Reframing Construction Labour Productivity in a Colonisation Context: The West Bank as an Example

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Reframing Construction Labour Productivity in a Colonisation Context: The West Bank as an Example

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Declaration

I declare that all the material contained in this thesis is my own work and has not been submitted for any other award. To the best of my knowledge, none of the material of this thesis has been previously published or created by another person except where due reference is made in the text.

Mustafa Abedmousa

ABSTRACT

This thesis explores the under-researched topic of defining construction labour productivity and the factors impacting it in the context of a small, volatile and dependent economy of the West Bank. The aim is to identify the impact of particular social, economic and political constraints on structural and agency factors affecting the construction sector's productivity using case studies from the West Bank. Labour productivity is studied from a broad perspective, adding political and economic conditions to reframe and evaluate the term and its determinants in the context of high uncertainty, political instability and complex geography. 'Labour productivity' comes to represent the production interplay between agency and structural factors, and construction labour is treated as complementary to the machine rather than as an extension of it. The theoretical framework is developed based on Giddens' Structuration Theory, mainly the reconciliation of the multi-layers structure and agency determinants impacting construction labour productivity in the context of colonisation. The study's philosophy validates the use of mixed methods methodology, merging positivism and constructivism under the canopy of pragmatism. Quantitative and qualitative data have been collected, with the quantitative part consisting primarily of comprehensive survey data from the PCBS and the qualitative of purposive semi-structured interviews with decision makers at macro and meso levels plus analysis of multiple case studies. The results reveal that the controversy about using hourly wage as an indication of construction productivity is resolved by including labour characteristics and context-specific variables in the model. The construction sector in Israel depends on skilled blue-collar employees from the West Bank rather than unskilled ones, with a higher rate of labour mobility for those from rural areas to Israeli construction markets than from other locations, leading to skill shortages in the West Bank. The construction labour process in the West Bank also rests on low levels of vocational education and training and a high risk of accidents due to meagre experience, lack of training and improper application of health and safety regulations. Finally, Israeli control of movement within the West Bank and the outlets to international markets impacts on labour productivity by imposing restrictions on importing and transporting construction materials and the internal mobility of workers. The research contributes to knowledge through its originality and generalisation by mapping the complexity of social factors and providing a definition of construction productivity appropriate to colonisation.

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LIST OF ABBREVIATIONS

AIDA	Association of International Development Agencies
ARIJ	Applied Research Institute-Jerusalem
ASOC	Arab Standard Occupational Classification
BADEA	Arab Bank for Economic Development in Africa
BEIS	Department for Business, Energy & Industrial Strategy
BIS	British Industrial Strategy
CIOB	Chartered Institute of Building
CLC	Construction Leadership Council
CME	Construction Management and Economics
DfEE	Department for Education and Employment
ETF	European Training Foundation
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GISHA	Legal Centre for Freedom of Movement
GVA	Gross Value added
IJPM	International Journal of Project Management
ILO	International Labour Organisation
ISCED	International Standard Classification of Education
JCEM	Journal of Construction Engineering and Management
JFA	Joint Financing Arrangement
L.C.	Letter of Credit
LPS	Last Planner System
MACRO	The Centre for Political Economics
MAS	Palestine Economic Policy Research Institute
MEHE	Ministry of Education and Higher Education
MOL	Ministry of Labour
NIS	New Israeli Shekel
NQF	National Qualifications Framework

OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Square
OPT	Occupied Palestinian Territories
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PCU	Palestinian Contractors Union
PECDAR	Palestinian Economic Council for Development and Reconstruction
PHC	Palestinian Housing Council
PLO	Palestine Liberation Organisation
TC	Technical College
TQM	Total Quality Management
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNRWA	United Nations Relief and Work Agency for Palestine Refugees in the Near East
USA	United States of America
USAID	United States Agency for International Development
VIF	Variance Inflation Factor
VSS	Vocational Secondary School
VTC	Vocational Training Centre
WAFA	Palestinian News and Info Agency

CHAPTER 1:

Introduction

1.1 Research Rationale

The construction industry, which is vital for the economies of both developing and developed countries, is responsible for creating around half of the physical assets in the world (Winch, 2010) and creates employment in a particular sector and economy (Gruneberg, 2019). A built environment that makes people safer, happier and healthier by providing better buildings and infrastructure contributes to productivity in the economy and enables the rest of the economy to function efficiently (Enshassi, et al., 2006; Green, 2016; Gruneberg, 2019; Productivity Commission, 2004). Productivity improvement is the primary concern for the whole industry in developed and developing countries. Consequently, studying the productivity of construction workers could be very attractive for all construction parties since it may lead to cost-saving and efficient usage of resources (Enshassi, et al., 2007).

