companies participating in student internships Programs, new graduate contribution support programs, etc.). In short, when establishing and developing university courses and curriculum efforts should be made to meet the needs of all stakeholders. The knowledge and competencies acquired during the studies must meet the requirements of students, employers and the labor market, as well as the needs of the entire community. As mentioned earlier, higher education cannot change its position immediately, it is very important to maintain a balance between these goals. As a result of the scientific and technical progress, different professions need higher knowledge level and skill, and need candidates with higher qualifications and more complex abilities. The quick technological development, the working possibilities abroad, the sharp competition in the market has basically changed the most requirements of the labor market. The employees should respond to these changes by improving their knowledge, by lifelong learning methods. The company should provide the students with specific practical information and techniques to compensate for the lack of knowledge, or the students could get the practical skills during the internship.

In their research to study the "variance between university education -including higher education- and labor market in Catalonia", (Corominas, Saurina and Villar, 2010), they found that the claim for high technical qualifications surpasses the skills that encourage employers, and that there is a gap in the differences between the level of education and the demands of the labor market based on obtained efficiencies. The researchers recommended the need to develop a system or mechanism to urge universities to adapt to changes in terms of competency and the need for the labor market in particular. Emphasis should be placed on studies produced by competent specialists, which may be difficult to study within the University.

In (2017) a study conducted in Ukraine by (Ilich & Akilina), entitled (Impact of ICT on Labor Market Development: Main Trends and Prospective). The level of intellectual activity in developed countries gives evidence concerning innovative economy formation and relevant employment model. The similar trends are being observed in Ukraine. Benefitting from the advantages existing and removal of key curbs regarding ICT introduction are of the actual importance in this country. The active participation of the state in gaining the true balance between technologies development

and creation of proper conditions for market gears operation as well as favorable regulatory environment formation will favor ICT development in Ukraine. Transformation of labor contents and character, gradual transition from functioning to project activity requires shaping a set of new skills peculiar to labor force as well as universal employee formation who is capable to fulfill both production and organizational duties, be engaged in projects and, correspondingly, who possesses creative abilities and thinking a new way while estimating production processes concerning their interdisciplinary and intercultural links. Based on monitoring examination of labor force skills matching to workplaces requirements the following future skills are shaped: design mindset, systems, project, computational, novel and adaptive thinking, trans disciplinary, cognitive load management, virtual collaboration, inter-sector communication, project management, programming IT solutions, service orientation, multilingual and multicultural abilities, coordinating with others, artistic skills, ability to work under uncertainty. Prospective future jobs which need above-mentioned skills are analyzed.

(World Trade Report, 2017) carried out a study entitled (Impact of technology on labor market outcomes). This section has considered the effects of technology on the level and composition of employment and wages. Technological progress is the ultimate source of economic growth, as it allows for the production of the same amount of output with fewer resources, or more output with the same number of resources. Technological progress has ambiguous effects on aggregate employment. When such progress takes the form of a new product (such as flat screen televisions) which replaces an old product (such as cathode ray tube televisions), firms producing the old product go out of business, but labor demand may increase due to additional demand from firms producing the new product. When such progress takes the place of labor-replacing automation, technological change leads firms to adopt more capital-intensive technologies and to substitute labor for capital. However, various compensation mechanisms (e.g., price-productivity effects, scale productivity effects, additional demand in other sectors of the economy) can counterbalance this type of reduction in labor demand. The evidence reviewed in this section showed few overall effects of technology on the level of employment. While having few effects on the level of employment, technology strongly affects its composition. This is because technological change has different effects on different workers, depending, for example, on their skills and on the work tasks they perform. This section has presented theoretical and empirical evidence showing that current technological change tends to be skills-biased, in the sense that it increases the relative demand for skills, and routine-biased, in the sense that it decreases demand for routine tasks. Therefore, skilled workers performing nonroutine tasks tend to benefit from technological change, while the latter can be disruptive for unskilled workers employed in routine tasks. Technological progress is ever-increasing.

#### 2.2.2 Arabic Studies

Falah (2019) in his study entitled: "Lack of skills and gaps in the industrial sector in the occupied Palestinian territories". The results of the study showed the reasons for the difficulty of filling the vacancies, according to the opinion of employers in establishments in the West Bank", which include, according to importance, the scarcity of applicants with the necessary skills and experience, and the leakage of workers to the Israeli labor market, followed by a large lack of specializations in academic institutions. Most of the difficulties related to the paucity of skills and expertise possessed by applicants, and the lack of adaptation of these skills to the needs of the labor market, as graduates suffer from a gap in English language skills, computer use skills and communication skills with others, which in turn affects work in terms of the inability to complete work on time and increase workload for workers. The results generally indicated that the extent and nature of negative impacts vary from industry to industry. The results of the analysis indicate that most of the industrial sectors suffer from a specialized skills gap for technical workers.

Furthermore, (Sham'a) prepared a study in Palestine- Gaza Strip in 2017 about "the role of career counseling in integrating Palestinian university graduates in the labor Market". This study purpose was to identify the role of vocational guidance in the integration of graduates of Palestinian universities in the labor market. The Job Advisory Centre (JAC) has been accredited at the Faculty of Applied Sciences (UCAS) in Gaza as a case study. The study community includes beneficiaries of JAC services, participants in its training programs, mentoring workshops, working days, and creative graduate project exhibitions. These were 4423 participants. The study uses a random sample method. The results of the study showed that there is a relationship between vocational guidance through the services provided to graduates in terms of training programs, counseling workshops, career days, exhibitions of creative graduate's projects, and the integration of graduates of Palestinian universities in the labor market. There is also the impact of vocational guidance and the integration of Palestinian university graduates into the labor market. The results of the study also revealed that vocational guidance services that affect the variable of "integrating Palestinian university graduates into the labor market" are training programs, workdays and exhibitions for creative graduate projects. The study found that consultative workshops had little role in this regard. In the light of these findings, the study reached a set of recommendations. Most importantly, the study recommends that the services provided by JAC be developed to take into account the actual needs of graduates and contribute to their efficiency and improve their chances of competing in the labor market.

Abo Odeh (2016) study aimed to determine the appropriateness of higher education outputs and the needs of the Palestinian labor market- a case study of the faculties of commerce in the Gaza Strip, the study used the descriptive and analytical methods. There were three different questionnaires that included elements of the study of the problem in (universities, operators and students), which represent the study population of the graduates of the faculties of commerce in the universities of (Al-Azhar University, the Islamic University, Al-Quds open University, Al-Aqsa University, the University of Palestine, Gaza University) in Gaza Strip. The sample consisted of the number 50 supervisor, while a sample of operators included the operators include 50 operators' institutions. The study findings showed that the partnership between the public sector and private with universities is weak, and needs to be developed to help graduates in the labor market. It became clear that graduates need to develop their skills in the English language and computer skills, educational institutions need to continuously develop their curricula to suit the local and international labor market, and maintain their status and quality. The study also concluded the lack of fundamental studies to determine the needs of the labor market by Palestinian universities, where there is a weakness in the coordination with the government regarding this matter, and especially the Ministry of Education and the Ministry of Labor. There is also lack of

guidance for students to suit the needs of the labor market mechanism. The research stems from the university's interest in the quality of its outputs, which has a major role in reducing the problem of unemployment. It also helps to maximize the benefit from an important and valuable resource in society, which is human capital. Given that the university's outputs are numerous, it includes research, innovations, discoveries, and holders of degrees who have become a burden in many countries of the world, including the Arab countries, a burden on the labor market. It calls for speeding up the creation of ways and methods to align between the outputs of university institutions and the requirements of the labor market. Among the results of the research, the graduates 'qualifications are often not compatible with the requirements of the labor market because of the market demanding higher qualifications in technology techniques and methods, or because this market is underdeveloped and therefore it does not have what suits the graduates. On the other hand, studies indicate that in all Arab countries there is a clear disconnect between the policies followed and the curricula in universities, so that there is excessive training on the one hand in some disciplines that have resulted in a large inflation of job seekers. On the other hand, there is negligence represented in the lack of attention to the formation of the sufficient number of graduates in other disciplines, which have no problem in obtaining jobs once they graduate. To bridge this gap, the quality of education in all its dimensions is a strategic input to harmonize the outputs of higher education with the requirements of the labor market.

Furthermore, (Hussein, 2015) prepared a research in Iraq about "the gap between the outputs of education and the labor market in the Iraqi economy for the period (2003-2015)". This research draws its importance from the fact that the graduate's unemployment is the most dangerous to face the social and economic stability in Iraq, especially as this category grew in very large numbers during the period (2003-2015). The problem of the gap between the education outputs and the labor market in Iraqi economy is one of the most important issues with economic and social repercussions in Iraq. This is due to the low internal efficiency of educational institutions whose indicators are low cognitive achievement, specialized qualifications, weak analytical, innovative and applied capacities, not a decrease in quantity but quality, because it represents the graduation of 'graduates in disciplines that the labor market does not need with the deficit and demand in Other specialties. (Boter'a & Habba, 2013) carried out a study in Algeria this study aimed to identify the knowledge gap between university training and the labor market as a factor of unemployment. The results of the study showed that the university seeks to form human resources with scientific excellence and academic excellence continuously through increasing the number of graduates. The university must add new specialties in all scientific fields, however, these numbers suffer from a severe problem represented in the second destination of the graduate, the labor market, where the graduate finds himself/ herself in front of many problems that push him/ her towards unemployment. The university training obtained did not protect the graduate as a distinct human resource from entering the circle of unemployment, as the study showed that the knowledge gap between university outputs and labor market requirements is the main cause of these problems.

Whereas (Abu- Alsondos, 2012) prepared a study in Jordan, the study aims at "analyzing the adequacy of the Intermediate education system outputs with the labor market needs in the Southern region of Jordan". It also determines the specializations of educational programs, the distribution of students enrolled in these disciplines, and the distribution of workers and unemployed graduates of the diploma. The study used Chi-Square tests to test the hypotheses of the study by applying the steps of testing the differences between the relative distributions of the workers in the relative distribution of the registered students, the relative distribution of the employed workers and the relative distribution of the unemployed graduates of diploma by disciplines and governorate in southern Jordan. The results indicated a relatively large gap in adequacy between the outcomes of the intermediate education system and the needs of the local labor market in the southern region of Jordan. The study recommended the need to link graduates of intermediate education colleges with the needs in the local labor market through the involvement of representatives from the public and private sectors to form advisory committees for the program to develop specialized educational programs under the supervision of the Balqa Applied University Palestinian Information Technology Association of Companies (PITA), 2013 prepared a study entitled (Palestinian ICT Labor Market Gap Analysis). The study showed that universities and the industry need to share information regarding the changing nature of the market and the requirements of employers, and both must play a role in equipping students with practical and realworld experience. They must encourage and enable students to develop a range of attributes, which will allow them consequently to engage effectively in the marketplace after graduation. While addressing these issues at an institutional level is necessary for introducing policies that will result in positive changes. The success of these policies will depend on their effective delivery. The study recommended that cater to the immediate needs of the ICT sector. The results gathered from all the research methods identified the overall needs of the ICT sector. The immediate needs of the companies were mainly identified from the phone survey and supported by the in-depth interviews with the companies and the focus groups. The training and capacity building courses to be provided by an established academy are suggested to consider ICT firms orientation and trends towards initiating and improving the following services:

- Development of mobile apps.
- Development of web-based applications.
- Games production (Web & Mobile).
- Cloud computing and artificial storage services.
- Customized applications and programs.
- Setting high security standards (Networks, Web and Mobile applications).
- Multimedia production.

Another study conducted by (Shtayyah, 2004) in Palestine, about (Information Economies in Palestine Reality and Prospects). The study lighted on the Palestinian knowledge– based society structure, which can be considered the original base, and the row material of the information-based economies. The researcher built cluster showed the Palestinian primitive knowledge, which starts from the family passing the educational sector, the movement of the educational research and the technical development reaching the invention on which the worldly new economics based on. By studying the international literature which is used for limiting and measuring the size of information activities, a Palestinian suggested classification could be made throw which the information economics divided on its base in tow primitive information sector and the other its secondary. The researcher stated that the (ICT) sector in Palestine is mostly consumptive, and hardly has productive activities, except few software industries. But it achieved the highest average of the worker productivity with an observed difference

from the other study sectors. The study also concluded that the Palestinian condition is in urgent need to activate the information knowledgeable activities, and ensuring the knowledge society understanding in the public and governmental establishment, with increasing the interests of the (ICT) sector as it is the more able economic sector to overcome the changeable political economic circumstances which the Palestinian society lived and still lives with the necessity of insuring on the role of the research scientific establishments in creating effective widespread Palestinian economy.

The section reviews the previous studies related to the variance between the outputs of higher education and the needs of the labor market. The previous studies considered above were carried out in different countries in the world such as U.S.A, Russia, Hungary, the Netherlands, Algeria, Jordan, and Palestine... etc. From the abovementioned studies, it is obvious that the relationship between Higher Education Outputs, and Labor Market demands are global issue, although the size and shape of this issue varies from region to another depending on social, economic, political and other conditions, the root of the problem is one, which is, the mismatch between ICT higher education and labor market regarding the competencies.

## **Chapter III: Methodology**

### **3.1 Introduction**

This section discusses the methodology of this thesis. The methodology is the general research strategy that outlines the way in which research is to be undertaken and, among other things, identifies the methods to be used. It also presents detailed information of the research techniques and strategies utilized in this research (i.e. study design, study population and sample, data tools and procedures, and data analysis).

## **3.2** Aim of the thesis

The purpose of this study is to investigate the following research questions:

- Is there a gap between the outputs of Higher education institutions in Information Technology and labor market needs of the same sector?
- Is there an integrated comprehensive national strategy to address the variance between the outputs of higher education and the needs of the labor market by policymakers in the Occupied Palestinian Territories / West Bank- Information Technology Sector?
- What is the strategic plan adopted by policy makers in Palestine to meet the variance between the outputs of higher education and the needs of the labor market?

### **3.3 Research design**

The method in this thesis is qualitative; it depends on semi structured interviews with the study sample. Qualitative research includes a process known as induction, data is collected relating to a specific area of study and from this data the researcher builds different concepts and theories. A qualitative approach is considered more applicable to undertake this research as it allows greater capacity to gain more depth and meaning based on the concerned directions' perceptions about the subject (Kumar, 2005).

## **3.4 Population**

Population contained:

- University academic supervisors (in Palestinian universities)
- ICT Students in Palestinian universities.
- Training officials in Palestinian ICT companies and factories.
- Chairman of the Palestinian Information Technology Association (PITA).
- Representatives of policy makers in Palestine.

## 3.5 Sample

A purposive sampling involves consciously seeking out participant who can contribute to the subject area. In this study, the sample includes:

- (4) training officials in four Palestinian companies specialized in ICT business, namely Paltel, Asal, Exalt and Experts Companies,
- Chairman of Palestinian Information Technology Association (PITA),
- (6) ICT academic supervisors in the colleges of information technology in four of the Palestinian universities, which are Al-Quds University, Birzeit University, Palestine Polytechnic University and the Arab American University,
- (16) ICT fresh graduates and expected graduates from the mentioned universities, and
- (8) of policy makers' representatives.

## 3.6 Study scope

- Subjective scope: The strategy of addressing the variance between the outputs of higher education and the needs of the labor market - ICT sector - by policymakers
- 2. Geographical scope: The Occupied Palestinian Territories (OPT)/ West bank only, excluding Jerusalem as it has special case that needs to be investigated separately.

3. Time Scope: The academic year 2019-2020.

## **3.7 Instrument**

In this study, in person or zoom meeting Semi-structured interviews were utilized as the primary data collection method. They help the subjects to elaborate and therefore provide the capacity to produce more information from the participant. Semi-structured interviews authorize scope for individuals to answer questions more on their own terms than the standardized interview permits, and still provide a good structure for comparability over that of the focused interview. Semi-structured interviews are the most suitable method for studying complex and sensitive fields as the interviewer has the opportunity to prepare a participant before asking sensitive questions and to explain complex ones to them in person (Kumar, 2005).

Deep semi structured interviews were conducted with training and human resources officials and university supervisors and students in the West Bank. The interviews included the questions about the research subject.

### 3.8 Validity and reliability of the instrument

In-person or zoom meeting Semi-structured interviews were utilized as the primary data collection method. The questions included in the interviews were confirmed by some experts (university academic supervisors) after giving some notes and amendments. The interview questions were arranged based on the experts' comments and suggestions. Few amendments were made to the questions in terms of their language and sentence structure and any unclear questions were rephrased by the researcher in order to give a clear understanding to the interviewees. Changes were made right after it to ensure that participants understand the procedure of the interview. The pilot test helped to attract the researcher's attention to the participants' voices during the interview session. The researcher knew that the recording needs to be clear in the state to aid during the process of transcribing. Therefore, two recording players were used in the interview. Each interview session's period time was about an hour, therefore, the pilot test has proven that the instrument satisfied the suggested time frame and procedure for the interview.

To increase reliability, the researcher mentioned the mechanism of data collection (semi-structured interviews for the two groups of the two phases), how the categories were obtained, and clarified how decisions were made throughout the inquiry. As for controlling bias, the researcher carried out a continuous data comparison, reviewing previous literature regarding the phenomenon in order to gain multiple points of view, searching for apparent negative examples, and checking and re-examining the data.

When the study opened up and specific information became clear, second interviews were conducted on the same two groups of the two phases, after a period of time of one month for each of the two groups within stable conditions. The answers for the two groups were compared to ensure trustworthiness. The results were consistent and the variance was very limited.

## **3.9 Procedure**

After obtaining the approval of the university to conduct the interviews, and after the agreement of the participants, the researcher conducted the interviews with the sample individuals. The participants, who welcomed the interviewing request, were assured that any data gathered will only be used for the purpose of the research only.

### **3.10 Data analysis**

Once the data is collected, it was transcribed, then coded, analyzed, interpreted and verified. The process of transcribing the interviews helped us to gain more understanding of the subject.

The codes applied were used to categorize or organize the answers according to the research questions and hypotheses. The data was analyzed, categorized and organized into themes and further sub-themes that emerged through the coding process.

The themes which emerged were assigned a specific code. The next stage involved interpreting the data by identifying any reoccurring themes throughout the interview and highlighting any similarities and differences in the data.

The final stage involved data verification; this process involved a process of checking validity of understanding by rechecking the transcripts and codes again for more accurate verification.

## • Transcribing the interview data

Researchers need to take data from the spoken text (structured interviews) to write them for analysis. Typically, transcription involves close observation of data through repeated careful listening (and/or watching), and this is an important first step in data analysis.

The interviewer can concentrate on listening and responding to the participant, without being distracted to write extensive notes.

The accuracy of the transcription plays a role in determining the accuracy of the data that are analyzed and with what degree of dependability.

Once the transcription was completed, an initial coding process was carried out.

## • Initial line by line coding

Coding is an essential part of qualitative data analysis that ultimately determines the themes that will be generated. Taking transcribed interview data and creating themes requires careful attention and a clear frame of mind. The purpose of data coding is to bring out the essence and meaning of the data that respondents have provided.

An important feature of this process of coding is to represent codes in a way that is theoretical and analytical and not merely descriptive.

## • Group coding

After identifying, the codes of each transcript using initial line by line coding, similar codes were gathered together. This process of coding is called group coding. In this stage, after reviewing the transcripts of different interviews, the receptive codes are eliminated. The identified codes of all interviews were listed under these categories:

## 3.11 Ethical considerations

Ethics is the discipline of dealing with what is right and wrong within a moral framework that is built on obligation and duty (Nation, 1997).

The thesis proposal was submitted to the supervisor. Ethical approval was granted by the supervisor prior to beginning of the study. In conducting any type of research, the researcher must at all-time be aware of the impact which their research will have on participants and on society as a whole and must therefore act accordingly. Kumar (2005) stated that it is unethical to collect information without the knowledge of participants, and their articulated readiness and informed consent. Therefore, the researcher made it clear to all the subjects that their participanton was on a voluntary basis and that they were free to withdraw from the study at any time. While conducting this study, the researcher ensured informed consent from all participants. They were also advised that they were under no obligation to answer any questions which they may not have felt comfortable with. Participants were given advanced notice before the interview, an outline of the subject to be discussed, and how the information which they provide would be used.

## 3.12 Limitations of the study

While conducting this study, the researcher faced some limitations such as the small number of participants which means that one has to be cautious in generalizing from the findings. But the use of semi-structured interviews proved very useful in gaining indepth and meaningful data from the participants.

It was meant to conduct in person interviews but unfortunately, due to Corona Pandemic and closure followed, the researcher was forced to conduct some interviews using zoom online application.

The other limitation is related to bias, which is always a risk in any type of study. Although it is impossible to eliminate research bias, the researcher is confident to have achieved valid findings, which can be used for larger population.

## **Chapter IV: Results Analysis**

#### 4.1 Analysis of students' answers

Interviewed ICT students and graduates agreed that the universities are interested in providing the basics in information technology with weak practical courses that are moderately compatible with the requirements of the rapidly changing and evolving labor market. They also emphasized that students' excellence in this field is through self-effort of some students by looking for knowledge throughout their enrollment in training courses other than the university curriculum despite that there are initiatives by some teachers who are interested in more what is in the curriculum.

In order to make a full idea about the students 'perceptions, their answers were organized according to the themes of the interview:

The answers of fifteen students were divided into thirteen themes. The following is an analysis of these answers:

#### 4.1.1 Possession of scientific and professional skills:

Regarding the graduates' possession of scientific and professional skills that enable them to engage in the labor market, students' answers indicated that they possess basic skills that qualify them to work in any company or institution. These skills are represented in the ability to work in the field of telephone programming networks, web programming, etc. The university provides them with theoretical subjects, but these skills are not enough; because the job market is constantly evolving, and the university is unable to fill this gap. The students also agreed that what they study in ICT colleges is wide and common; they cannot choose a specific field of interest and specialty. Each course deals with the fundamentals of the subject, as the universities could only offer the basic knowledge. This also applies to labs and training courses, which were described as insufficient and inadequate to the requirements of labor market. This leads to a lack of professional capabilities and skills among students, and a gap between companies and universities.

#### 4.1.2 Introduction to the most recent information related to major.

Student respondents confirmed that the university does not update information related to their specialization, even if adjustments are made; these adjustments will be on textbooks and not in the field of technology and programs. Some students indicated that they are making a personal effort, which is to track the most important developments in their specialization, in order to harmonize the university curriculum and the labor market. Students attribute the university's weakness to update information to the fact that university courses are often theoretical, far from the use of computers and (ICT), in addition to lack of knowledge of university professors on the most important technological developments on programs and applications due to their devotion to the academic work and keeping apart from labor market. Some students mentioned that this lack of knowledge in ICT industry and market by some academics is due to the fact that they (the academics) are committed to the old and traditional methods of education, which contradicts with the rapid change in this sector.

## 4.1.3 Notifying the students about the goals of the college and the goals of labor market institutions.

The students' opinions were divided into two parts regarding this issue. Some students indicated that the university introduces fresh students to the goals of the college, labor market requirements and the most important disciplines through guidance and awareness; they also indicated that faculty members provide suggestions about the best sectors that have the capacity for labor absorption. Other students emphasized that the university does not educate graduate students about the job market, its requirements and goals, there are some personal initiatives by some staff members that rare and not systematic, and students mentioned that universities refer this role to schools and responsible parties in Government institutions to present them awareness sessions about the prominent university specializations and labor market best and evolving domains.

## 4.1.4 Development of programs and systems and their suitability to the requirements of labor market.

The students' answers revealed that there are some programs and systems offered to the students are relatively modern and developed, meaning that some of the materials are updated and developed and are commensurate with the requirements of the labor market. As for the programs that are used, they are old and not developed and updated, and students attribute this to the fact that the university aims to provide students with the basics of specialization, and the students themselves should look for new programs and register for courses whether outside the campus or online.

## 4.1.5 Availability of training or non-training programs for the graduates to facilitate their merging in labor market.

The students confirmed that they have to finish around 240 training hours during summer semester within the training course which is a requirement in their study plan in their final year before graduation. The university provides the opportunity for the students to join companies for training. Students indicated that this training is insufficient to provide students with what is needed to know about labor market and its domains, or to have a general idea about different programs or products or specializations as they are varied. They also confirmed that timing of this training causes a problem for many students, because all universities provide training in the summer, as companies and institutions are crowded with graduates, and sometimes this training is for programs or domains students are not interested in it, in addition to not obtaining a training certificate from the company. While courses and workshops are held in partnership with different companies by student councils or clubs in universities, such as English language courses, VLSI courses, or computer courses... etc. Students attribute the reason for the failure of the university to provide training or non-training programs for students to the fact that the university is satisfied with the training specified in the plan for each student, according to his specialization.

## 4.1.6 Matching between theoretical material given at the universities and practical work in labor market

Student responses revealed that they possess the basic information and that allow them to work in companies, but actually, there is a gap between them. The university introduces the students to the labor market but does not help them to merge in labor market by introducing them to what the labor market requires and offers. Students also indicated that companies and institutions contribute to the widening of this gap, as they do not hire them without experience, so that they can develop and update their information in line with the programs used. Students have proposed that these companies may engage fresh graduates to gain the required knowledge and skills with moderate salaries or offering probationary job contract for limited time, this gives both parties the opportunity to examine whether it is worthy or not before to go for formal hiring.

## 4.1.7 Availability of laboratories or workshops in the ICT colleges that fulfill the required competencies that labor market looks for.

It was evident from the students' answers that there are laboratories in universities within the traditional ideas and in a way that is compatible with theoretical subjects, but they are quite old or depreciated. Some students also indicated that concerned authorities have equipped university laboratories with modern and advanced equipment and devices for students, including German institutions, under the supervision of their instructors to utilize these devices and programming networks in their training.

## 4.1.8 Universities role in helping graduates find jobs in labor market, especially distinguished graduates.

According to the students' answers, the university's role has been limited in this direction on offering space for companies' representatives and expected graduates to be connected with each other through the annual career day, this helps each party to find out training programs, internship and employment opportunities. Students also see that the weakness of universities in providing sufficient and updated training courses whether inside or outside campus, is due to the use of old methods by concentrating on

the theoretical part even in labs and training classes. The students implemented that they do not benefit from universities trainings, as industry focuses on the know-how, which means they need the work to be executed and done in an efficient and effective way, not memorized efficiently.

This weakness, as students implied, is justified by the fact that the labor market is responsible for efficient and updated trainings, at the excuse that each company has a specific specialization which universities cannot provide or follow So these companies need graduates with solid basis which universities provide them with, then there comes the company's role to give them their expertise by training.

## **4.1.9** University's use of experts from labor market institutions to teach some specialized courses and trainings

Students reported that the university invited some representatives from companies inside Palestine and experts from outside Palestine to introduce students to the labor market and the most important programs or trainings used by companies. But in terms of teaching courses, no experts are used.

## 4.1.10 Expected graduates follow up during practical training courses in labor markets' institutions by college administration

Student responses revealed that the university monitors the students during training, but in certain matters, depending on the company in which the work is done and the nature of its work, as the university assigns a supervisor to attend the training and verify the course materials. At the end of the training an evaluation report is delivered to the supervisor about the students' progress, how they benefited from this training, and to identify the problems that faced them during the training, suggestions and recommendations may be included too.

## 4.1.11Graduate's feeling about the students' possessing the required capabilities to become competent in global markets.

Student responses from different Palestinian universities indicated that they possess basic skills to work in local markets, which is the ability to work under

pressure, work within the team, in addition to communication with others, leadership skills, language skills, and speed in response to work, but their capabilities to compete in Global markets are weak, due to their dependence on theoretical material more than the practical side, which requires them to make a personal effort represented in participating in courses and workshops to develop their capabilities to compete in global markets.

## **4.1.12** Differences between academic education and the practical experience of trainees in the labor market.

The students' answers stated that there are differences between academic education and the practical experience in the labor market. From their point of view, the reason is that there is no modernization and development of academic education that is appropriate to the evolving requirements of the labor market. Meanwhile, at the university, the theoretical basics required for work are obtained, without conducting practical training on the necessary programs in the labor market. Another difference which is clearly noticed that the devices, hardware and software used in labor market are more modern or totally different than those are used in the universities.

## 4.1.13 Supporting expected graduates' projects and entrepreneurship by the universities

Students emphasized the presence of an incubator in the university for youth projects and initiatives and entrepreneurial work. Some universities provide budget for students to prepare graduation projects if they prepare entrepreneurial ideas such as robots design, as university professors hold several meetings with the various sectors of project development. Also distinguished graduation projects get awards by displaying them in seminars and conferences locally and internationally.

4.2 The results of the interviews conducted with six academic supervisors in the colleges of information technology in four of the Palestinian universities, which are Al-Quds University, Birzeit University, Palestine Polytechnic University and the Arab American University:

As for the universities, six academic supervisors were interviewed in four universities (Birzeit University/ Ramallah, Polytechnic University/ Hebron, Al-Quds University/ Jerusalem, Arab American University / Jenin). The interviewees agreed that the universities provide students with the basic knowledge and fundamentals of information technology. They also emphasized that this ICT specialization, depends largely on the practical courses and its application. Also, they assured that the universities pay attention to the practical training and courses side by side with the theoretical material, which made Al-Quds University, adopt the method of (Dual studies) where students study a theoretical material in a semester at the university, and the next semester is applied in labor market institutions sequentially.

In terms of skills and competencies, the interviewees emphasized that the universities suffer from the weak level of fresh students in this aspect, and they agreed that this problem should be dealt with from early school years gradually to general secondary stage. To overcome this problem, Birzeit University has launched the Leadership & Active Citizenship Program- Masari, an interactive learning journey to target first year students in all disciplines. The learning journey lasts for 3 academic years through which the student passes with six learning stations: Personal competencies, citizenship, professional path, debate skills and leadership. Unfortunately, this program is not mandatory, which means only interested students apply.

In the context of raising the technical competence of students and creating awareness about the skills necessary to enter the ICT labor market locally and globally, the Polytechnic University has established "Software Engineering Update Unit", which is a sustainable modern unit within a project funded by the World Bank. This unit deals with updating academic plans for all computer paths, raise awareness about open-source software and its applications, support graduates in finding employment opportunities and start entrepreneurial software projects.

The interviewees also agreed that ICT colleges face four major challenges: The constant change and development in ICT field, the high cost of upgrading and updating, universities' policies and regulation, and also the lack of appropriate coordination with the labor market.

A question about whether there is coordination or cooperation between universities and the relevant official and governmental institutions or policy makers? It was found that there is lack of cooperation and coordination, due to the lack of universities' involvement in the national strategic plans in this field.

# **4.3 Updating the universities 'curricula to cope with the development in ICT field**

The results of answering this question:

Indicated that the there is an update on the plans and courses based on the intended learning outcomes, especially in (computer science courses), which are constantly updated, or by adding new courses or materials. This update is done almost every 4 or 5 years in general. Some other universities revise the curricula annually. They mentioned that materials or courses are developed and updated due to the continuous change in this sector. At the same time, some academic supervisors mentioned that there is a gap between the universities' science and labor market requirements in general, but it is most obvious in ICT sector, that is due to the rapid evolvement and change in this sector. And despite the efforts made by the universities to narrow this gap, it still exists because universities cannot afford keeping up with the changing market neither financially nor academically.

Some supervisors mentioned that the scientific material and the basic data paths and data structure are fixed; meanwhile, new versions of applications are obtained.
### 4.3.1 Sufficiency of mandatory programs

The results indicated that in some areas there were an increase in the number of programs that are provided by the university, while some respondents indicated that the programs were sufficient but need some improvement as it concentrates on the theoretical side at the expense of the practical side which needs more improvement, that means there should be cooperation with the industry. But some elective courses should be mandatory as they are important and will cover the needed skills and practices for students. Some interviewed academic supervisors stated that Computer engineering is overloaded with courses; students spend five academic years, approximately 170 credit hours. While in some other countries, like Europe in general, students can obtain their bachelor and master's degree with the same number of credit hours. Some Palestinian universities considered this issue in their new plans by limiting these credit hours to 158 or 160. They also stated that universities should add some courses of soft skills, hard skills as university or college requirements, because most of the students lack these skills, which are necessary for their future jobs.

#### 4.3.2 Techniques used in teaching to enhance skills-based learning

The results of answering this question indicated that there are some courses in the universities that are taught in practical form through the labs and students work in groups, such as the computer modeling course where the students learn how to build 3D models through t a skilled program. They also mentioned that the necessary hardware, software and tools needed to be up-to-date are mostly provided. The respondents also indicated that there are many branches in ICT sector and computer science that need different technologies and skills, such as web applications and others in programming which are given not according to specialization, but to widen their knowledge. Other respondents stated that they use different teaching methods such as project-based learning, while others mentioned that they prefer the traditional way of teaching that depends or writing down notes (using papers and pens), as the teachers need to overcome some obstacles such as the shortage of assistants an laboratories, despite the fact that the technology is provided and most of the students own laptops.

## 4.3.3 Availability of internship programs for students and their percentage of the academic load

The respondents' answers showed that internship programs are provided in most Palestinian universities within the plan in terms of credit hours.

The total credit hours in ICT specialization are between 170-180 credit hours in different Palestinian universities, the internship course takes 3 credit hours only and are executed mostly within the summer course (2 - 3 months) which is short period. That means internship program is insufficient and would not help the students to benefit from it as needed. Meanwhile, some students have the chance to do internship programs abroad in certain courses, if there is exchange programs or offers from some countries such as Egypt and Germany. The respondents refer the problem of shortage of internship period due to the large numbers of students against the limited number of ICT companies in Palestinian labor market.

Al Quds University since 2015 has launched the "Dual Studies Program", which is funded by the German Government and executed through the German Agency for International Cooperation (GIZ). This program gives the students the opportunity to learn and practice by combining the theoretical study with practical experience and application. Students spend one semester studying theoretically at the university, then they spend the next semester in labor market to practice what they have learned earlier, this process continues to the last semester in the same sequence. This means that the internship in this case is 50% of the academic load.

### **4.3.4** Availability of the fieldwork for students and its percentage of the academic load

The answers showed the importance of training for students in terms of carrying out field visits for students to several companies, taking feedback from students and companies, and following up their training

Field work in most universities depends mostly on the 3 credit hours training mentioned in the previous question. While Palestine Polytechnic University (PPU)

along with the World Bank, established a sustainable unit called Software Engineering Upgrade Unit (SEUU). This unit works in collaboration with global and local hi-tech companies. The student and the academic staff are the main beneficiaries of this unit, as well as the industry itself. It is a project (program) related to labor market. It aims to enhance the technical skills for (students and staff), by creating awareness of the needed skills for local and global ICT industry. To achieve this, by upgrading the curricula for this program, improving awareness about outsourcing and open-source software opportunities, in addition to helping students to find jobs or establish their own startups

This program although it is successful as it is a simulation to labor market, unfortunately, not all students could benefit from it, as 50 students out of 80 could join this program, due to some technical problems, mainly the number of computer machines or devices provided is limited.

### 4.3.5 Additional materials, skills, activities and events that are offered at the university and its relationship to ICT activities

The respondents' answers to this question indicate that most universities conduct events, competitions and workshops at the level of departments and colleges and involve all students from different majors in Computer Engineering and Information Technology colleges.

Universities participate in programming competitions such as (ACM) International Collegiate Programming Contest for global programming, and (EEE) Electrical and Electronics Engineering. Participants from local universities achieved high rank in these global contests, and won prizes, some student were hired accordingly. Students' clubs such as (the computer science club, and the computer engineering club) in Birzeit University are active and plays a great role in helping students in many ways, such as collaborating with the industry to arrange trainings and execute competitions within the university in technology and programming fields, these clubs are run by students with full support from the university. Respondents confirmed that the universities host experts from local and global ICT industry, to give lectures about their companies and trainings of certain fields in technology and programming.

### 4.3.6 Providing ICT students with capabilities necessary to compete in global markets.

The answers varied on this question, as some respondents answered that students were provided with the capabilities necessary to compete in global markets, and some courses related to hardware were added, after reviewing the plans and examining the experiences of others from the labor markets, and accordingly, new courses were designed. This answer confirmed that what students receive is theoretical and practical basics, as they cannot be given everything that the market requires, but it is a solid pillar that gives students a good starting point to refine after training in companies and the local and global labor markets as well. In the same answer, it was mentioned that many students competed for jobs in companies such as Google and Facebook and were employed, while others had offices in companies abroad.

While other respondents reported that there is a big problem for most of the students in Soft skills, such as working within teams, the English language, and others. Another problem that students have is the misuse of technology. Many of them rely on the technology that is provided to them only, and they do not look for external sources or information, but their focus is only on the required material, and this weakens the opportunity for them to find jobs in international companies.

### 4.3.7 Cooperation between the university and the private sector in training and rehabilitation of graduates in the ICT sector

The respondents' answers indicated the existence of cooperation between universities and the private sector in various disciplines, as the municipalities have conducted training for Geographic Information System GIS and ICT graduates and opened special maps for them and employed a number of them. Meanwhile one of the local universities followed a new technique represented in training the university's existing academic staff on how to train and teach students through courses and conferences in order to develop the academic cadre.

Some respondents mentioned that there is some sort of cooperation with the private sector, regarding students' graduation projects and some creative ideas related to information technology, as many Palestinian universities participated in annual conferences in which many students presented their projects and some of these projects were adopted by certain private sector companies. The answers in this matter also showed that there are great challenges for all parties, students, industry and the academic institutions, as strong strategic relationships should be built and organized.

### 4.4 The results of the interviews conducted with training officials in four Palestinian companies specialized in ICT business, namely Paltel, Asal, Exalt and Expert Companies and the Palestinian Information Technology Association (PITA):

Four of leading companies in the field of information technology have been interviewed. Three of them are located in Ramallah, (Experts, Exalt, Asal with its two branches (Ramallah and Hebron) and the last one is Paltel which is located in Nablus. The companies mostly work outsourcing, especially in the software domain; due to the limitation of the market, but, according to the interviewees, there is a change and shift towards activating the hardware business in Palestinian market, which means that market will become more diverse and more job opportunities will be valid. The interviewees agreed that the universities provide the basic requirements in information technology in general, which is an important matter. As for the practical side, those companies do not depend on the practical trainings that students were provided with during their studying years, whether within the laboratories or during the practical course (training), as each company has its own training system based on the specialty and scope of work.

Within the answer to a question about which is more important to the company when recruiting ICT graduates, is it the technical and personal skills of the graduates, or the excellence in theoretical material and its fundamentals? The interviewees agreed that all is important in a way or another, but some of them gave priority to theoretical material and the basics, as the practical aspect and cognitive ability and skills are provided during the probation period and training in the company. Others emphasized that the fundamentals are strengthened by experience, but it is important that the graduates possess certain skills required by the company.

#### 4.4.1 Technologies and devices used in the above-mentioned companies

The responses showed that the devices that universities use in teaching are not the same or some are not even similar to the devices used in labor market institutions, and there is a big gap in keeping up with the update of technologies and devices between the university and labor market companies in terms of software and hardware as well.