One of the most frequent research topics in developing and developed countries is the productivity of the construction sector and the factors influencing it (Dixit, et al., 2019; Dolage & Chan, 2013), indicative of the significant concern in the construction industry and academia that construction productivity has been generating (Dolage & Chan, 2013). A critical review of research literature on productivity in construction, selected from reputable journals with potentially high impact ratings, was carried out by Dixit et al. (2019) and Dolage & Chan (2013). According to the 2013 study, which covers articles published by the Journal of Construction Engineering and Management (JCEM), Construction Management and Economics (CME) and International Journal of Project Management (IJPM) from 1980 onwards, the share of construction productivity in the total number of publications of JCEM, CEM and IJPM was 2.76%, 2.27% and 0.94% respectively. Dixit et al. (2019) show that just between 2006 and 2017, 82 out of 5,423 articles published in seven potential journals, selected according to their average citation scores, paid attention to construction productivity.

Although the term productivity, which as a straightforward concept is defined as the ratio of output to input, has been used since the eighteenth century, both the definition and the factors affecting construction productivity have been debated throughout its history (English & Marchione, 1983; Jarkas & Bitar, 2011; Olomolaiye, et al., 1998; Sumanth, 1984 ; Tangen, 2005). The construction sector, particularly building construction subsectors, is labour-intensive. However, despite the importance of labour in construction, which can be considered the key input for the construction process, the main focus of the research has been on the output rather than the production process. Significant aspects impacting on blue-collar workers, including job security, health and safety, and valuing labour, are not profoundly discussed in most previous research (e.g. (Durdyev & Mbachu, 2017; Hamza, et al., 2019; Jarkas, 2015). One main criticism of most of the previous studies, which are 'closer to those of management than those of workers and requires prior agreement on the part of management, if it is not actually management sponsored' (Macarov, 1982, p. 14), is the omission of the labour side when discussing productivity in the construction sector at macro, meso and micro levels (Dolage & Chan, 2013).

The adaptation of industrial models, such as lean planning, industrialisation and TQM, to improve labour productivity is a striking factor in the research, particularly by researchers studying construction labour productivity in developed countries. Yet, this research and associated reports have not considered a wide range of structural, social and economic factors (external structural factors) that influence the industry's labour market, which is exceptionally complex (Dainty, et al., 2004). Currently, there is a focus on BIM and lean construction to improve productivity. However, according to Dainty et al. (2017), while industrial strategy recognises skill gaps and shortages in the sector, it is largely blind to the specific needs of firms to access the skills required to use BIM by construction firms. In addition, the level, breadth and quality of construction vocational education and training (VET) at the macro level, the fragmented employment structure in the sector (Clarke, et al., 2017), firm size and financial status (Dainty, et al., 2017) and the learning infrastructure on sites (Clarke, et al., 2017) need to be considered when discussing improving construction labour productivity. Gruenberg (2019) asserts that learning new skills appropriate to new technologies by construction workers is one of the main pillars of improving labour productivity.

However, authors who posit a link between productivity, on the one hand, and construction cost, unemployment and paucity of skilled and expert workers on the other, such as Gruneberg (2019) and Winch (2010), reduce the worker to a mere stock of capital and end up with one-dimensional analysis whereby work experience and skills, and worker mobility are just regarded as part of the accumulation of capital (Clarke, 2006). Gruenberg's (2019) view in discussing the sector's productivity has tended to treat construction labour as an extension of the machine rather than as complementary to it. Additionally, construction workers are treated as passive victims rather than actors to improve productivity. Problems, such as skill shortages and the size of construction firms, and their impact on the training of construction workers are discussed only briefly.

The most important factors influencing the shortfall in construction skills are the reduction in commitment and investment in training within the industry due to the growth of self-employment and the use of labour-only subcontractors (agency factor) (Briscoe, et al., 2000; Clarke, 2006; Harvey, 2001), the poor image of the sector (Dainty, et al., 2000), failure to develop multi-skilling as a route to overcoming an overwhelming shortage of skills (structural factor) (Chan, et al., 2010; Clarke, 2006; Clarke, et al., 2017; Scott & Cockrill, 1997), reduction in the number of people entering the construction labour market due to a demographic downturn (agency factor) (Druker & White, 1996) and the introduction of new technologies that have reconstituted the skills required (structural factor) (Agapiou, et al., 1995). Furthermore, according to Clarke and Wall (1998), the construction training system in Britain is employer-led, dominated by qualifications broken into narrow task-related units and confined mainly to the traditional trades. Many construction firms have a relatively low commitment to working towards high standards and see training and development as secondary activities (Dulaimi & Beckinsale, 2001). Accordingly, the low level of training investment in Britain, which leads employers to poach staff from each other and other countries and inflates wage rates, is one of the main reasons for higher costs and lower productivity (Dainty, et al., 2004; Prais & Steedman, 1986; Winch, 1998). Authors, such as Dainty et al. (2004), do not consider labour mobility, a significant issue affecting construction productivity in the West Bank, as a cause of skills shortages.

This thesis reveals the challenges faced by the sector in Palestine in developing labour due to the inappropriate policies of the Palestinian Authority (PA), such as overlooking

technical and vocational education, whose roots go back more than 160 years. For example, Schneller School, established in 1860, is the first foreign school in Palestine that focused on vocational, artisanal and manual training that concerns several subjects such as carpentry, blacksmithing, turnery, and pottery making (WAFA, 2022). Additionally, during the British Mandate, many vocational schools were established. Nevertheless, this type of education was not a priority for the PA's successive governments (Abdullah, 2018). Hence, the relationship between the business environment and the construction industry needs to be analysed in its social, economic and political context to have a dynamic picture of the factors impacting construction productivity. In all research carried out in developing countries, particularly in Palestine, the type of VET and employment system, firm size and financial position, and the presence of two attractive Israeli markets, as well as how the three construction sub-sectors differ in their dependency on non-labour and machinery, have rarely considered.

While economic risk covers shortages in resource supply and availability, including materials, labour and equipment, political instability, war threats and delays in obtaining governmental approvals and building permits are considered under the category of political uncertainty (El-Sayegh, 2008). The harmful impact of political instability on economic performance, which also affects the construction sector's performance, has been studied by several economists, e.g. Alesina & Perotti (1996) and Fielding (2003). Political instability has harmed construction productivity and negatively affected investment in the construction sector (Alesina & Perotti, 1996; Asteriou & Price, 2001; Fielding, 2003). Political instability is associated with lower productivity growth, increasing uncertainty, and disruptions in productive activities. Consequently, an increase in crowding out of the investment, postponement of projects, a fall in the productivity of labour and capital and emigration of those with a high level of human capital are to be expected (Aisen & Veiga, 2013; Alesina & Perotti, 1996). According to Fielding (2003), construction investment is more sensitive to political instability than machinery and equipment investments. Political factors have been considered by construction contractors as among the causes of business failure in Palestine (Enshassi, et al., 2006). In the West Bank, both categories, i.e. economic and political, should be studied hand in hand since the former is a consequence of the latter.

The sequence of events provided in ***Table 1A. 1***, which summarises significant events and their impact on the Occupied Palestinian Territories (OPT) since 1922, shows that the OPT, which includes the West Bank, the eastern part of Jerusalem, and the Gaza Strip, is politically unstable. One of the main sectors adversely affected by these political situations in the OPT is construction. Significant parts of the West Bank land, an essential resource for developing the construction sector, have been expropriated and confiscated by Israel. Thus, many Israeli restrictions have constrained the development of the construction sector to effectively meet Palestinian housing and the physical infrastructure requirements of other sectors.