The companies were discreet in providing the list of technologies they use when they were asked to, but they gave some examples. One of the companies mentioned that they have advanced and modern devices such as the Thin Client, which is an alternative of the desktop computers, and it does not exceed the size of the palm of the hand. In addition to screens of about 20 inches directly connected to the company's servers. Also, they mentioned the touch wall devices which are distributed in the halls. As for software technologies, advanced softwares are used in the companies, such as, the sophisticated archiving system, advanced android and mobile applications, statistical systems, dot net, back end and front-end developers, etc.

#### 4.4.2 Skills that labor market companies require from ICT graduates

The sample of companies agreed that the required skills must include strength in the basic principles of specialization, the ability to execute them and the capabilities related to the nature of specialization in terms of networking, system, security and others. Also they should be able to learn and develop, capable of solving problems and it is so crucial to have English language good skills. The companies agreed that the graduates must undergo training period on the companies' systems and tools and procedures, but they should own the basic skills.

### 4.4.3 Required competencies of ICT graduates

The respondents emphasized that non-technical competencies are required such as oral communication skills, reading and writing skills, problem-solving, analytical and critical thinking, planning and organizing, decision-making, leadership, positive behavior, teamwork and they also unanimously agreed that possessing good English language is a must in their field.

#### 4.4.4 Duration required for training the graduate

The companies agreed that all fresh graduates and newly hired employees must undergo a training period that varies in duration between 3 to 6 months. It may exceed this period in some special trainings for certain programs or occupations.

#### 4.4.5 Technologies expected to be added to business development

Companies have unanimously agreed that there is a permanent update of their programs and technologies to keep pace with any new development in their fields of work. They were also discreet about exposing these new technologies. Their answers stressed that they look for new technologies and programs and applications to add, based on market's demand and the high competition in this field.

When they were asked about the coordination between them and the ICT colleges in the universities when a new technology is added, in terms of giving trainings students or academic staff members on this new technology, the answers showed that there is no need to do this, as students will have this training during their summer training course, or when they are hired. As for the academic staff, if there is training, it would be upon their request.

#### 4.4.6 Graduate's ability to use techniques, programs, activities and skills

The respondents confirmed that ICT graduates often possess the needed basics to start with their careers, nevertheless, they should be submitted to extensive trainings during the probation period, which distinguishes the capabilities of each one of them, and decides their career paths. The difference in the capabilities of graduates despite obtaining the same basics, is due to the fact that some students possess the skill of selfdevelopment and their efforts and attempts to identify what is not covered within the curricula and materials offered by their universities. The respondents mentioned that another reason for these differences between graduates, is referred to the universities and curricula, where some academic subjects are not combined with practical materials of trainings, which affects the students' abilities to execute what they have learned .Adding to that, some universities do not have the ability to cover all the material and programs and hardware in ICT sector to keep up with emerging materials in the market, these universities rely on students to build their own knowledge since they have the needed foundations, their excuse is that training materials are expensive and the students are not obliged to pay. Some respondents also discussed the problem of students relying on only what is offered to them by their academic institutions, they referred it to early school stages, which lacks the other side of education in terms of developing students' skills and abilities to look for the knowledge and mostly the knowhow, so they -students- continue to be only receivers even at the university.

As for the number of graduates, some respondents indicated that the number of graduate students exceeds the needs of the local market, while others emphasized that the market absorbs all ICT human resources due to the upcoming programs and technologies that are being worked on locally, regionally and internationally and can take in all of them and even more. Despite the fact that most graduates do not possess the required qualifications due to the weakness or lack of practical experience, most of the jobs are in the outsourcing sector for regional and international companies working in the technology field. This causes a problem for local companies that hire and train new graduates, and then when they acquire the necessary skills, part of them moves to work for the benefit of foreign companies, mainly because of the higher salaries of these companies compared to local ones.

### 4.4.7 Providing an opportunity for practical training for the graduate in the field

The respondents agreed that regardless of the formal training course, the graduates are always welcomed to join other training courses. On the other hand, some companies have restrictions on letting the trainees to be in direct contact with the customers to avoid any mistake due to the graduate's lack of experience, but if they were given the chance to contact with the customers, this would be under full supervision from the companies' side. This happens if the graduate or the trainee showed high potentials in any ICT field. One of the companies mentioned the dual studies program which is a great opportunity for students to experience work during their study years and they acquire the necessary skills while working in the market as part of their curricula.

# 4.5 The extent of the institution's contribution with the college in supervising graduation projects related to the labor market

The answer to this question showed that there is an occasional unorganized supervision, as not all universities involve the companies in such activities unless upon company's request and university's approval. Nevertheless, there is cooperation with some universities with IEEE (Institute of Electrical and Electronics Engineers) contests, where an annual competition is held in the universities to choose distinguished projects, a project of health care was chosen and was developed as a product similar to a startup. Most of the companies declared that there is support from their side for some pilot projects, other companies declared that they didn't have the chance to participate in such activities, but they won't mind participating.

### 4.5.1 Adoption of creative ideas and providing incubators to support creative students.

The companies reported that there is constant contact with the universities regarding any new creative idea. If there is a creative and appropriate idea, the necessary support is provided by the companies. An example a program called IQ created by students, was executed and developed in one of the companies, and currently it is a small separate business with 18 employees.

### 4.5.2 Giving special lectures at the university and cooperating with universities.

Respondents reported that there is cooperation between companies and universities, but not regularly or systematic. Sometimes a new program is provided in the labor market that requires students to be informed and trained on, coordination with universities in this case is through giving lectures of training in university laboratories about it. Adding to that, universities sometimes ask to give the lecture in companies as a kind of practical training and direct access to the labor market. One of the Palestinian universities has shown cooperation in the field of coordinating the courses with labor market, as they presented their study plan to the companies and consulted about the importance of some new courses such as, networking and information security.

When asked about cooperation between companies and the Higher Education Council in the Ministry of Higher Education, they confirmed that there is weakness or lack of coordination with them and that companies communicate more with educational institutions (universities), which in turn may have a greater relationship with higher education and the Higher Education Council. However, at the same time when a question was asked about the existence of restrictions by government institutions such as the Ministry of Higher Education or the Ministry of Communications, the companies agreed that there are no types of restrictions regarding cooperation with universities or the training and programs offered by these companies, and that their role is limited to granting the necessary licenses.

#### 4.5.3 Problems and obstacles related to the employment of new graduates

Among the problems that the sample of companies agreed upon was the problem of students' weakness or even lack in needed competencies such as, problem-solving, team work, customer centricity, both critical and analytical thinking, planning and organizing, decision making, communication skills (reading, writing and oral communication) in addition to the poor English language of most of the students, which is necessary for ICT labor market.

As for the obstacles that companies face with the universities, is the inflexibility of the information technology and the almost absolute commitment to the curriculum, which leads to a weakness in development and to be on the same track with industry in this specialization. In addition to the problem of low acceptance rate for computer science students compared to computer engineering and computer system engineering students, although it is the highly demanded major in the labor market, this matter makes computer science students weaker than engineering students in general, and thus this is reflected in their performance in the labor market, so it is worth considering raising acceptance rates for computer science in all universities.

Some respondents indicated that there is a need for university academic staff to be trained on some new programs and issues in this area, and not be limited to the basics, as new developments happen very quickly and continuously, the companies would not mind sharing their new technology techniques with the universities as they suggested.

### Palestinian Information Technology Association (PITA)

PITA as an association of information systems companies, founded in 1999 through an initiative of some companies represents companies, not individuals.

### Role of PITA.

Its main goal is to protect and defend the interests of members.

Basically, there should be a complementary relationship between all parties that answers the question: Where will we be in the ICT sector after a certain period? In Palestine, whether in the government or the private sector, immediate reactions are the responses to any issue that arises. The integration with the above-mentioned ministries is found in simple parts, but not strategically or in the form of articulated policies

### Representation of PITA in the Higher Education Council,

PITA doesn't have any representation in the Higher Education Council, and this must be seriously considered and will be raised during the next Board of Directors meeting.

### PITA's role in universities.

There is a weak role for PITA in universities; this role can be strengthened through cooperation with universities in implementing projects during the academic years and giving lectures by specialists from the private sector and the labor market in universities.

### Giving full courses by the private sector and labor market institutions in universities.

PITA doesn't mind or actually, must participate by giving lectures and training to students and even to academic staff, this is in everyone's interest in the end, whether universities, students and the labor market.

### PITA's role in addressing the gap that exists among graduates of the ICT sector.

Usually, some projects are presented by international companies such as Cisco, where training projects were proposed at that time. There are also some projects regarding women empowerment in information technology and some projects for entrepreneurs and startups. However, PITA does not have plans for all the graduates. About the gap, every company tries to contribute to bridge this gap through the training period that the graduate or newly appointed spends in the company to become eligible to meet the job requirements, which may extend to two years.

## A system that protects information technology companies from workers' drop out after being trained.

Some companies ask newly employed persons to sign a contract of commitment and pledge to spend a certain period in the company after completing the training.

### PITA's role in organizing work in information technology companies.

PITA has no authority over the companies themselves, except that they exist to protect, preserve and defend their interests.

### Ideas or suggestions about the future of the ICT sector.

This sector is a promising sector here in Palestine. If the Palestinians are able to compete, it will be done through enhancing the skills and competencies of the graduates from various disciplines in general, and information technology graduates in particular, therefore, work must be done on enlarging local companies, increasing their number of employees and enhancing them with the required skills and capabilities so that the Palestinians can compete with other countries in terms of outsourcing.

The first phase ended. The results of this phase revealed the existence of the gap, which is mainly caused by: The weakness of updating the curricula, tools and programs in universities in line with the continuous development of ICT labor market, the weakness of the Palestinian ICT market to meet the global trends and poor coordination with the higher education institutions, and students' weakness in technical skills due to the universities' focus on the theoretical basics at the expense of practical courses. The researcher then moved the second phase by presenting these results to representatives of policy makers in Palestine in order to answer the main question.

In this phase, four relevant ministries were interviewed, namely, the Ministry of National economy as (the demand side), Ministry of Higher Education as (the supply side), Ministry of Labor as (the matching side), and Ministry of Telecommunications and Information Technology as responsible for managing and developing the ICT sector. The questions that were asked, some of them were unified questions, especially those concentrating on the situation of strategies, the extent of their comprehensiveness and integration, alternative plans, the monitoring and evaluation system, the ministry's role in bridging the gap between higher education outputs and labor market needs, etc. The other part of the questions varied according to the specialization of each ministry and its role in bridging the gap in general and the information technology sector in particular, as well as any other questions about other problems that may have an impact near or far on the topic of research.

The researcher conducted 8 interviews with these representatives and the results are illustrated as follows:

#### Ministry of National Economy (MNE) Projects Department

#### A comprehensive and integrated strategic plan with ICT sector

There is a strategic plan which is currently in the process of updating in cooperation with the General Secretariat of the Prime Minister.

The MNE consider the communications and information technology sector in all its strategies as it is a promising and accelerating sector that has advantages in Palestine,

including: an abundance of graduates in this sector, low labor costs compared to neighboring countries or abroad, in addition to that, this sector is a pillar for many sectors such as industry, agriculture, transportation, health and education.

### The availability of alternative plans, or plan B

There is no alternative plan, only a plan was prepared within a week to address the effect of the Corona Virus Pandemic on a short, medium- and long-term levels.

### The communication and coordination with stakeholders

MNE assured that the coordination exists when putting the strategic plans, as all strategies of Palestinian ministries emerge from the National Policy Agenda which was set by the Palestinian Cabinet. Most investments for instance, investigate the infrastructure before starting any business; which requires collaboration with the Ministry of Telecommunication and Information Technology accordingly.

### The availability of Monitoring and Evaluation as a separate body in the institution

The one who undertakes this task is the Policy, Research and Planning Department of the General Administration of International Relations Unit. The existence of these indicators is assured, as MNE is based on them. Regarding ICT sector, a large percentage of them were covered until the occurrence of the Corona Pandemic as the situation is unstable.

### The availability of measurement indicators for operational plans.

MNE is based on these indicators as they assured.

### The coordination and relationship with local higher education institutions:

There is cooperation with the universities about projects and activities, for example, the Techno Parks, with the local universities in cooperation with the United Nations for Industrial Development Organization (UNIDO) to establish a specialized laboratory for products development and creative industries design, and emerging technologies in the Palestinian national economy.

### Membership in Higher Education Council and the Accreditation and quality Assurance Commission (AQAC)

MNE is neither one of the members of Higher Education Council, nor the AQAC.

### The role of the MNE in graduates' vocational and technical training

MNE's vocational training centers, that are mainly concerned with training and qualifying university graduates from the vocational and technical sector, who were provided with the theoretical materials during their university years with little focus on the practical side, that aims at bridging the gap between the outputs of higher education and the minimum requirements for occupying the position. This is based on the feedback from employers and what are their needs from graduates who lack the necessary skills in order to be taken into the labor market. Here, the role of MNE's vocational training centers emerges.

There is also a ministerial committee that includes the relevant ministries, which has been approved by the Prime Minister, to coordinate employment. At the beginning of 2020, a decision was issued by the Council of Ministers to establish a technical university for vocational and technical education.

The extent of knowledge of labor market institutions especially medium sized and small businesses, availability of data, and follow-up these companies as part of the economy.

There is no unified and specific definition of (SMEs) in Palestine, which is currently determined by the capital and the number of employees. Therefore, MNE works with the European Union on a unified definition for the small business and medium sized enterprises (SMEs), as adding to that, MNE have launched the Innovative Private Sector Development project 2019-2023 (IPSD), which focuses on Home Based Business and helps to organize this sector, it concentrates on labor intensive rather than capital intensive especially in the ICT sector. There is also cooperation between MNE, the World Bank and the private sector to provide some kind of incentives to those with entrepreneurial ideas, such as exemption from taxes or registration fees, in order to encourage the unregistered enterprises to be registered with MNE.

With regard to electronic commerce and foreign trading, the respondent mentioned that there is no control or precautions for this kind of commerce in Palestine, as there is no Law to regulate it.

The involvement in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector

MNE confirmed the existence of the skills gap between what is provided by educational institutions and the needs of the labor market, as most employers and business owners have difficulty filling the vacant jobs.

In the MNE strategy, the information technology sector operates through three axes : Technology Parks or Cities which will be implemented in Tulkarm in cooperation with the local universities as a complement to the initiatives of industrial cities. The goal of these technology cities is to create a platform for developing medium Palestinian technological industries into advanced technology, as most companies are small and do not have the ability to export, compete regionally or globally, in addition to help in creating job opportunities for young people and to provide an attractive environment for internal and external investments. As for the second axis, it is related to the technological incubators and accelerators, which are an integrated work system divided according to the specialization in the field of information technology, to facilitate the included companies in this incubator to compete, whether at the local or international level. As for the third axis, this includes vocational training centers that mainly concerned with training and qualifying university graduates of the vocational and technical sector.

The recommendations regarding the ICT sector and the gap between education and industry

• Formation of a ministerial committee from which technical committees emerge to gather ideas and parties in a unified path to harmonize between institutions of higher education and the private sector, and involving all related stakeholders in this process.

• MNE considers this sector a promising sector, so the focus is mostly to support it in all the strategies.

### Ministry of Higher Education (MOHE) - Directorate General of Planning

### A comprehensive and integrated strategic plan with ICT sector

Until now there is no separate strategic plan for MOHE, as after separating the Ministry of Higher Education from the Ministry of Education, a strategic plan of MOHE is under preparation, which is meant to be a comprehensive plan for the years (2021-2023), and this goes with the decision made by the government to update the strategies.

About the integration, it was obvious that there is lack of integral plans with other governmental intuitions, especially the Ministry of National Economy (MNE), this was clear within the response that there should be integration with MNE as what is required of university graduates is to build the state economy. The role of MOHE is to design higher education systems, laws, programs, study plans and scientific research, in the meantime, the role of MNE is to regulate the national economy and to follow up the registration of patents of inventions and the intellectual property. Unfortunately, in this domain, there is no follow-up for registration or monitoring of higher education outputs.

### The availability of alternative plans, or plan B

There is no alternative plan, although, there is an emergency plan which deals with issues when they occur. There is an emergency plan, though.

### The communication and coordination with stakeholders

As for the coordination and communication with Ministry of Education is valid in terms of the technical and vocational education. MOHE is present in all education committees, such as curricula, examinations and quality. As for the Ministry of Labor, there is also integration with them in terms of joint committees for the development of vocational and technical education issues. As for the other ministries, the communication and integration is based on the decisions of the Council of Ministers, but there is no special link or special relationship.

### The availability of Monitoring and Evaluation (M&E) separate body in the institution

It appeared that there is no M&E separate body, M&E is a job within the planning department, but there is an external auditor for a project funded by UNESCO.

### The availability of measurement indicators for operational plans.

Indicators are filled in detailed forms set by the Cabinet.

### The coordination and relationship with local higher education institutions:

The respondent emphasized that national development policies are the role of the MOHE, and that the educational institutions must evaluate their programs and present new programs, for the competitive nature of universities. It was also mentioned that the other part lies with the labor market institutions in the evaluation of universities and programs, as they are able to distinguish between students, their performance and skills during work or training, therefore, they can distinguish between universities accordingly.

### The role of MOHE in graduates' vocational and technical training

MOHE's role is integral with the Ministry of Labor, especially with all the aspects of developing the technical and vocational education

## The involvement in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector

The respondent implied that this requires a comprehensive study of the information technology sector that includes all related governmental and non-governmental parties. MOHE has a guiding role with accurate database about graduates which must be used, and a graduate follow-up system related to the gap.

Note: The respondent emphasized that the database is general for all majors and sectors, there is no specific database about ICT graduates. It was also mentioned that the guiding role of MOHE appears in the laws and regulations, but the higher education institutions don't follow-up.

The respondent also mentioned that the universities are responsible for assessing market needs in general and in ICT sector in particular as they do not have sufficient sensitivity to investigate whether any academic program is highly responsive to demand, in other words, they are supply-oriented rather than demand-oriented.

The extent of knowledge of labor market institutions especially medium sized and small businesses, availability of data, and follow-up these companies as part of the economy.

As mentioned earlier, there is a huge database in the ministry of graduates includes the unemployment, diagnosis and skills.

### Recommendations regarding the ICT sector and the gap between education and industry

The respondent manifested the importance of ICT sector due to the importance of technology which intervenes with all other sectors and aspects of life, and as it is the main sector for supporting the economy as a major supplier for the outsourcing sector. A recommendation is made to name the national plan "Technological Transformation" and to transform all activities into this direction.

### Analysis of meeting with Higher Education Council (HEC)

The Higher Education Council consists of 24 members consisting of 6 periodically selected university presidents and 18 other members (4 members of the Ministry and 14 members from the private sector, a representative of one of the unions, the accreditation and quality assurance commission (AQAC), a representative from the Diaspora, and a representative from the Palestinians of 48 areas). The main role of the council is to draft and enact the rules for higher education institutions which they must be obliged to.

### The representation of ICT sector in the HEC

For ICT sector, Al-Wataniya Company (Ooredoo) is a member of the Council this year, and there are so many bodies and unions, with a difficulty to engage them all at one time.

#### Circulating the decisions issued by HEC sessions

In response to the question about the absence of decisions or results of the Higher Education Council sessions on the ministry's website, it appeared that the circulation of decisions is made through the members, in the sense that the represented universities in the Council of Higher Education, it is up to them whether to circulate these decisions in their universities or not. While universities that are not members of the Council are informed only if they turned to the Ministry in a matter of their concern.

This response, made the researcher wonder what the Ministry's Website is for? Why there is no easy access to information regarding higher education laws, systems and instructions?

### Analysis of Accreditation and quality Assurance Commission (AQAC)

AQAC is a national entity that works under the umbrella of MOHE. It has a board consisting of professionals, academics and representatives from both private and public sectors along with the civil society that supports its decisions. AQAC is the official and the only authority which is responsible for the accreditation and quality assurance of Higher Education in the Palestine.

### The representation of ICT sector in the HEC and AQAC

Besides the respondent's role in AQAC and as a permanent member of HEC, the researcher investigated the point of view of the respondent regarding the permanent official representation of ICT sector in both of them (i.e. the Ministry of Telecommunication and Information Technology, as a provider of the infrastructure for this sector which intersects with all the other sectors), the answer showed that regardless of the importance of this sector, it is impossible to involve all the variables and sectors, as these bodies for policy making, not technical ones. A representative of related institution is invited when seeking a technical opinion only.

### The authorities of AQAC in accrediting programs in general and information technology programs in particular

AQAC decisions are no longer related to the MOHE and the AQAC, but the decisions become issued by the Commission's Board according to the decision issued on 5/11/2020. This council consists of ten members in addition to the Minister of Higher Education as the Chairman of the Accreditation Board. Eight of the members are specialists from the public and private sectors, including those with previous experience in universities as university presidents and former deans. It appeared that Ministry of Labor is a member of the Commission's Board for its important role in clarifying the labor market situation and its needs.

Technically, the powers are practiced by dialogue not mandatorily with the concerned parties. Discussions are made about any newly proposed majors or about the existing programs, to make a decision of accreditation or to close ineffective programs or merge similar programs. As for ICT major, recently, a call was made by the commission board that only programs related to Data Analysis and Artificial Intelligence to be presented for accreditation. In general, AQAC uses a standard reference guidebook with certain criteria, in which the subject of accreditation is discussed for any major, including ICT major.

As for the policies part, AQAC policies change in line with the change of global policies, and that there is a governmental general policy regarding the needs of university majors. Adding to that, the global reality that imposes itself, such as the Corona pandemic, this led to the review of some disciplines, and look for adopting new programs.

## The cooperation between AQAC and the ICT labor market in facing the inability of universities to develop programs to keep pace with development in this sector

Cooperation with private sector and employers in labor market do exist, as a result, 60 study plans of four sectors have changed. They haven't reached the ICT sector yet.

The role of the AQAC in dealing with the weakness of the practical and skills aspects of universities' graduates of information

It is difficult to deal with lack of skills, but there is a possibility of switching to dual studies programs to overcome training and skills gap in many disciplines and encourage universities to do so.

### The role of AQAC in studying and analyzing the gap between higher education outcomes and the labor market needs

The AQAC is unable to plan the alignment of the graduates with the market, as the market is weak, fragile and unstable due to the practices of the occupation. He stated that building an economy with the occupation existence is impossible.

### AQAC recommendations in the field of the research

- The relationship of accreditation in public sector service must be highlighted, by adopting programs to provide the necessary cadres, for example, the severe shortage of some specializations in the Ministry of Health.
- In the issue of scientific research, as it is weak and should be given more attention as a supporter of government approaches.

### Ministry of Labor / Deputy and Planning Unit

### A comprehensive and integrated strategic plan with ICT sector

The Palestinian government announced a national policy agenda (2017-2022) setting priorities, sector plans were prepared for all sectors, accordingly, including the labor sector. The MOL prepared the strategic plan at the time. The current government did not eliminate this strategy but asked for some modifications and introduced some priorities and clusters development, giving more attention to vocational and technical training as priority. MOL's revision included the activities. Main objectives, goals and priorities are still constant. These activities include improving MOL's services due to the increase of unemployment rate, providing skills in the field of vocational and technical training and matching them to labor market needs, law enforcement and decent work in the labor

market, social protection and social dialogue, which include partner parties in the labor sector.

### Availability of alternative plans, or plan B

There is no alternative plan, unless the emergency plan of the Corona Pandemic can be considered plan B.

### Communication and coordination between stakeholders

The coordination is at the level of ministers or heads of departments, but it is not systematic or framed. MOL's strategy for the labor sector depends on continuous and direct communication with the main parties; MOL faces a challenge regarding this issue, as a matching side between the demand side, which is the Ministry of National Economy MNE, and the supply side which is the Ministry of Higher Education (MOHE). MOL is not a member of the two most important bodies of Ministry of Higher Education, The Higher Education Council and the Accreditation and Quality Commission. MOL wonders, how does higher education as a supply introduce specializations related to the labor market, without engaging MOL in this process or at least take the opinion of the labor market?

As for the Demand Side, there is a term in the MOL strategy called "Active labor market policies", which refers to applying active labor market techniques. In order to apply them, MOL needs the demand side's collaboration, but it is hard to get information regarding this issue. There must be an integrated and interconnected system between all parties.

### Availability of Monitoring and Evaluation separate body in the institution

MOL has no separate body for monitoring and evaluation, this process is not completely institutional. Reports are submitted to the Internal Control Unit, and to the General Secretariat of the Council of Ministers within the framework of the strategic results and measurement of indicators. All of them are subject to control by the control unit and the competent departments about the extent to which the results related to the objectives have been reached.

There are excellent results because from the beginning MOL tries to be realistic when developing the plan. Some results are not achieved or not as required due to the financial situation and weak budgets.

### The availability of measurement indicators for operational plans.

MOL have many specific indicators which are officially approved indicators at the state level and are also linked to the global development goals. The labor sector has more than 23 indicators. These indicators are related to policies on issues such as, unemployment, employment, and women's employment. There are indicators in the ministry's records such as work injuries, vocational and technical training issues (i.e., quality of training, training centers, numbers of graduates), which are all specific and measurable indicators.

### The coordination and relationship with local higher education institutions:

There is no framed official or organized coordination with the universities.

MOL has employment centers in all universities; they also work to hire students in all sectors, including the information technology sector. Two issues appear regarding these units: the majority of universities' students don't know about these units, and there are similar bodies in the universities that do the same job such as, student clubs, and there is no coordination between those bodies.

Another type of coordination, MOL invites experts from universities to participate in most of the committees.

MOL blames the universities for their non-compliance with agreements, and not following up students after graduation, as the universities fear that the graduates will understand that universities are responsible for their employment.

### Membership in Higher Education Council (HEC) and the Accreditation and quality Assurance Commission (AQAC)

There is no representation for MOL neither in HEC nor in AQAC. This made MOL wonder: How can MOL as a matching side, build a strategy when there is no effective

communication between them and the demand side -which is represented by Ministry of National Economy- and the supply side -which is represented by Ministry of Higher education-?

### The role of the MOL in vocational and technical training

Despite the existence of vocational and technical training centers affiliated with MOL, however, there is a tendency from the current government to reconsider the issue of vocational and technical training as one of its priorities. Regarding this, a decision was issued to form a coordinating body for the subject of vocational training that includes all governmental and non-governmental parties, including MOL and all agencies that has vocational and technical training centers, in order to unify this system.

### The extent of knowledge of labor market institutions, availability of data to provide the labor market with the necessary manpower

According to MOL, Palestinian Labor market's needs are inconstant, as it is limited, small, weak, unstable, and dominated by small and micro enterprises, not medium ones, and the greater part of them are family enterprises and unorganized establishments. This is due to the influence of Israeli policies. This means that it is an unorganized labor market therefore, the outputs of higher education are not absorbed as they are in the labor market for the following reasons: The weakness of the different sectors, including the private and government sectors, where they hire between (8,000 – 10,000 out of 40,000 graduates), therefore, there is a need for a great focus to be placed on the new technical and vocational education needed by the labor market. This is MOL's approach as it is the global trend.

MOL practically, deals with medium and large organized firms, which do not exceed 10% of the market size

MOL claims that needs are determined by the private sector due to the rapid change of labor market. MOL has Policy Unit in all its directorates in each governorate that monitors the needs. MOL do not have research and sectoral studies regarding labor market, sometimes they rely on some research and study institutions such as (MAS) or the Central bureau of Statistics.

The involvement in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector

According to MOL, Palestinian labor market should be organized first in order to bridge the gap. MOL have been working on two things regarding this issue: 1- Standard Occupations Classification.2- Occupational Work Organization Law.

The Standard Occupations Classification is fulfilled and approved by the government in 2009-2010 for more than 5,000 professions. It does exist but it is not applied yet, as there is no law to regulate professional work. MOL works according to a law which is not related to standard classification of professions. Of course, It needs revision after ten years.

MOL stressed that the current situation of the market is a chaotic open market; most of workers, work in a different field other than their specialization because there are no controls or licenses. MOL's proposal is to establish trade unions for the professions to carry out the same tasks as other existing unions. According to MOL, to solve this issue, they must have an approved standard classification of professions, then the labor market is organized accordingly, and they can measure the quantitative gaps, qualitative, skill and specialized. This should be followed by an admitted law.

The recommendations regarding the ICT sector and the gap between education and industry

- About planning in Palestine, in general, plans must be more flexible, with the ability to change and respond to face the continuous changes and instability in the Palestinian environment, and the weakness or instability aspect which makes short-term plans easier and applicable.
- requires at the strategic level to making strategic fundamental changes at all levels, starting from the bottom line in terms of introducing the concept of

vocational and technical training to change the prevailing culture in the society from both the students 'and parents' sides, and accepting it in the market as an investment.

- Accomplishing the Occupational Work Organization Law.
- Solving the problem of the weakness or poor coordination, which consumes a lot of resources and effort, and sometimes it is repeated for the same activity or the same goal.
- As for the information technology sector, it is a promising sector and more attention is required to this sector, especially since the work space in it and remote work is wide and opens the way to great job opportunities for graduates, whether for university or technical students either internally or abroad, where it is possible to work remotely.

### Ministry of Telecommunications and Information Technology "MTICT"

### Planning GD + Technological Innovation and Creativity Center

### A comprehensive and integrated strategic plan with all different parties

MTICT have an approved strategy by the government for (2017-2022) which is updated as requested by the current government. MTICT plan is a sectoral plan that includes all geographical areas, and the issue of development by clusters does not apply to it.

### The availability of alternative plans, or plan B

Alternative Plan or plan B doesn't exist, but MTICT will be taking this into consideration in the future especially after the Corona Pandemic issue to develop scenarios for this matter.

### The communication and coordination with stakeholders

The role of MTICT is to ensure providing a complete infrastructure for this sector to support all other sectors in which ICT has become an important part of each one of them but there is no integration with the other ministries, the problem is with setting the priorities; this is clearly shown at the time of implementation, as most of MTICT activities must be executed in partnership with the other ministries. Therefore, MTICT, recommends defining the national priorities from the beginning.

As for coordination, although the General Secretariat of the Cabinet carries out the follow-up process for strategies through periodic reports, but there is lack in coordination between all government institutions.

### The availability of Monitoring and Evaluation separate body in the institution

M&E is carried out by the Planning DG.

### The availability of measurement indicators for operational plans.

MTICT has measurement indicators; they are revised constantly with periodic reports and annual reports which are submitted to General Secretariat. MTICT refer the occurrence of most deviations to low budgets.

The tendencies of MTICT towards new technological transformation, and its readiness to provide the necessary infrastructure and communication with universities to define the needed programs or curricula accordingly

MTICT has studies regarding technological transformation, but this issue is linked to political aspects as they claim. Within MTICT strategic plan, there are scenarios to be discussed regarding the transformation. There are also some modern technologies and the creativity center affiliated to the ministry is running workshops and training courses for these matters.

According to MTICT, most of the local universities are private, and it is up to them to introduce updates and new technologies, MTICT's role is to provide support when needed.

### The coordination and relationship with local higher education institutions:

There are mutual interests between MTICT and the local universities, there are signed agreements to conduct training for students and graduates, as sometimes MTICT benefits from some university trainings if MTICT facilities are used.

MTICT have a government innovation laboratory inside the center which is not officially operating yet. It aims to investigate societal problems such as hospitals, traffic or transportation departments. It helps solving these problems, by stimulating creative solutions, these steps are taken: MTICT conduct a workshop to find out the details of the problem with the relevant people, then hold another workshop in which MTICT gather the relevant stakeholders with specialists from universities, university academics present these problems to students to be their graduate research papers that are at the core of the topic or problem.

Although MTICT have not officially operated this laboratory, but they are doing some work in this regard with partners and universities, and they are still looking at the experiences of others to avoid any obstacles or problems in order to officially launch it in the right way.

MTICT has taken steps to support universities in cooperation with telecommunications companies to raise speeds especially after adopting the e-learning system.

### Membership in Higher Education Council (HEC) and the Accreditation and quality Assurance Commission (AQAC)

MTICT is not a member in HEC, but, it is possible to invite them to participate in a workshop or committee or project.

As for AQAC, MTICT is not a member, but they may be asked to participate in one of the committees about information technology programs in universities if necessary, but they have no principle or direct role.

MTICT have requested the Ministry of Higher Education to reconsider the curricula in the field of ICT, and to change or upgrade the study plans every 5 years, as technology is constantly evolving and changing.

### The role of the MTICT in graduates' vocational and technical training

MTICT has established the Center for Technological Innovation and creativity which consists of 8 training big halls, fully equipped with modern equipment's, and can accommodate 160 trainees in order to establish a society of knowledge. The courses that are held are in two domains: the capacity building for national cadres for the government sector and graduates. These courses are free of charge. The private sector benefits from their center services for a small fee or in return for attending the training course by some of employees from our side for free if the private sector is the owner of the training. The other domain is in providing training for students and graduates of the universities according to the signed agreements.

### The extent of knowledge of ICT labor market institutions, availability of data, and follow-up these companies

MTICT is responsible for information technology companies. They do not communicate with the companies directly, but they take the feedback from the Palestinian Information Technology Association (PITA).

The involvement in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector

MTICT's role in this issue is to provide training compatible with the labor market for graduates in this field to raise their competencies. This is achieved by monitoring the new technologies required by the labor market institutions and communicating with students and companies to do matching and provide job in training, where the student trains and gets a job afterwards.

MTICT creates current solutions, without interfering in changing the programs or curricula.

## The recommendations regarding the ICT sector and the gap between education and industry

Since Palestine in a permanent state of instability, it is difficult to develop long-term implementation plans, therefore, considering the government's plan (the Policy Agenda) as the strategic plan, and the ministries make their annual implementation plans according to their sections in the Agenda, is ideal to overcome the nonstop obstacles especially with the case of low budgets.

### 4.6 Most important points

### 4.6.1 Similarities in the respondents' answers:

- Respondents agreed that there are strategic plans, but they are not comprehensive, so that they do not include, for example, the information technology sector, which is a common denominator and an important element for all institutions in the public and private sectors and at all public and private levels. These plans are also not considered integrated. The origin is that there is a complementary relationship between all parties and that the deal is done with immediate reactions to any issue that arises, as there are no plans that answer the question related to bridging the gap between the outputs of higher education for information technology (for example) and the need of the labor market: Where will we be in the ICT sector after a specified period? Plans must be drawn up in partnership with all relevant parties, starting from analysis and setting priorities, and ending with implementation and evaluation. The lack of integration of these strategies leads to confusion in investment in this sector, confusion in universities and the specializations and materials they offer, and confusion in providing the necessary infrastructure. The work must be collective in the first place and with the participation of all parties from the public, private and nongovernmental sectors, to develop conceptions of where we want to reach and what is the role of each institution to reach the required results.
- The respondents agreed that there are no alternative plans despite the special Palestinian case of instability and instability, and the possibility of emergencies occurring constantly. And that the strategic plans must be flexible so that it is possible to change them in line with the emergency situations.
- The respondents agreed that implementation plans are often deficient due to lack of commitment to pay the funds needed to implement some projects or activities.
  The respondents also unanimously agreed that there is no special body in their institutions related to M&E, and that the process of following up and implementing strategic plans takes place in the same planning unit.
- The respondents agreed that the information technology sector is the promising sector in Palestine. Land, agriculture, raw materials and the components of

industry are in a declining situation as a result of occupation practices. Palestine is a country with almost no natural resources. Its wealth is the educated youth who possess the capabilities and skills required globally. Technology has become a global requirement to keep pace. Bold decisions must be taken and invest in these minds, establish hub outsourcing, and attract large companies to invest here. In addition to the fact that the information technology sector is changing rapidly as a result of the development of technology in the world, and accordingly, attention to it must be a priority and that the development be continuously in terms of scientific and practical sides.

- The respondents agreed that the Palestinian labor market is fragile and weak, and it is predominantly small and micro enterprises, and it is difficult to monitor and predict development trends in it or solve the problem of the gap between education and the labor market as long as it is not organized as many of these institutions are not documented by the ministries of labor or economy. This makes it difficult to monitor and follow up on these institutions, and it is difficult to develop strategic plans for a market in which the economy conflicts with the occupation. At the same time, the labor market for the information technology sector is the market most capable of investing in it, due to the lack of control of the occupation.
- The respondents agreed that there is a weakness in the technical and soft skills of information technology graduates and their need for training and qualification. Therefore, all government agencies stated that they have training centers, and there is no coordination between these institutions.

### **4.6.2 The differences:**

• On the issue of strategic plans, one of the respondents suggested that the national plan be like the governmental strategic plan and includes all sectors, and that the ministries make implementation plans in relation to the field of work of each ministry or institution. This proposal was opposed by most of the respondents, with an emphasis on the necessity of flexibility in strategic plans depending on the variables.

- The opinions of the respondents differed with regard to the Higher Education Council and the necessity for a permanent representative of the information technology sector in the Council. The respondents from the Ministry of Higher Education emphasized the difficulty of installing a permanent member in the Council because members change representatives according to need, and that there is nothing to prevent technical advice if it was required.
- Opinions differed about responsibilities for the academic programs offered in universities in general. Some indicated that the ministries' role is directive and non-binding, and that the ministries' primary task is to formulate policies and set regulations and laws to run the academic process, while universities' role is to manage the educational process in them and move towards competitiveness, innovation, technology and leadership. While some others emphasized that the role of ministries should go beyond that and that the ministries should be able to exercise their powers with regard to higher education issues to serve the government's policy and the country's economic orientations.
- Opinions differed about the follow-up of graduates. Some emphasized that this is the role of universities, and that the role of ministries is only in the statistical aspects, while others emphasized that the ministries' role should include following up graduates not only through training and qualification programs, but rather conducting extensive studies on the status of graduates in universities and the labor market to examine the feasibility of the educational process and to monitor its shortcomings.

### **Chapter V: Major Findings & Discussion**

### **5.1 Major findings**

- 1. When the researcher asked the policy makers or their representatives about their opinion of the future of ICT in Palestine and what do they suggest or recommend, it was clear that there is a lack of a clear strategic thinking or a clear vision for the future of information technology in Palestine, as planning for this sector, does not involve all governmental and non-governmental parties and relevant civil society institutions to predict the future of this sector in Palestine and build strategies accordingly. It also appeared that dealing with any arising issue is done by immediate reactions and not based on proper planning and studied predictions.
- 2. There are strategic plans of the related ministries, but they are neither comprehensive nor integrated, as most of them do not include the information technology sector which is one of the most important elements of development and progress and is considered as a promising sector where investment must be made, especially after the Corona pandemic in which the technical component was a vital requirement for all other sectors, especially the education and health sectors. This is what all respondents of decision-makers agreed upon. It is also not integrated due to the lack of coordination between the relevant parties, and this is evident in the executive plans or during implementation.
- 3. There are no alternative plans despite of the prevailing situation in Palestine as a state under occupation, which suffers from instability in all aspect, socially, economically and politically. The incursions, arrests, closures, and the possibility of an uprising at any time, all of this requires having an alternative plan or an emergency plan. The biggest evidence of this is the confusion that followed the spread of the Corona pandemic, especially in the two mentioned sectors, health and education in particular, and the issue of distance learning.
- 4. During the interviews, and after revising the strategies of the mentioned ministries, it appeared that the focus is more on the quantity than the quality with regard to the plans. The focus is on the number of activities not their type, meaning that the measurement is based more on (How many) rather than the extent of efficiency and

effectiveness. As for the issue of forming specialized and technical committees for strategic plans or to discuss policies or technical issues, committees are formed, but their efficiency and effectiveness is questionable. And the outputs, feedback and follow-up on recommendations, if any, are all deficient, as there is no commitment by some members and others whose presence is modal .

- 5. There is an absence of a specific body within the ministries for monitoring and evaluation of strategic plans. M&E in the ministries is a job as a part of the planning units, and this is considered a violation.
- 6. It has been noticed that there are no deep specialized studies and research in the aforementioned ministries to study the information technology sector, whether for educational issues or for the labor market related to it, to contribute to the proper planning process. The ministries resort to studies prepared by research centers or rely on statistics and studies of the Palestinian Central Bureau of Statistics.
- 7. There is lack of coordination between relevant government institutions and higher education institutions regarding the issue of bridging the gap between higher education outputs and the needs of the labor market in all disciplines and sectors in general, and in the information technology sector in particular. The aforementioned ministries have a rather weak relationship with universities, even the Ministry of Higher Education, their relationship is limited to granting licenses to universities, accrediting programs or courses, but there is no interference in universities as they are private universities, even government ones, as the relationship with them is from an administrative and financial perspective.
- 8. Poor coordination with higher education institutions (universities) regarding the programs and specializations required for the information technology sector, the required qualification, the techniques used in teaching, the future of the information technology sector and what this sector needs, in short, there is no coordination or integration of work, all working in separate islands.
- 9. The repetition of the issue of qualifying and training ICT graduates in universities and ministries, as the two sides do the same work. An example of this are the units that have been established in universities by the Ministry of Labor and which are related to training and employment, and universities play such a role, which weakens that process.

- 10. All respondents agreed that Information Technology university graduates have a noticeable weakness in the necessary skills that are an essential requirement for labor market in this sector that enables them to easily fill vacancies. This weakness is due to the poor policies and strategies in government and ministries plans. There are attempts to overcome this problem through training and vocational centers, but the absorptive capacity of these centers is limited as it is not possible for all graduates to be trained there. Adding to that, there is lack of coordination regarding the training process, as in the repetitiveness of the same training courses, the poor advertising of training courses for university students as many students do not know anything about them, and lack of coordination with universities in this regard to use these centers better and exchange experiences between universities and training centers is a bit weak which makes many concerned students pay a lot of money to take online courses or in private centers. There is also a lack of coordination between ministries, the Ministry of Higher Education, the National Economy, Telecommunications and Information Technology, and the Ministry of Labor, in order to find out what the market needs in terms of training, adding modern programs, distributing training courses, ... etc. As well as the weakness of cooperation with information technology companies in this field to know the development in the market, which is occurring quickly, and therefore many things arise accordingly, such as the subject of training and qualification on new technologies
- 11. Many respondents from the relevant ministries agreed that the academic burden for information technology specialization is large and sufficient in terms of the number of credit hours, but a good percentage of these credit hours have nothing to do with the specialization, such as subjects of philosophy, culture and other requirements of the university or the faculty, at the expense of courses that can be given in the core of specialization, whether theoretical or practical.
- 12. The lack of representation of all relevant governmental and non-governmental parties regarding the information technology sector in the Higher Education Council despite the importance of that is obvious. The absence of the Ministry of Labor, the Ministry of Economy, and the Information Technology Association (PITA) is a problem in itself, as information technology intersects with many disciplines in one
way or another. In addition, what results from the sessions of the Higher Education Council are not published on the Ministry of Higher Education's electronic portal, so whoever is not a member of this council, whether from universities or governmental and non-governmental institutions, cannot know the decisions except by contacting the Ministry of Higher Education.

- 13. Not all the local universities are represented in the Higher Education Council, which makes the non-represented universities unable to participate and follow-up the issues related to the specialization of information technology, in terms of the programs offered, important and basic courses, the future of this sector, etc.
- 14. Regarding accreditation and quality assurance procedures, it was noted that the accreditation and quality control process for the information technology specialization is practiced like any other discipline, while this specialization in particular, is constantly changing and evolving, and that the quality control process must be based on international standards for this specialization in particular. In the same context, this specialization needs supportive courses required by the labor market to fill the required competencies gap, such as creative thinking and communication skills. In addition, the program evaluation process is done very slowly, for specialization that needs reassessment from time to time, according to the change in the scientific and practical aspects.
- 15. Repeating some roles or tasks from different government institutions, for example, vocational and technical training and training centers, as each ministry has training centers for information technology graduates affiliated with it and offers almost the same programs and performs the same roles.
- 16. There is no specific definition of small and micro enterprises, which is currently defined based on the size of capital and the number of employees. Most information technology companies are small companies and there are micro companies whose owners may be individuals. These companies are not registered with the Ministry of Labor or the Ministry of Economy; this in return, leads to poor overall planning for this sector.
- 17. Most of the work in the ICT sector is related to outsourcing, which needs to be organized and to expand the network of relations with major global and regional

companies to encourage investment and encourage the recruitment of ICT graduates in it.

- 18. Monitoring the labor market by the competent authorities has deficiencies in terms of monitoring and evaluating the market and knowing the distinct sectors and the conditions of companies and institutions in it. There are no specialized units for this purpose which leads to a lack of proper planning, so the labor market analysis and evaluation is deficient. Also, the database for the labor market is general, there is no allocation of sectors such as the information technology sector, as it is not possible to obtain accurate information on the number of companies, employees, performance, even the problems of workers in this sector.
- 19. The follow-up of graduates from the Ministry of Higher Education also suffers from weakness, despite the existence of a database for graduates, but it is general, there are no data or studies related to graduates of a particular sector or specialization such as information technology and the labor rate in it according to specialization, diagnosis, skills, etc.
- 20. It was noted that the scientific research does not receive the required support from all parties, whether universities, government institutions or the private sector. In the same contest, there is a decline in the role of business incubators, and the weak adoption of distinguished students and their projects by the aforementioned parties.
- 21. It was noted through the interviews that there is a problem of blaming the other side, especially on universities, as ministries talk about the role of universities in some matters, and there is no directive, supervisory or coordination system for ministries in universities.

#### **5.2 Discussion**

This study objective was to investigate the existing strategies to overcome the variance and to bridge this gap by policy-makers in the Occupied Palestinian Territories / West Bank- Information Technology Sector. This was done after implementing the first phase, which aimed at verifying this gap in terms of its existence, form and causes, by conducting interviews with higher education institutions and labor market institutions for this sector.

- The results of phase one confirmed the existence of a gap between the outputs of higher education and labor market needs in the Information Technology sector. This gap is qualitative and it also somehow quantitative, especially for the outsourcing sector. One of the reasons for this gap that emerged through the interviews that were conducted with universities and industry, which is the inability of universities to keep abreast with the continuous and rapid development in the labor market of the information technology sector. The academic supervisors at the universities explained that the reason for the inability to develop programs and equipment is either due to universities' policies or the high budgets needed for the development and modernization process, as it is continuous and endless. The researcher assumes that it is possible to solve this problem through full coordination and cooperation between universities and the labor market in this field, where interests are mutual between the two parties. The Palestinian Information Technology Association (PITA), as the body that represents ICT companies, may have the coordinating role between universities, companies and relevant government institutions such as the Higher Education Council, the Accreditation and Quality Assurance Commission and the Ministry of Telecommunications in addition to the Ministry of Economy. This result is consistent with the result of (Abu- Alsondos, 2012) which indicated a relatively large gap in adequacy between the outcomes of education system and the needs of the local labor market in the southern region of Jordan. This result also supports the results of (Al- Ayoubi, 2008) study which concluded that the institutions of vocational and technical education are unable to follow the changes in society, science and technology, and unable to absorb new disciplines, professions and the renewal of the content of education it requires, to change the specifications of its students so as to acquire new skills and methods to perform occupations and jobs.
- The study also showed, from the viewpoint of the respondents, including academics, students and industry, that one of the causes of the gap is the weakness of students or graduates technical and soft skills. The respondents emphasized that the training period which students spend during their academic studying years is not sufficient to enable them to enter the labor market smoothly; this calls for companies to undertake the training process for graduates or new employees, which may extend to

two years until these graduates become familiar with all the jobs' requirements. As for the dual-studies system, interviewees from labor market have asserted that this system helps in bridging the part of the gap which is related to the lack of technical and soft skills. As for soft skills, the biggest problem, as confirmed by the ICT companies, is poor English language and communication skills, which is necessary for the industry. This result supports the results of (Al-Dalou, 2016) which revealed higher education is required more than ever to work on improving the that educational processes of human investment to the maximum extent possible, through the development of skills and the development of new disciplines that suit the requirements of the era, with ensuring the graduation of human resources with the necessary skills to deal with all the developments and variables that Witnessed by the present era.( Falah, 2019) reported that most of the industrial sectors suffer from a specialized skills gap for technical workers and that the availability of skills is one of the most important determinants of the performance of enterprises. It is one of the most important inputs to production, especially for enterprises that rely mainly on technology. Consequently, the lack of skills has negative implications for the foreseeable future on the ability of enterprises to meet production demands or use other inputs efficiently. This result is also consistent with the results of Kozma & et al. (2012) study which showed that the knowledge and competencies acquired during the studies must meet the requirements of students, employers and the labor market.

• When the researcher asked for the lists of technologies of the ICT companies, in order to make comparisons with the technologies taught in the universities, they were discreet about giving this information, which led the researcher to wonder about the planning process. In other words, if a company wanted to add a new technology, would it give information about this technology to universities in advance in order to add a course, modify a course, or even give training about it? It is understood that there is a state of competition between companies, and that some information for some time is confidential, but the process of contracting to own this new technology does not prevent coordination with universities, if there is a law that protects the right of ownership for the company. This also leads to the question about the ICT industry's involvement in the education process in this sector in

particular, as it is limited to giving lectures or small trainings in the universities. The industry should be more involved in this matter if the educational process is traditional and not similar to dual study system. This result support the results of (Abdullah, 2015) study which revealed that the absence of real coordination or cooperation among the concerned directions, and the absence of strong participation of private sector in curriculum formulation and in the provision of apprenticeships training and learning created overlays and shortage in the technical and vocational education and training system.

- The last point for the first phase of the research which concerns similar stuff, in principle, that should be highlighted, is the problem of weakness of scientific research, the decline in the role of business incubators, and the weak adoption of distinguished students and their projects by companies, businessmen, universities, government institutions and other concerned parties. The responds regarding these issues during the interviews were about individual cases. There is no system or structure in any of the aforementioned parties that possess bodies to perform any of these functions. The focus from all parties was on graduating students for the sake of working in the outsourcing sector, not for the sake of creativity and development.
- In phase two which investigated the policy makers' strategies in the four ministries (National Economy, Higher Education, Labor, and Telecommunication and Information Technology) to bridge the gap between higher education outputs and labor market needs for ICT sector. These are the following major points that the researcher would like to focus on:
- Although the decision-makers emphasized the importance of the ICT sector and the need to pay special attention to it as a global requirement, and as an essential sector for economic and societal development in Palestine, no plan has been found to implement this, although there were previous recommendations by previous ministers, they were not implemented as a national strategy. The above mentioned ministries have strategic plans, but they are neither comprehensive nor integrated with each other in general, and in the ICT sector specifically although they are derived from the National Policies Agenda of the Cabinet. This is due to: 1-The nonexistence of clear vision about the future of this sector, as planning for this sector does not involve all governmental and non-governmental parties and relevant

civil society institutions to predict the future of this sector in Palestine and build strategies accordingly. 2- Lack of communication and coordination between the different parties that are related to this subject, for example, the repetition of some roles and tasks in the mentioned ministries, such as, the vocational and technical training and the same multiple training centers, as each ministry has training centers for information technology graduates affiliated with it and offers almost the same programs and performs the same roles.

- The mentioned ministries do not have alternative plans or emergency plans. The researcher think that this is a crucial matter, especially for the ICT sector in particular, as all aspects of life are now connected to technology. The Corona Virus Pandemic for instance, revealed the absence of these plans especially in the education sector and the issue of distance education, and the state of confusion followed that. Far from the pandemic matter, Palestine is an unstable country with frequent disturbances due to the political situation caused by the occupation's existence on its land. This makes it very necessary to have more than one plan all the time.
- The Absence of Monitoring and Evaluation departments in the mentioned ministries separate from the Strategic Planning Units, which is considered a violation. This is also reflected on the accuracy of the results and the measurement tools.
- As for the Higher Education Council, the role of this council is to approve the general policies related to higher education in Palestine and develop them continuously, especially in light of the unstable and changing environment. Therefore, the policies established in all issues in higher education must be constantly reviewed. The matter is consistent with the information technology sector, for which the researcher asked why it is not represented in the council, whether from the private or government sectors, although it is one of the most important sectors in the world in general, and in Palestine in particular, as an essential resource for the economy and development after the dwindling of other resources such as agriculture, industry, etc.? This question has been answered that one of the telecommunications companies represents this sector for this session, despite the fact that there is an elected body representing the ICT companies in Palestine. In order to develop policies, there must be inputs related to monitoring.

and analyzing the reality, identifying deficiencies in the various areas, and setting priorities for setting goals, accordingly, based on all of this, policies are developed. Therefore, I think that this issue should be given great attention to answer the following questions: What are the existing higher education policies and are they sufficient? Is it well developed to fit the case of constant change? Does it cover all educational aspects and all sectors? The role of the Higher Education Council is unclear in higher education issues, from the technical level to the policies level. The solution may be to form technical committees that include all sectors and segments to study and analyze these sectors, identify their problems and submit recommendations to the Higher Education Council to run consultation and approve policies accordingly. It is also worth noting that only six universities are represented in the Council, and that the decisions or instructions issued by the Higher Education Council meetings are circulated through the members or the "Palestinian Official Gazette" according to what has been mentioned, but on the official website of the Ministry of Higher Education, there is no published decision, which means that any party that is not a member of the council does not know about any decision unless it communicates with the Ministry of Higher Education directly, or look for the decisions in the "Palestinian Official Gazette".

- As for Accreditation and Quality Assurance Commission (AQAC), although they
  have a standard reference guidebook with certain criteria, it should be revised, and
  to deal in an unconventional way which must be based on a study and analysis when
  submitting the accreditation application, of course these criteria are written well in
  the guidebook, but unfortunately, the use of the criteria is different in reality, this is
  shown in the statistics regarding higher education and the unemployment rate, etc. It
  is necessary to allocate standards for the information technology specialization, as it
  is a constantly and rapidly changing discipline.
- Regarding the courses and programs of universities' ICT specialization, the interviews revealed that there is a number of credit hours that the students have to take other than the subjects of their specialization, as a good percentage of these credit hours have nothing to do with the specialization, such as philosophy, cultural studies and other requirements of the university or the faculty, at the expense of

courses that can be given in the core of specialization, or to give courses to enhance students' competencies.

- Lack of good knowledge of the Palestinian labor market in general and referring to it by the aforementioned ministries as a chaotic, fragile and weak market. In addition to the lack of studies or statistics on the information technology sector as a good sector for investments and production sector. In the statistics conducted this year for this sector by the Palestinian Central Bureau of Statistics, the statistics were from a consumption perspective rather than from an analytical strategic perspective of the reality of information technology in the Palestinian labor market, whose problems must be studied and analyzed, and solutions must be found to overcome these problems for this sector as a basic pillar of the economy in Palestine. The researcher wonders here, how will Palestine be able to attract large global and regional companies to invest in its markets knowing that the market is fundamentally fragile and weak?
- Information Technology sector in Palestine, depends on outsourcing mainly, therefore, it needs more organizing and expanding of the network relations with global and regional companies, to help graduates find jobs and help in solving unemployment problem. At the same time, there should be an evaluation of what global and regional market need from graduates to be hired there and make adjustments in the higher educational process to meet the requirements of these markets, as competition is high between countries to join these markets.
- The final point for this phase is about laws and regulations: During the interviews, it was quite obvious that there are lack of laws and regulation regarding labor market and economy which help in organizing and controlling the market in general including ICT labor market. Examples of the unissued or unexecuted laws: 1- An approved standard classification of professions, in order to organize labor market, as it helps in measuring the quantitative, qualitative, skills and specialization gaps. 2- A law for electronic commerce and trading especially with regard to the trading of information technology, including hardware, software, and others.

These results support the results of (Urevna, 2013) and (Ionela, 2012) studies which showed that there should be better cooperation and coordination between the policy

makers and the universities and labor market to fill the gap between the outputs of higher education and the needs of the labor market. These results also support the results of Abo Odeh (2016) study which concluded the lack of fundamental studies to determine the needs of the labor market by Palestinian universities, where there is a weakness in the coordination with the government regarding this matter, and especially the Ministry of Education and the Ministry of Labor, and the lack of guidance for students to suit the needs of the labor market mechanism.

## **5.3 Recommendations**

Upon the results of this study the researcher recommends the following based on study questions:

- A. <u>Is there a comprehensive integral strategy to address the variance between the</u> <u>outputs of higher education and the needs of the labor market by</u> <u>policymakers in the Information Technology sector in the Occupied</u> <u>Palestinian Territories / West Bank?</u>
- B. If there is a strategy, why it is not working well? If there is no strategy, why <u>not?</u>
- Developing a clear vision and a strategic thinking for the future of the ICT sector in Palestine, as it is a major and essential sector, not only as a complementary or supportive sector.
- Developing the National Policy Agenda from which the strategic plans of government institutions are derived and include the Information Technology sector as a promising investment sector and one of the infrastructure tools for all other sectors.
- Preparing strategic plans for government institutions under the supervision of the Council of Ministers, with the full participation of all parties and sectors, and full cooperation and coordination to be comprehensive and integrated. This includes planning for the information technology sector in all domains within the government's vision for this sector and linking it to the educational process in order to prepare a generation of graduates who are able to employ technology as an

important component of the economy and development and one of the most important trends and requirements of regional and global markets.

- The necessity of obliging government institutions to develop alternative plans, with a focus on the information technology sector, which the Corona pandemic has demonstrated the urgent need for this sector to resume the governmental processes, especially the education and health sectors.
- Reviewing and developing the ministries' structures and issuing a binding decision to establish an independent body for monitoring and evaluation, or be affiliated with the Internal Audit Unit. In the same context, activating the role of the planning unit of the General Secretariat, to conduct studies and reports on the effectiveness of strategic plans and the progress of operational plans.

# C. <u>To what extent there is cooperation between the relevant government</u> <u>institutions to bridge the gap between the outputs of higher education and the</u> <u>needs of the labor market for the ICT sector?</u>

- Improving the infrastructure needed for teaching information technology specialization in universities and providing the necessary advanced laboratories and equipment that are compatible with what is used in the labor market.
- Studying and analyzing the vocational and technical training centers affiliated to government institutions and using them in a right way, by providing various specialized programs that are not repeated, and organizing administrative and technical matters so that they can accommodate the largest number of students and cooperate with universities to contribute to filling the deficiency in the laboratories of the universities.

# D. <u>How Information Technology sector is represented in the Higher Education</u> <u>Council and what is the coordinating role of the council between higher</u> <u>education institutions and labor market institution?</u>

• The composition and formation of the Higher Education Council and its role must be reconsidered. Important government institutions must be permanently involved and represented in this council, such as: The Ministry of Economy, the Ministry of Labor, in addition to the Ministry of Telecommunications and Information Technology. At the technical level, specialized technical committees should be affiliated to the council with the participation of all parties, especially from the information technology sector, which is represented by the Palestinian Information Technology Association of Companies (PITA). The role of these committees is to prepare reports and studies on the reality of the sectors, including the information technology sector, prepare proposals and recommendations, and submit them to the Higher Education Council for further discussion before setting any policy. In addition to the necessity to publish all decisions issued by the Council on the official website of the Ministry of Higher Education. As for the representation of universities on the council, which is usually represented by six universities, the mechanism of university representation must be re-examined, for example, this may be through, an agreement between the universities themselves to establish an association or a small council consisting of university presidents, through which university education issues are discussed, and this council delegates representatives in the Higher Education Council, and provides universities with the decisions issued by it.

## E. <u>What are the criteria for accrediting programs for the ICT specialization, and</u> are they accredited based on market needs?

• As for accreditation and quality control, a comprehensive evaluation of all programs in the information technology specialization in all its branches must be conducted. And the addition of supportive courses for this sector such as scientific research, creative thinking, communication skills and other courses that enable graduates of this specialization to acquire the skills required for the labor market and be able to easily find job opportunities should be considered. It is also of highly importance that international standards must be adopted in order to develop Palestinian products and outputs that are able to compete in the global and regional markets. In addition, information technology specialization programs must be re-evaluated periodically in line with the rapid development and change in this sector, and laboratories must be re-evaluated in terms of hardware, tools and software development, this should be executed through a binding decision for universities to renew licenses based on the period that has been determined, especially for programs where there is constant change.

- F. <u>What is role of Ministry of labor in bridging the gap between higher education</u> <u>outputs and labor market needs for the ICT sector in particular?</u>
- Studying and analyzing the reality of the labor market, creating a comprehensive database and sectoral studies that include all the details related to each sector in separate, including the labor market for the information technology sector and the outsourcing sector, which I could not find clear data about them during my search in government institutions. When asked about the ministries' role in bridging the gap between the outputs of higher education and the needs of the labor market, most of the respondents referred to the labor market in Palestine as chaotic, fragile and weak, and hard to control. This requires taking firm decisions by the government and taking the necessary steps to organize and strengthen the market, including enacting the necessary laws for that, such as, Occupational Work Organization Law.
- Encouraging entrepreneurship and enhance the role of business incubators to support entrepreneurial projects and ideas by all segments and sectors, especially by the government, as the number of businesses and projects that are incubated is modest, and funding is often external by donors.

## 5.4 A proposed outline for a strategy

In light of the prevailing Palestinian situation as an occupied state suffering from Israeli control, which directly affected its economy and development, the economic dependence on the Israeli economy in addition to the restrictions imposed on it, undermines the attempts to strengthen the Palestinian economy and enabling it to catch up with global development in all areas as a result. As for the ICT sector, according to national and international studies, the continuous and accelerating change in this sector, which is followed by a change in the requirements of jobs and the skills of workers, is the challenge that the countries all over the world face in general, but this is part of the problem in Palestine, it is also one of the sectors that suffers from the consequences of the occupation, and this is evident in an analytical study published by the Palestinian Center for Policy Research and Strategic Studies – MASARAT in October 2020 entitled (Mechanisms for Technological Disengagement from the Israeli Occupation). In

this study, the challenges facing the Palestinian ICT sector are highlighted. Among the most important of these challenges:

- The restrictions imposed by the Israeli occupation that appear through: controlling imports related to this sector such as devices or other technological inputs, not granting frequencies to modern generations of technology, the penetration of some Israeli technology companies in the IT Palestinian markets, and Israeli control over the Palestinian technological space.
- The decline in the development indicators of information technology in Palestine, as: Palestine ranks 123rd in the world in this field according to the International Telecommunication Union (ITU) report in 2017, the decline in the technological development indicators in Palestine from 4.7 in 2012 to 3.5 5 in 2017.

Through this study, three alternatives were proposed for disengagement from dependency relationships. The researcher cites one of the alternatives related to the topic of this research, which is the second alternative, "promoting investment in the technology sector" by (by way of (but not limited to):

- Joint efforts and full coordination between the Palestinian government, industry and the educational institutions.
- Alignment between infrastructure and human cadres and the quality of education and training.
- Adopting a national strategy to the digital economy transformation.
- Providing training centers within universities to raise competencies and students' acquisition of the necessary skills.
- Developing a strategy in the Ministry of Education and Higher Education that aims to develop curricula. Also, this strategy contributes to bridging the gap between the outputs of higher education and the labor market needs of the ICT sector locally and internationally, as well as increasing technological specializations.
- Developing the infrastructure for the economy of the technologies of the fourth revolution

Based on what has been mentioned, it has become clear that the difficulties facing technological development in Palestine, and compared with the vast growth of ICT in

the world, the standards in Palestine are lower than international standards as a result. However, investment in this sector is still the gateway to development and progress, if appropriate strategies and policies are adopted.

As mentioned earlier, the ICT sector is considered one of the vital sectors worldwide as it has become more powerful, accessible, and widespread. It also plays a key role in enhancing competitiveness, enabling development, contributes to societal development. Adding to that, it is one of the fastest-growing areas of the world's economy; therefore, interventions must be developed to address the variance between the outputs of higher education and labor market needs for this sector, which was discussed in the course of this research. This variance can be addressed by developing the necessary policies and tools for these interventions by decision-makers with full coordination with the industry, education, and all other related stakeholders. In order to find a way to achieve this, the researcher conducted a brainstorming session with some of the previously interviewed ICT local experts from the industry and higher education institutions, in an attempt to generate a possible solution to the variance problem. In this session, the importance of the information and communication technology sector was emphasized in light of the globalization of markets and the global competition. Emphasis was also placed on Palestine's urgent need to keep up with the rapidly accelerating development in this field, especially in light of the deteriorating economic conditions and the scarcity of resources resulting from the occupation practices that affected all aspects of life. Technology has become an integral part of all industrial and service processes alike, and the manufacturing processes, even the most basic ones, have become an integral part of technology, therefore, it is necessary to add the needed knowledge and skills to this sector based on criteria or a system to be used as a reference, to ensure the continuity of successful development and marketing of both products and services. During this brainstorming session, it was mentioned that the economic strength of all corporations even the big or multinational ones is related to the extent of their technological distinction, and that globalization in the field of business has led to greater dependence on knowledge and information, which means that old organizational tools are no longer useful. The organizational efficiency of any institution must be less hierarchical; therefore, it should be reconsidered to be more flexible in nature based on the needs. As for the global competition matter, it was stressed out that due to the situation in Palestine, as a country under occupation with the lack of resources and control, it is very important to invest in human capital, by providing ICT students and workers with the appropriate knowledge, skills, and education so that Palestine would have a highly-skilled workforce, which is a must to enhance its competitiveness.

It was also emphasized that due to the connection of the business with technology, information, and knowledge, the nature of the occupants of these works and what is required of them has changed accordingly, as it has become very important to work as a team and adopt creative thinking in solving problems, and possessing the ability of adaption and flexibility due to the continuous change in jobs requirements resulting from the continuous and rapid technological development that is directly related to all businesses as mentioned earlier, in addition to the ability to continuously learn to keep pace with these developments. It was asserted that the advanced industrial countries that possess highly competitive capabilities are distinguished by their possession of a clear and specific skills framework, whereby each industry sets standards for skills related to that industry, to be the basis on which planners and decision-makers rely on to develop educational curricula accordingly. What is meant by skills standards is clarified within this session: they are the standards that are set and defined by the industry for both the work itself, and the workers required qualifications, through which the skills, capabilities, and knowledge are determined to aid the workers to perform their tasks successfully at the workplace. These standards differ from one industry to another, depending on the work nature. As for Palestine, and in order to be able to implement this, there must be a process of re-evaluating the current methods of human resources development, followed by the development of effective strategies to ensure that the industry is supplied with highly skilled workers. It is crucial to start studying the foundational skills standards and technical performance standards in order to be able to supply the market with graduates and workers who are able to do their work efficiently and effectively in the labor market. This means, building a system that serves both educational and labor market institutions. This system (skills framework) must be approved by the government and be considered as an obligatory reference to all parties, educational institutions, labor market institutions, and formal institutions. He also added that learning should go beyond educational institutions to labor market institutions by adopting lifelong learning programs.

A discussion followed to define who would benefit from the skills framework, it was agreed upon that it would serve the whole community, but the main beneficiaries are: the industry, education, and the government.

With regard to the industry, the use of the skills framework helps in different ways to): modifying organizational including (but not limited structures of developing career maps, formulating job descriptions, defining institutions. supervisory positions and their requirements, determining vacancy filling requirements, identifying and developing training needs, developing performance appraisals, forecasting human resources needs, determining skill needs and gaps, and helps corporations meet the challenge of being competitive by ensuring that their workers possess the needed job competencies.

As for the education, the use of the skills framework helps in different ways including (but not limited to): Developing and revising curricula in line with the required and approved standards, having a mechanism for effective communication with the industry, government and students, identifying and developing current and future requirements and tools for academic courses, developing training related to education and commensurate with the labor market, contributing to the process of guiding students about their educational and professional options, determining what is required of human resources (educational cadres, trainers and technicians), contribute to identifying and developing joint programs between educational institutions and industry, as well as among educational institutions themselves.

As for students, they also have a share of benefiting from the skills framework through: Evaluating educational programs and comparing them, obtaining greater opportunities for work through mastering the skills and acquiring the competencies necessary for the labor market, obtaining appropriate salaries, opportunities and job security, also enabling them to understand job requirements, employment characteristics, and career path researches.

Finally, the government would benefit from the skills framework by: Integration of the work through the unification of national efforts among all parties to address the variance between education outcomes and labor market needs in the ICT sector through effective

communication, creating a unified, reliable and credible framework as an official reference, developing education and training policies, developing labor market and workforce policies, forecasting requirements of manpower and educational resources, increasing the possibility of adaptation, especially in light of the continuous development and change in this sector, by continuously reviewing and updating the skills framework in line with changes in the industry, improving the competitiveness of Palestine in the ICT sector through the development of a highly skilled workforce, and increasing opportunities for underrepresented populations.

To know more about the skills framework, the researcher examined the experiences of some countries that developed ICT skills framework to overcome the skills gap, which causes the variance between education and industry in this field. Among these countries is Singapore through the Infocomm Media Development Authority (IMDA). It is a Singaporean governmental legal body, works under the supervision of the Ministry of Communications and Information (MCI). It was created after the Information and Communication Development Authority (IDA) and the Media Development Authority (MDA) were restructured and merged into one body, which was called (IMDA). It was launched on 30<sup>th</sup> Sept. 2016 after the approval of the draft law of the Infocommunications Media Development Authority in Parliament in August of the same year.



Figure (3): IMDA Skills Framework Interface

IMDA has many initiatives, mainly: •(SMEs Go Digital) that gives businesses digital solutions and helps them to digitalize their businesses, • (Digital Economy Framework for Action) which assist businesses and industries by accelerating their digitalization processes and to improve their competitiveness, •(Services 4.0) that offers programs to help businesses meet the requirements of the new industry or services which is enabled by emerging technology, •(Digital Readiness) which are the programs that help Singaporeans in using technology in active, responsible and with confidence , •(Tech Skills Accelerator - TeSA) which is a cooperative initiative with Skills Future Singapore, its objective is preparing the Singaporean workforce for the digital economy and offering grants and programs that help professionals build and develop pertinent ICT skills, •(Skills Framework for Infocomm Technology) which was developed by the collaboration of: Skills Future Singapore (SSG), Infocomm Media Development Authority (IMDA), Workforce Singapore (WSG) and Cyber Security Agency of Singapore (CSA), in consultation with ICT industry associations, educational institutions and training providers and other related stakeholders.

The ICT skills Framework is considered a guide for employers, educators, students, training providers and concerned individuals, to enhance ICT skills proficiency and lifelong learning. It consists of 7 tracks which are: Data and artificial intelligence, infrastructure, software and applications, strategy and governance, operations and support, cyber security, and sales and marketing. It also consists of 32 sub-tracks and 104 individual job roles, as shown in the figure below:



Figure (4): IMDA ICT Skills Framework- tracks and sub- tracks

According to some testimonies of Singaporean companies' seniors and professionals, who adopted the skills framework of Infocom Technology/ IMDA, they agreed that because technology is rapidly and constantly changing, and as everything is connected to technology, and that acquiring new skills has become a survival instinct to many professionals and individuals, therefore, the main aim of every ICT company and professional is to keep up with this rapid change. Their experience after adopting the skills framework revealed the following benefits as was shown in a YouTube report which was published on their website:

- The framework shows key ICT skills and maps out career pathways within and across job functions. It also lists existing and emerging skills and training programs for skills upgrading and mastery.
- It helps companies to look after and grow their existing human resources, and also helps in the recruitment of fresh talents.
- It helps in identifying the relevant skills and competencies, especially in emerging technology areas, such as, data analytics and cyber security.
- It can also be used as a benchmark for all possible skills across their country. As well as being a foundation of creating skills profile in order to identify the career pathways and establish training needs of the organizations. Adding to that, it also can be used as a skills assessment guide to be able to reveal the skill gap.
- It helps to speed up the hiring processes, as it is very easy to develop a checklist for the interviews.

Another international example of skills framework to overcome the skills gap is the Skills Framework for the Information Age (SFIA Foundation).

IIIIIII SFIA         Search Site         Search           The global skills and competency framework for a digital world         Search         Search								Search
Home Using SFIA SFIA 7	Future SFIA Older versions	Tools and resources	Get help	Get accredited	News	Licensing SFIA		
SFIA VERSION 7 Framework status: Current standard	SFIA 7							

Figure (5): SFIA Interface

SFIA is an international not-for-profit organization; its origin can be detected back to the beginning of the 80s of last century. It was formally launched in 2000. SFIA is a cooperative effort that involves people who are related to IT such as, managers, education specialists and HR specialists from around the world. It has a governance board consists of the Institution of the British Computer Society, IT Service Management Forum (itSMF), Engineering and Technology and Institute for the Management of Information Systems (IMIS). SFIA is run by a General Manager, and it has an Update Manager who leads the update of the framework. The update of the framework is a collaborative effort which is regularly updated. The update process is done through global open consultation with people who have expertise in developing and managing the skills and competencies from public and private sectors, whether in the industry or the education from all around the world. As SFIA believes that its accomplishments are relevant and true because "It is built by industry and business for industry and business".

SFIA's framework describes the required skills and competencies that involve ICT. The framework provides fine illustration of the skills and the levels of responsibility. Until now, it is adopted in nearly 200 countries by governments, companies, institutions and individuals. The current version or the latest update which was released in 2018 is (SFIA 7).

In general, SFIA is considered a common reference model which is easy to use. It is also a feasible source for all who manage or work in or related to ICT, digital transformations, and software engineering.

It has two axes, the first axis is a framework consisting of 102 professional skills which describe the professional skills at various levels of competence, and the other axis is the seven levels of responsibility which describes the levels of responsibility, they start from (level 1) which is the lowest level to the highest level which is (level 7), they are set using simple description to the values, behaviors, knowledge, and distinction that a person should possess so that he/ she would be recognized as competent at the level. , and they are as shown in the figure below:



Figure (6): SFIA levels of responsibility

The levels of responsibility are characterized by supporting general attributes for the levels of responsibility for each level, and they are: Autonomy, Influence, Complexity, Knowledge and Business Skills. An example is shown in the figure below for (level 1):

	Autonomy	Works under supervision. Uses little discretion. Is expected to seek guidance in unexpected situations.
Level 1 Follow	Influence	Minimal influence. May work alone, or interact with immediate colleagues.
	Complexity	Performs routine activities in a structured environment. Requires assistance in resolving unexpected problems.
	Knowledge	Has a basic generic knowledge appropriate to area of work. Applies newly acquired knowledge to develop new skills.
	Business skills	Has sufficient communication skills for effective dialogue with others. Demonstrates an organised approach to work. Uses basic systems and tools, applications, and processes Contributes to identifying own development opportunities. Follows code of conduct, ethics and organisational standards. Is aware of health and safety issues.



Back to the first axis which is the professional skills, professional skills are prepared to be consistent with levels of responsibility, so that the skill description is consistent with the level of responsibility of the required or specified level. Consistency at every level of responsibility definitely leads to consistency across the whole framework. There are general features for each level of responsibility, as mentioned previously, along with professional skills to describe competency. These skills are broadly defined and precisely described for what it means to practice the skill at each proficiency level. As shown in the example in the figure below for (level 4):



Figure (8): SFIA, professional skills meet generic attributes

SFIA skills are grouped to assist the users in role profiles or job descriptions, or who are building an organization's IT competency framework. These skills are grouped into categories and subcategories for the convenience of users.

Each skill is presented consistently, with a brief overview description of the skill, followed by what it means to practice the skill at each relevant level of responsibility. The table below shows the structure of SFIA professional skills and how it is constructed:

Structure of the SFIA professional skills					
Skills are constructed with the following reference details:					
Skill name:	The name used for reference purposes				
Skill code:	A unique code used as a short reference for the skill				
Skill description:	A broad definition of the skill, without any reference to the levels at which it might be practiced				
Level description:	Definitions of the skill for each of the levels at which it is practiced. The phrasing facilitates their use as professional competencies.				

According to SFIA, it is updated frequently to remain relevant and aligned with the needs of industry and business and current thinking.

Based on the interviews, analysis and the findings of this study, the brainstorming session, and after examining the experiences of some other countries which were relatively successful in solving the problem of the gap between the outputs of higher education and the needs of the labor market for the information technology sector, such as Singapore and India and some other OECD countries, the researcher proposes this framework which could be considered as a base to developing a strategy to overcome this gap:

- Defining a vision for the future of information technology that achieves technological transformation.
- Formation of an official body or entity by the Prime Minister in order to create a framework for ICT skills and Job requirements. This body consists of specialists and experts from all related stakeholders in this field, whose goal is to create a unified professional framework for this sector based on international standards. It is also possible to establish partnerships with countries or specialized institutions in this field to benefit from their expertise or for advice, such as: Infocomm Media Development Authority (IMDA) and Skills Framework for the Information Age (SFIA Foundation).
- The work of this body or entity should be ongoing and permanent, so that framework is reviewed periodically due to the rapid accelerating change and the emergence of new occupations and skills in the ICT sector.
- The outcome of this body or entity should be approved by the cabinet and reflected on the National Qualifications Framework (NQF), and should be considered as an official reference in each of the Higher Education Council for the purpose of setting educational policies accordingly, as well as an official reference, for the Accreditation and Quality Control Commission, for the purposes of accrediting programs and majors for information technology and controlling their quality. It also should be a reference to the Ministry of Labor as part of the Standard Occupations Classification regarding ICT sector.
- Setting plans for constant coordination and permanent interaction between the relevant parties of ICT sector to implement the vision in a comprehensive and integrated manner.

- Preparing and supporting the ICT labor market, organizing it and directing it according to the vision that has been adopted, and providing the appropriate conditions to maximize job opportunities in this sector and encourage investment in it.
- Different means of funding and monetization should be explored to guarantee the sustainability of the approved framework body for ICT skills.

### **5.5** Conclusion

After completing the scientific research procedures, using the aforementioned methodology, tools, data collection and analysis and showing the results, it was found that there is no clear strategic thinking regarding ICT sector by policy makers, lack of comprehensiveness integrated strategic plans for this sector, poor coordination between all stakeholders, weak formation of the HEC as there is no formal representation for the most important institutions in it such as ICT, the accreditation and quality assurance system for higher education institutions is conventional, weakness and fragility of the labor market as a result of the chaotic situation and the absence of laws to regulate it, in addition to the lack of in-depth statistics and studies whether for ICT higher education or for ICT labor market. Therefore, some actions must be made based on these finding to confront the discrepancy between higher education outcomes and labor market needs for ICT sector, most importantly : Develop a strategic thinking about the future of ICT sector in Palestine, embrace the ICT sector as a priority on the national policy agenda as a vital sector to enhance the economical and societal development and as a gate to the global Hi Tech and economy, re-structure HEC and engage the ICT sector as a permanent and essential part of it, establish units in the MOL to study, analyze the labor market and monitor its trends and needs according to the active productive sectors (i.e. ICT sector), review the accreditation and quality mechanisms of ICT programs and giving more attention to the practical side and its tools. The researcher suggested a brief outline that could be as a base for a strategy.

There remains a need for broader studies on this topic to confirm and support these findings and also for the constant change in the ICT sector.

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# Annexes
### 1- List of ICT Academics interviewees

- 1. Dr. Ra'fat Amarneh / Arab American University.
- 2. Dr. Mohammad Mir'i / Arab American University.
- 3. Dr. Wael Hassouneh / Al Quds University.
- 4. Dr. Wasel Ghanem / Birzeit University.
- 5. Dr. Mohammad Hussein / Birzeit University.
- 6. Dr. Sami Taha / Palestine Polytechnic University.

### 2- List of ICT Students interviewees

- 1. Ali Tamrawi /Arab American University.
- 2. Mahmoud Othman / Arab American University.
- 3. Mu'ath Alawneh / Arab American University.
- 4. Abdullah Abu Hilal / Al Quds University.
- 5. Anas Hamdan / Al Quds University.
- 6. Mahdi Kharrousheh / Al Quds University.
- 7. Ahmad Fahed / Birzeit Unirversity.
- 8. Jana Abu Rmeileh / BirzeitUnirversity.
- 9. Ayham Hashish / Birzeit Unirversity.
- 10. Fares Hamdan / Birzeit Unirversity.
- 11. Mais Sbeih / Birzeit Unirversity.
- 12. Rateb Rimawi / Birzeit Unirversity.
- 13. Mustafa B'eirat / BirzeitUnirversity.
- 14. Ghaid Al Eweiwi / Palestine Polytechnic University.
- 15. Yousef Abu Rayya/ Palestine Polytechnic University.

### 3- List of -ICT- Companies interviewees

- 1. Saleh Khader/ Paltel.
- 2. Randa Samara/ Exalt.
- 3. Mahdi Turkman/ Experts.
- 4. Nadia Khattab/ Asal.
- 5. Ibrahim Jaffal/ PITA.

### 4-List of Policy Makers interviewees

- 1. Abdul Karim Daraghmeh / Director General of Planning / Ministry of Labor.
- 2. Samer Salameh / Deputy of Ministry of labor.
- 3. Fadi Darghmeh / Ministry of National Economy.
- Dr. Ahmed Osman/ Director General of Development and Scientific Research / Ministry of Higher Education and Scientific Research.
- Muheeb Abu Loha /Secretary of the Higher Education Council/ Ministry of Higher Education and Scientific Research.
- Moammar Shteiwi / Chairman of the Commission (AQAC)/ Ministry of Higher Education and Scientific Research.
- Murad Barhoumi /Deputy Director General of Planning / Ministry of Telecommunications and Information Technology.
- 8. Iyad Ereikat / Director of The National Center for Technological Innovation and Innovation/ Ministry of Telecommunications and Information technology.

### 5-Interview questions directed to academic supervisors in Faculties of Information Technology in Palestinian universities

- Are the curricula provided for students constantly updated according to developments in the fields of information technology?
- 2) Do you think that mandatory courses are sufficient?
- 3) What is the list of technologies used in teaching that enhance skills-based learning?
- 4) Are there internship programs for students and what is its percentage of the academic load?
- 5) Is there fieldwork for students and what is its percentage of the academic load?
- 6) What are the additional materials, skills, activities, events, workshops, etc.... that are offered to the students related to ICT activities?
- 7) Do you think that the ICT graduate from your university is provided with the capabilities necessary to compete in global markets?
- 8) To what extent, do you think, there is cooperation between the university and the private sector with regard to training and qualifying graduates in the ICT sector?

### 6-Interview questions directed to graduate students or prospective graduates in ICT departments:

- 1) Do the graduates have the scientific and professional skills that would help them work in their specialty?
- 2) Are the graduates constantly updated with the latest information related to their major?
- 3) Are students aware of the goals of the college and the goals of the labor market institutions?
- 4) Are the ICT programs and systems which students study or use within the campus, modern and fit with the requirements of the local and international labor market in the field of specialization?
- 5) Does the graduate have training or non-training programs available before graduation to facilitate his integration into the labor market?
- 6) Do the theoretical subjects in the college or university match the applied work based on the experience of the training period?
- 7) Does the college have the required laboratories to achieve the competencies required for labor market institutions?
- 8) Does the college seek to find jobs in institutions and companies for graduates?
- 9) Does the college seek the help of experts from market institutions to teach some specialized courses and training?
- 10) Does the college administration pursue its graduates during practical training in labor market institutions?
- 11) Do you feel, as a graduate, that you possess the capabilities required to compete in global markets?
- 12) Did you find, as a trainee in the labor market, any differences between academic education and actual work during the training period?

### 7-Interview questions directed to the Palestinian ICT companies

- 1) What types of technologies and techniques are used in your company?
- 2) Are there technologies expected to be added to develop work and keep pace with the advancement of technology regionally and globally?
- 3) What are the expected skills and competencies do your company require from workers or ICT graduates?
- 4) How long does it take to train the graduates on the technologies used by the company?
- 5) Do the ICT graduates have the capabilities to use technologies, programs, activities and skills required by your company?
- 6) Do you think that they as fresh graduates- have the capabilities to compete in global markets?
- 7) Does your company provide an opportunity for graduates to have scientific training in work sites?
- 8) Does your company participate with the college in supervising graduation projects related to the labor market?
- 9) Does your company adopt creative ideas and provide incubators for them, whether during the training period, work, or support for creative students?
- 10) Have you encountered problems related to employing fresh graduates in terms of knowledge or skills in the field of ICT? What are these problems, if any?

### 8-Policy makers interview list of questions

### The following are the unified main questions; some extra questions were added during the interviews in terms of the Ministries' field of specialty.

- 1. Do you have a comprehensive and integrated strategic plan that includes ICT sector?
- 2. Do you have an alternative plan, or plan B?
- 3. Is there communication and coordination with all stakeholders?
- 4. Is there a Monitoring and Evaluation separate body in your institution?
- 5. Do you have measurement indicators for operational plans?
- 6. Is there coordination and relationship with local higher education institutions regarding ICT sector?
- 7. Do you have any representation in the Higher Education Council and the Accreditation and quality Assurance Commission (AQAC?)
- 8. What is your role regarding vocational and technical training for ICT students and graduates?
- 9. To what extent is your knowledge of labor market institutions in general and ICT institutions specifically, especially medium sized and small businesses, and do you have data or follow-up systems for these companies?
- 10. To what extent are you involved in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector
- 11. Do you have recommendations regarding the ICT sector and the gap between education and industry?

#### 9- Phase Two interviews

### Fadi Daragmeh

#### **Ministry of National Economy**

### 1. Do you have a comprehensive and integrated strategic plan that includes ICT sector?

We had a plan for the national economy, which is the(National Strategy For Export 2014-2017), that mainly focused on the communications and information technology sector as it is a promising and accelerating sector at the same time, it is also a sector that has advantages in Palestine, including: an abundance of graduates in this sector, low labor costs compared to neighboring countries or abroad, in addition to that, this sector is a pillar of many sectors such as industry, agriculture, transportation, health and education.

There is also the Ministry's Strategic Sectors plan (2017-2022), this strategy focused on innovation and creativity in several fields. We are eager to have an effective information technology sector with a strong and solid infrastructure for local or foreign investment to base on. MNE focuses on doing business, which is the Doing Business report issued by the World Bank annually, with ranking for about 194 economies, meaning 194 countries.

So, the sectoral strategy focused on developing business services, this leads to improving the business environment and targeting micro, small and medium enterprises, as it is an essential source for the local economic development and the Gross Domestic Product (GDP). There is also a strategy for the Industrial Estates Authority from the beginning of 2020 to 2024, which is an independent body; the Chairman of its Board of Directors is the Minister of National Economy. The information technology sector operates through three axes: Technology Parks or Cities, the second axis, it is related to the technological incubators and accelerators and the third axis, which includes vocational training centers, that are mainly concerned with training and qualifying university graduates from the vocational and technical sector, who were provided with

the theoretical materials during their university years with little focus on the practical side.

### 2. Do you have an alternative plan, or plan B?

During the Corona pandemic, for example, we were contacted by the Cabinet to develop a vision to address the effects of the pandemic. The solutions for the Ministry of National Economy were prepared within a week on the short-term, medium-term and long-term levels, i.e. until after the Corona virus.

### 3. Is there communication and coordination with all stakeholders?

Yes, for example, our strategy for smart industrial cities was carried out with the participation of all stakeholders and any organization related to this issue was involved. This strategy started at the beginning of 2020, and then the pandemic occurred, thus an extension of it will occur until the end of the crisis.

#### 4. Is there a Monitoring and Evaluation separate body in your institution?

The one who undertakes this task is the Policy, Research and Planning Department of the General Administration of International Relations

#### 5. Do you have measurement indicators for operational plans?

Yes of course, the Ministry of Economy is based on these indicators

### 6. Is there coordination and relationship with local higher education institutions regarding ICT sector?

There is contact with Khadoori University, and there is also the Techno Park or the Palestinian Technological Park in partnership with Birzeit University, launched by the Ministry of National Economy in 2019 in cooperation with the United Nations Industrial Development Organization (UNIDO) in order to establish a specialized laboratory for product development and creative industries designs, and emerging technologies in the Palestinian national economy. This center can provide spaces or services for innovators, creators and businessmen to develop their designs, products and brands. They have experts in design and innovation at the local and international levels and help them market products in global markets by virtue of the agreements signed with those countries, and the products include software and services, not only tangible goods.

### 7. Do you have any representation in the Higher Education Council (HEC) and the Accreditation and quality Assurance Commission (AQAC?)

We are not represented in HEC, as most of the existing members are from the Ministry of Higher Education and its affiliated bodies. As for AQAC, I'm not quite sure that.

### 8. What is your role regarding vocational and technical training for ICT students and graduates?

Within our strategy, there are four industrial cities: Tulkarm, Jericho, Hebron, and Bethlehem. These cities will include vocational training centers to help graduates. At the beginning of 2020, a decision was issued by the Council of Ministers to establish a technical university for vocational and technical education.

### 9. To what extent is your knowledge of labor market institutions in general and ICT institutions specifically, especially medium sized and small businesses, and do you have data or follow-up systems for these companies?

This is a very important question, and its answer is two parts: The first is that we do not have in Palestine a unified and specific definition of SMEs, which is currently determined by the capital and the number of employees, but we, as a Ministry of Economy work with the European Union on an unified definition for the SMEs and it will be ready and approved by the Council of Ministers very soon. As for the second part, we have the Innovative Private Sector Development project (IPSD), which is funded by the World Bank. The main objective of this project is to reduce the market failures which are linked to the gaps in the digital economy business ecosystem. It focuses on Home Based Business and how we can organize this sector. To solve this problem, there is cooperation with experts from the Ministry, the World Bank and the private sector to provide some kind of incentives to those with entrepreneurial ideas, such as exemption from taxes or registration fees. How do we know who these companies are if they are not registered? Here, we contact these companies and encourage them to register to be included in the beneficiary categories. There are amazing creative ideas in the country; we ask them to register with us to obtain this support.

### 10. With regard to electronic commerce, how is this type of commerce organized?

It is not possible to set controls and precautions without a law. We do not have a law for electronic commerce, and basically, we do not have a foreign trade law according to the Paris Agreement. It is difficult to formulate and pass a law without having control.

## 11. To what extent are you involved in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector?

There is a real problem in the issue of the skills gap between what is provided by educational institutions and the needs of the labor market, as most employers and business owners have difficulty filling the vacant jobs. As for university graduates of information technology specialization, employers indicate that these graduates do not possess all the skills to fill a specific vacancy, not only in vacancies for senior positions, but also in small jobs. Here comes the role of the government to encourage harmonization between institutions of higher education and the private sector, meaning that strategies are developed by public and private sector institutions and those involved in non-governmental institutions, each in its own role and specialization. The government in general and ministries in particular, and I assume that there should be ministerial committees from which technical committees emerge to gather ideas and parties in a unified path. Regarding the information technology sector, it is the only sector in Palestine that is growing rapidly in relation to other sectors, and this sector has the skills and competencies of programmers and engineers who work as outsourcing abroad. Here comes the role of the Ministry of National Economy, according to the mentioned strategies.

### 12. Do you have recommendations regarding the ICT sector and the gap between education and industry?

The ICT sector as it is a promising and accelerating sector at the same time, it is also a sector that has advantages in Palestine, including: an abundance of graduates in this sector, low labor costs compared to neighboring countries or abroad, in addition to that, this sector is a pillar of many sectors such as industry, agriculture, transportation, health and education. We, the Ministry of National Economy, consider it one of the most important sectors, and should support it within the projects that are funded by donors.

#### Muheeb Abu Loha

### Secretary of the Higher Education Council (HEC)/ Ministry of Higher Education and Scientific Research.

### 1. What are the elements of the Council of Higher Education and what is its role?

The Higher Education Council consists of 24 members consisting of 6 periodically selected university presidents and 18 other members (4 members of the Ministry and 14 members from the private sector, a representative of one of the unions, the accreditation and quality assurance commission (AQAC), a representative from the Diaspora, a representative from the Palestinians of 48 areas).

### 2. How is the Information Technology Sector represented in HEC?

As for the representation of the ICT sector, Al-Wataniya Company is a member of the Council this year. There are so many bodies and unions, so it is impossible to engage them all at one time. But it does not include the Ministry of Telecommunication and Information Technology.

# 3. When I looked for the decisions issued by the Higher Education Council on the Ministry of Higher Education and Scientific Research website, I could not find any of the decisions there. Why are the decisions issued by the council not published?

The generalization of decisions is done through the members; meaning that the universities that are members of the Higher Education Council, for example, after approval of the session and decisions, they are either circulated or not generalized within the university, this is up to them. As for universities that are not members of the Council, they are not notified unless they contact the Ministry in a case such as accrediting a program at the Accreditation and Quality Authority, and for the Commission, its role is only if this program meets the criteria set by the Higher Education Council or the Ministry and is not based on demand and market needs. There must be justifications for this program and knowledge of the study plan for it and analysis Comprehensive and complete for it in terms of opportunities, challenges, strengths and weaknesses, then it is evaluated and accordingly it is either accepted or rejected.

### Moammar Shteiwi

### Chairman of the Accreditation and quality Assurance Commission (AQAC)

### **1.** As a permanent member of the Higher Education Council, is there representation of the ICT sector in the Council?

It is difficult to represent all variables and all sectors, and this is a council for making policies not a technical, executive council to involve all sectors in it.

### 2. Don't you agree that the ICT sector has become intersecting with other sectors, and therefore it is essential to be represented in HEC?

Of course it is an important sector, and it is the base infrastructure for all other areas. However, not all institutions can be represented.

3. What about the Ministry of Telecommunications, for example, which one of its main tasks is to provide the infrastructure in this area, which is required by all institutions whose information technology has become an integral part of all their work?

The subject of E-learning is a technical issue, so there should be a representative from the Ministry of Telecommunications, but if we want to talk about policies and we need a technical opinion, then the Ministry of Telecommunications or any party related to that is invited.

### 4. To what extent do AQAC have influence over the accreditation of programs and majors in universities, especially programs related to information technology? What are the mechanisms for program accreditation?

We have influence in this field, not by obligation, but by dialogue. Discussions are made about the new proposed specialization or the existing programs for the purpose of merging similar programs or closing ineffective programs that are not of good demand, which are the typical programs with high surplus of graduates has been closed, and we have closed approximately 180 program. In the field of information technology, we

requested in the last call for accreditation programs that only programs related to Data Analysis and Artificial Intelligence to be presented, and good programs were presented accordingly. Our policies change as policies change in the world, and we develop our needs accordingly.

There is a general policy of the government regarding the needs of university majors. As well as the global reality that imposes itself, such as the Corona pandemic, this led to the review of some disciplines, and the search for the adoption of new programs.

As for the technical evaluation, we have a standard reference guidebook with certain criteria, in which the subject of accreditation is discussed. This year, 2020, a decision was issued by the Council of Ministers, to form a Council for the Accreditation and Quality Commission. The decisions are no longer related to the Ministry of Higher Education and the Accreditation and Quality Commission, but the decisions become issued by the Commission's Board according to the decision issued on 11/5/2020. This council consists of ten members in addition to the Minister of Higher Education as the Chairman of the Accreditation Board. Eight of the members are specialists from the public and private sectors, including those with previous experience in universities as university presidents and former deans. It is worth mentioning here, that the Ministry of Labor is a member of the Commission's Board for its important role in clarifying the labor market situation and its needs.

5. With regard to information technology, is there coordination between you - as an accreditation and quality body - and the labor market institutions operating in this field?, especially since according to the results of the first stage of my research, universities are not keeping up with the rapid development that is taking place in the labor market in the information technology sector?

We changed study plans for 60 programs in four sectors, tourism, health, administration, and now we are working on program management. The change mechanism takes place in cooperation with the private sector and employers in general. But we haven't reached the ICT sector yet.

6. As a result of the interviews with ICT companies and the Palestinian Information Technology Association of Companies (PITA), it showed that there is a real problem with the practical side and skills of ICT graduates, which forces companies to spend the effort and money to train graduates or new employees, so this topic is worthy to be discussed with the universities, reviewing curricula and increasing materials that gain students the skills needed to be included in the labor market smoothly?

This is difficult to do now, but we are studying the possibility of switching to dual studies programs to go beyond training and skills in many disciplines. We also intend to encourage universities to switch to dual studies.

### 7. Do you have a studies department to study the issue of the gap between higher education outcomes and the labor market?

In fact, we do not have a market so that we can align our graduates with this market, it is a fragile, weak, distorted and unstable market and therefore planning based on the market is incorrect.

#### 8. How do you think this problem can be solved?

We are facing a great problem between economy and the occupation how is it possible, for example, to build plans to prepare students for the specialization of agriculture, while at the same time the lands of the Jordan Valley and agricultural areas are confiscated?

#### 9. Is there anything you would like to add in the search field?

The relationship of accreditation in public sector service must be highlighted. An example of this is that we have stated that there is a severe shortage of some specializations in the Ministry of Health, when we are looking into the possibility of adopting programs to provide the necessary cadres. Also, in the issue of scientific research, as it is weak and should be given more attention as a supporter of government approaches.

#### Samer Salameh

Deputy Minister, Ministry of labor.

### 1. Do you have a comprehensive and integrated strategic plan that includes ICT sector?

Yes, we have a strategic plan, and we are currently working with the General Secretariat of the Prime Minister to update the plans

2. Within your strategic plan presented on the Ministry of Labor's portal, professional units have been established in eleven universities in the West Bank according to a memorandum of understanding signed by the Ministry of Labor to integrate graduates into the market. What exactly is the aim of these units? And do they still exist within the campuses, as during my interviews with universities, these units were not mentioned at all?

I am not surprised that they did not mention them, these units are effective, but the question is: to what extent are they effective? They do exist, but in a weak way, and provide services to students. We established them to fill the skills gap, and to prepare the students to enter the labor market, this is basically its role. In addition to the fact that these units work to facilitate students' access to the labor market through (Job Sales) programs, and the activities that they do (employment activities), but unfortunately, since its establishment in 2013, the universities have not paid attention to them. On the other hand, the universities have not structured these units within their structures, and there is an internal struggle within the universities over them, therefore, there are some universities cope with these units and others are against them and have similar bodies like these units within the campus, which weakens our role.

### 3. Do students know about these units?

I think that many students don't know about them. It depends on the students themselves, there are students who are looking for this, but the largest part doesn't, for example, the Arab American University which is located in Jenin, all students know, this is due to the students themselves.

### 4. In your opinion, what should be done to strengthen these units in the universities?

The solution, in my opinion, is to establish fixed units for this purpose in universities, and to invite stakeholders to cooperate with them, such as the Ministry of Labor. We may have a representative in it instead of having an independent unit there. In this way, the work becomes joint and unified. I think that most of our universities have not reached sufficient maturity that their responsibility extends to after graduation, there is no follow-up with the student, and this may be due to the fear that the graduates will understand that the university is responsible for their employment. When working in this context by universities, it is just an attempt, but not in the form of a permanent and fixed body whose function is to facilitate and coordinate between the university and the labor market.

## 5. Employment services still face many challenges, including the lack of effective structures and processes to evaluate the labor market, what is the reason?

As for the nature of the Palestinian labor market, it is a fragile and a weak labor market, dominated by small and micro enterprises, not medium ones, and the greater part of them are family enterprises and unorganized establishments. This means that it is an unorganized labor market. It needs tremendous efforts and much sophisticated tools. In America and Europe they have Small Business Association (SBA), which we don't have, all businesses are registered and there is a database that can be accessed easily. While we do not register even for Small micro businesses, no one knows about them or even what they do or operate. This is considered irregular because more than 90% of Palestinian market is small and micro-enterprises, 9% are medium-sized and 1% is large organized enterprises. Practically, organized firms are medium and large, which do not exceed 10% of the market size. The labor market is difficult to monitor and forecast based on the trend of development as long as it is not regular or unorganized.

6. Why don't you divide your work it in sectors?, for example, a detailed industry sector, agriculture, technology and others, and deal with each sector in all aspects, in terms of studying, analyzing, planning, implementation, etc.?

The government has included this in the strategy, they focus on the issue of cluster development and this is important, so it has become mandatory for us to develop cluster based on sectors as labor market permanently.

7. Can you create a unit similar to the model of your units in the universities? Assigning employees who will be responsible for evaluation and monitoring of these issues that could accelerate the process of being able to monitor and list the problems for each sector separately?

It is worth considering, we have done studies, and we have a sectoral study along with the Belgians, but our main problem lies in the structure of the labor market.

### 8. What can you do to organize the labor market so that its features are clear and defined?

There are two things that have been worked on, part of which has been completed since 2010 and the other has not been fully accomplished, which is:

1- Standard Occupations Classification. 2- Occupational Work Organization Law.

- The standard classification of occupations is fulfilled, because it was implemented at a regional level and was approved by the Arab Labor Organization, as an Arab classification, and in 2009-2010 it was approved by the government as a standard classification for professions in Palestine. It certainly needs revision because we are talking about 10 years. This standard classification exists, but unfortunately it is not applied yet, because we do not have a law to regulate professional work. The laws in which we work according to, is not related to a standard classification of professions. At the level of the Ministry of Labor, there is a problem when drawing up laws because they affect

the interests of many people, for example, (the Social Security Law), and therefore what must be accomplished is a law to regulate professional work based on the standard classification of professions.

The current situation of the market is a chaotic open market; most of worker, work in a field other than their specialization because there are no controls or licenses. The issue of licenses exists for some professions that have professional unions, such as doctors, engineers and lawyers, and these are the ones who give licenses or practice the profession and organize themselves by themselves, but we are talking about other professions. Our proposal is to establish trade unions for the professions to carry out the same tasks as other existing unions. For this, we must have an approved standard classification of professions, then the labor market is organized accordingly, and we can measure the quantitative gaps, qualitative, skill and specialized. We have the standard classification that we have done; we have reached more than five thousand professions. But now it needs updating and approval. And then, It should be followed by an admitted law.

### 9. Regarding the outsourcing matter, either locally or abroad, what is your role in providing job opportunities?

This role exists in our structure and it is called (employment abroad), but unfortunately most of our relationships to organize work within the Green Line. Meanwhile, our role for abroad outsourcing is limited. We tried to do a program with Qatar and the Gulf countries, which has not yet been implemented because most of the Gulf countries do not recognize Palestinian passport to conclude work contracts.

### 10. Is there communication and coordination with all stakeholders?

There is lack of communication among ministries, we cannot deny that. Yes, it is true even though we have a strategy. The Higher Education Council for instance, or any related bodies in higher education such as the Accreditation and Quality Commission in which there is no member representing the Ministry of Labor. How higher education as a supply introduces specializations related to the labor market, without engaging us in this process or at least they should take the opinion of the labor market?. This puts us in front of a challenge in this area. We must be within this framework, and when it comes to the labor market and its needs, here comes the role of the representative of the Ministry of Labor to present the correct data in this matter.

As for the Demand Side, in our strategy there is a term called "Active labor market policies", which refers to applying active labor market techniques. In order to apply them, we need the Ministry of National Economy's collaboration. We do not deny that until now there may be coordination at the level of ministers or heads of departments, but it is not systematic or framed. We did not reach maturity unless we have an integrated and interconnected system with each other. We should get the required information by one click. Even at the level of donors sometimes they present an unacceptable idea, and if it is not approved, the idea goes to another ministry that has nothing to do with the topic.

#### 11. Is there a Monitoring and Evaluation separate body in your institution?

We have, but not in a systematic way, the process takes time and we work on it in an incomprehensible way. There should be a solid M&E system to evaluate and be result oriented.

#### **Abdul Karim Daraghmeh**

### **Director General of Planning / Ministry of Labor**

### 1. Do you have a comprehensive and integrated strategic plan that includes ICT sector?

Yes, of course, the Palestinian government announced a national policy agenda (2017-2022) setting priorities, and accordingly sector plans were prepared for all sectors, including the labor sector, and we prepared our strategic plan in at the time. When the current government took over, it did not eliminate the agenda but rather introduced some priorities, clusters development giving more attention to vocational training as priorities. The priorities are still largely the same and have not changed, but Corona obligated the ministries to make rapid national response plans, and this is what Ministry of Labor has done. At the same time, a review of the labor sector plan is currently underway as requested by the government to amend the sectoral strategies; we almost accomplished it in cooperation with our partners. The review included the activities more than the main objectives as our goals and priorities in the labor sector are still constant. We are concerned with employment issues and improving its services as a strategic goal due to the increase in unemployment rate especially in the light of the pandemic, and we are also interested in the issue of providing skills in the field of vocational and technical training and matching them to the needs of the labor market, adding to that, the issues of law enforcement and decent work in the labor market, in addition to issues of social protection and social dialogue, which include partner parties in the labor sector.

#### 2. Do you have an alternative plan, or plan B?

In normal conditions, no, but in the event of an emergency that impedes the implementation of the plan, emergency committees are formed to start working according to it. Now, for example, in light of the Corona pandemic, we have started working on a response plan at the request of the General Secretariat of the Prime Minister.

#### 3. Is there communication and coordination with all stakeholders?

During strategies preparation, everyone participated in preparing these plans. In our sector (the labor sector), our partners are representatives of workers, which are trade unions and those who represent the private sector. There is broad participation with all related parties. As for implementation, there is coordination, but it is not sufficient and needs more efforts, especially in areas related to the financial aspects. As for the Ministry of Education and Higher Education, in terms of vocational and technical education, there was the Supreme Council for Technical and Vocational Education and Training previous government, but the current government formed committees to reconsider where the subject of vocational training is one of the its priorities. These committees made a decision to form a coordinating body for vocational training and to include all governmental and non-governmental parties, including the ministries of labor, education and higher education, and everyone who has vocational training centers or provides training programs. We hope that this body will reach a conclusion, whether at the level Policy in terms of policies and planning for the need to unify this system, or at the level of integration by forming a ministry for vocational training. Research is still ongoing in this aspect and there is great cooperation between us and the Ministry of Education. The Ministry of Economy is also among our partners, they are present with us in the committees, in addition to the Ministries of Social Affairs and Woman affairs, and sometimes the Ministry of Finance. These are our main partners in all committees, coordination and communication takes place within these committees.

### 4. Is there a Monitoring and Evaluation separate body in your institution?

There is no separate body for monitoring and evaluation, this process is not completely institutional. We submit our monthly, quarterly, semi-annual and annual reports to the Internal Control Unit, and we also submit reports to the General Secretariat of the Council of Ministers within the framework of the strategic results and measurement of indicators.

### 5. Do you have measurement indicators for operational plans?

Of course, the labor sector is one of the sectors that have many specific indicators, and they are officially approved indicators at the state level and are also linked to the global development goals. The labor sector has more than 23 indicators, these indicators we are now working on, and there is a direct and indirect part related to policies on issues such as: unemployment, employment, and women's employment. There are indicators in the ministry's records such as work injuries, vocational training issues (quality of training, training centers, numbers of graduates), which are all specific and measurable indicators. But the question is what the accuracy rate is? There are excellent results because from the beginning we try to be realistic when developing the plan. Some results are not achieved or not as required due to the financial situation and weak budgets, especially for development projects that need high budgets? In addition to the changes on the ground related to the practices of the occupation in terms of geographical division, barriers and obstacles, and the inability to reach the facilities. In addition to the general state of unemployment that forces the unemployed to accept unfavorable or decent work conditions. In addition to the weakness of some economic activities that need a better economic environment in order to be able to develop.

### 6. Is there coordination and relationship with local higher education institutions regarding ICT sector?

Of course, we have employment centers in all universities, and we work to hire students in all sectors, including the information technology sector, and most of the committees invite experts from universities to participate in our work, but things do not take the official and organized type.

### 7. What is your role regarding vocational and technical training for ICT students and graduates?

We have training centers, but it's worth mentioning that the prime minister's vision to establish a university for vocational training, and developing existing centers, whether they are private or governmental. This is an investment in human resource and redirection of its resources.

### 8. To what extent is your knowledge of labor market institutions in general and ICT institutions specifically, especially medium sized and small businesses, and do you have data or follow-up systems for these companies?

We study the market in general not by sectors, we may benefit from some studies carried out by some research centers. It is true that the information technology sector is one of the most important sectors, especially after the pandemic, for the purpose of distance education and others, but the changes are rapid and multiple, although this sector is one of our priorities, but this has not been done so far as in-depth studies due to the pandemic, but it is a topic that is raised in the committees among other topics. We hope that we will do this, and it is one of the important options to support the Palestinian economy, especially since the occupation's control over it is little and there is a possibility to go far in the technological sector.

## 9. To what extent are you involved in bridging the gap between the outputs of higher education and the needs of the labor market in the information technology sector?

Generally speaking, labor market's needs are inconstant, especially in the Palestinian case, as the Palestinian market is limited, small, weak and unstable due to the influence of Israeli policies, and accordingly, the outputs of higher education are not absorbed as they are in the labor market. This is as a diagnosis, and the reasons are: The weakness of the different sectors, including the private and government sectors, where they hire between (8,000 – 10,000 out of 40,000 graduates), and therefore there is a need for a great focus to be placed on the new vocational education needed by the labor market, and this is our approach as it is the global trend. This requires at the strategic level to make fundamental changes at all levels, starting from the base in terms of introducing the concept of vocational and technical training and changing the prevailing culture in society from both the students 'and parents' sides, and accepting it in the market as an investment. As for the topic of needs, needs are determined by the private sector. Change in the labor market is rapid. In each directorate of the Ministry of Labor of all governorates, there is a policy unit that monitors the needs, but we do not have research

and studies, sometimes we rely on some research and study institutions such as (MAS) or the Central Statistics bureau.

### **10.** Do you have recommendations regarding the ICT sector and the gap between education and industry?

I would like to talk about planning in Palestine in general. Given the exceptional situation that exists in Palestine of instability, plans must be more flexible, and that we have the ability to change and respond to face the continuous changes and instability in the Palestinian environment and the weak or unstable financial aspect makes short-term plans easier and applicable.

Another basic and important problem is one of the biggest weaknesses, which is weakness or poor coordination, which consumes a lot of resources and effort, and sometimes it is repeated for the same activity or the same goal.

As for the information technology sector, it is a promising sector and more attention is required to this sector, especially since the work space in it and remote work is wide and opens the way to great job opportunities for graduates, whether for university or technical students either internally or abroad, where it is possible to work remotely.

### Iyad Ereikat

### Director of Training and Development at the Center for Technological Innovation and creativity/ Ministry of Telecommunications and Information Technology

1. What type and mechanism of the training that you do for university students or graduates? Are they related to the labor market or what is expected in the labor market, and how is coordination with educational institutions, the Ministry of Labor and the Ministry of Higher Education?

The Ministry of Telecommunications has established the Center for Technological Innovation and creativity in order to establish a society of knowledge. The courses that are held are in two domains, the first is capacity building for national cadres for the government sector and graduates, these courses are free of charge, there is also cooperation with the private sector in this matter. We have 8 training halls equipped with modern equipment and can accommodate 160 trainees. The private sector benefits from the our center services for a small fee or in return for attending the training course by some of employees from our side for free if the private sector is the owner of the training, for example, in the last session which was about video production, after calculating the cost of utilizing our facilities by a private sector institution, which is equal to the fee of five trainees, we had an agreement to train five members of our ministry and the radio and television staff instead of charging them. We have a full data of the training needs of the entire government sector in our field of work, which is a good reference when the selection process is made based on the categories that can benefit from the training according to its type. As for universities, there are agreements signed with Palestinian universities to conduct training for students and graduates, the benefit here is also mutual, as we sometimes benefit from some university trainings if our facilities are used. We also have a government innovation laboratory inside the center which aims to investigate societal problems such as hospitals, traffic or transportation departments. Our next step is to help in solving them by stimulating creative solutions: first we conduct a workshop to find out the details of the problem with the relevant people, then we hold another workshop in which we gather the relevant stakeholders with specialists from universities, here comes the university academics to present these problems to students to be their graduate research papers that are at the core of the topic or problem, and from here the students' abilities and creative thinking methods are developed and their loyalty is strengthened by contributing to solving the country's problems. Now we have not officially operated this laboratory, but we are doing some work in this regard with partners and universities. At the same time, we are still looking at the experiences of others to avoid any obstacles or problems in order to officially launch it in the right way. We have signed agreements with most universities, but the Corona pandemic has suspended it.

## 2. What is your role as Ministry of Telecommunication to reduce the gap between higher education outcomes and the labor market in the information technology sector?

We monitor the new technologies required by the labor market institutions and try to communicate with students and companies to do matching and provide job in training, where the student trains and gets a job afterwards. We are creating current solutions, but we cannot interfere in changing the curricula, although we have requested the Ministry of Higher Education to reconsider the curricula in the field of information and communication technology, and to change or upgrade the study plans every 5 years, as technology is constantly evolving and changing.

### **3.** Do you have studies on the topic of the gap, market development, or the unchanging or constancy of study plans?

We, as a ministry, are responsible for information technology companies. We do not communicate with the companies directly, but we take the feedback from the Palestinian Information Technology Association (PITA), but we hope to have a greater role with all parties to reduce this gap.

### الملخص

هدفت هذه الدراسة إلى تقييم استراتيجية معالجة التباين بين مخرجات التعليم العالي واحتياجات سوق العمل في فلسطين (قطاع تكنولوجيا المعلومات والاتصالات) من المنظور الاستراتيجي الوطني والدولي.

وهي دراسة نوعية أجريت على مرحلتين باستخدام المقابلة شبه المنظمة لكلتا المرحلتين. هدفت المرحلة الأولى إلى دراسة الفجوة بين مخرجات التعليم العالى واحتياجات سوق العمل في قطاع تكنولوجيا المعلومات والاتصالات. وشملت المقابلات 6 مشرفين أكاديميين في مجال تكنولوجيا المعلومات والاتصالات و 15 خريجة حديثة أو طلاب متوقع تخرجهم في 4 جامعات محلية، و4 شركات لتكنولوجيا المعلومات والاتصالات، بالإضافة إلى رئيس إتحاد شركات أنظمة المعلومات الفلسطينية (بيتا). كشفت نتائج هذه المرحلة عن وجود فجوة ناتجة عن: ضعف تحديث المناهج والأدوات والبرامج في الجامعات الفلسطينية بما يتماشى مع التطور المستمر لسوق عمل تكنولوجيا المعلومات والاتصالات، ضعف سوق تكنولوجيا المعلومات والاتصالات الفلسطيني لتلبية الاحتياجات والاتجاهات العالمية وضعف التنسيق ما بين سوق العمل ومؤسسات التعليم العالى، وضعف الطلاب فيما يتعلق بالمهارات التي يحتاجها سوق العمل. في المرحلة الثانية، تم تقديم نتائج المرحلة الأولى إلى صانعي القرار في كل من: وزارة التعليم العالي، وزارة التعليم العالى، وزارة العمل ووزارة الاتصالات وتكنولوجيا المعلومات. تمت مناقشة سياسات واستراتيجيات هذه المؤسسات. ومن أهم النتائج ما يلي: عدم وجود فكر استراتيجي واضح فيما يتعلق بقطاع تكنولوجيا المعلومات والاتصالات من قبل صانعي السياسات ، عدم وجود خطط إستراتيجية متكاملة وشاملة لهذا القطاع، ضعف التنسيق بين جميع أصحاب المصلحة، ضعف تشكيل مجلس التعليم العالى حيث لا يوجد تمثيل لأهم المؤسسات فيه ومن ضمنها مؤسسات تمثل قطاع تكنولوجيا المعلومات والاتصالات، إضافة الى أن نظام الاعتماد وضمان الجودة لمؤسسات التعليم العالى تقليدي، ضعف وهشاشة سوق العمل نتيجة حالة الفوضى وغياب القوانين المنظمة له، بالإضافة إلى عدم وجود إحصائيات ودر اسات متعمقة سواء للتعليم العالى أو لسوق العمل تختص بقطاع تكنولوجيا المعلومات والاتصالات. وخلصت الدراسة إلى عدة توصيات من أهمها: تطوير فكر استراتيجي حول مستقبل قطاع الاتصالات وتكنولوجيا المعلومات في فلسطين يتماشى مع التطور العالمي لهذا القطاع، ووضع قطاع الاتصالات وتكنولوجيا المعلومات كأولوية على أجندة السياسة الوطنية وكقطاع حيوى لتعزيز التنمية الاقتصادية والمجتمعية، إعادة هيكلة مجلس التعليم العالى وإشراك قطاع تكنولوجيا المعلومات والاتصالات كجزء دائم وأساسى فيه، إنشاء وحدات في وزارة العمل لدراسة وتحليل سوق العمل ومراقبة اتجاهاته واحتباجاته وفقًا للقطاعات الإنتاجية النشطة (مثل قطاع تكنولوجيا المعلومات والاتصالات)، ومراجعة أليات الاعتماد والجودة لبرامج تكنولوجيا المعلومات والاتصالات. وفي النهاية اقترح الباحث إطارا لإستراتيجية خاصبة بقطاع الاتصالات وتكنولوجيا المعلومات