The West Bank, 60% of whose area Israel controls, is a de-facto landlocked territory, aggravated by Israel's unilateral control of borders and transport facilities. Accordingly, the Palestinian construction industry's five factors of production- land, labour, capital, materials and equipment- have been affected by Israeli occupation policies and by the political instability in the West Bank. When searching the Google Scholar repository for "construction labour productivity in Palestine," only three publications were found directly investigating various factors of impact on labour productivity. Due to the paucity of research in this field in the Palestinian territories, there is an opaque problem in discovering the attributes and factors affecting the sector's productivity related to economic and sociodemographic changes and political instability. Extracting these is confronted with the further challenge of merged economies, given the interdependency between the Israeli and Palestinian construction labour and material markets. As labour is the most crucial asset for any construction project (Chan & Kaka, 2003; Blenkinsopp & Scurry, 2007; Price, et al., 2004), the central concern of this thesis is to look at construction labour productivity in the construction sector in the context of colonialism and focus on the definition and determinates of construction labour productivity for a small, volatile and dependent economy that is controlled by a robust economy of the occupation country where the labour mobility is allowed, such as the case of the West Bank.

1.2 Research Significance

The thesis draws from the ongoing debate on definitions of labour productivity and the factors impacting it. In this thesis, labour productivity, which appears to be in greater and greater disarray and poses issues on which people differ, has been studied from a broader perspective that adds political and economic conditions to this dilemma. The uniqueness of

the Palestinian context, the political instability, the status of uncertainty under occupation and the issue of ‘statelessness’, as well as the existence of two robust Israeli construction markets that play crucial roles in shaping the economy and its resources, call for new means to interpret, read and assess productivity in the construction sector beyond its conventional definition.

Factors impacting productivity at different levels, which are often interdependent and influenced by each other, can be divided into structure and agency and, together with definitions, cannot be isolated from their temporal and spatial contexts. Most articles and reports consider productivity in technical terms and adopt technical solutions, such as BIM, standardisation and modularisation, to enhance it. Although the construction industry has a social dimension, few articles and reports adopt socio-technical approaches. Human agents are not only creative and experiential beings, but their contexts of action constantly shift. Thus, research programmes, which commonly adopt the positivist research tradition, often fail to untangle the dynamic and contextual relational links between agent action and structures (Guy & Henneberry, 2000). Accordingly, having a theoretical framework within a context and a constructivist methodology that allows several types of data to be used needs to be adopted to study the interaction between factors impacting construction worker productivity.

The thesis's theoretical framework is developed based on Giddens' Structuration theory in the context of colonisation. Giddens’ theory of structuration (1979) is used to develop a framework for this study, to explore the effects of the relationship between the conditions of a) both internal and external structures and b) construction workers (agency) from the West Bank, in an attempt to map the factors affecting construction sector productivity in the region. The thesis attempts to open the black box of the term' labour productivity' by framing it as the production interplay between agency and structural factors and treating construction labour as complementary to the machine rather than as an extension of it. Additionally, through considering a human-technical approach, construction workers are treated not as passive victims but rather as actors to improve productivity, which has been overlooked when, for instance, adopting technical or digital solutions to improve labour productivity. This thesis attempts to show that labour productivity stems from an interaction between labour agency and structural conditions, which are two ontological dimensions that reciprocally constitute each other.

The thesis discusses labour mobility and its impacts on productivity in a competitive and intensive labour market by enriching an understanding of the value of labour, the departure of skills and how such issues are affected by structural determinates, such as the political division of the West Bank. The main concepts (duality of structure, knowledgeability, power and resources) of structuration theory are applied to understand and draw up the factors influencing productivity. Furthermore, using structuration theory, which offers added explanatory power to the subject of construction productivity, the thesis aims to provide a clear definition and to identify factors affecting productivity at macro, meso and micro levels derived from the unique context and the involvement of blue-collar as well as white-collar perspectives. Finally, the thesis shows how important and to what extent sociological theory can be applied in construction productivity research and whether human capital theory alone can be applied to explore the factors impacting on labour productivity.

1.3 Research Aims, Objectives and Questions

This thesis aims and questions justify the use of the concepts of structure and agency and their reconciliation as defined in Giddens' structuration theory in the context of high uncertainty, political instability and complex geography. The thesis aims to identify the impact of particular social, economic and political constraints on structural and agency determinants affecting the construction sector's productivity at macro, meso and micro levels, with the example of the West Bank. In order to achieve this overall aim, it is structured according to four main themes: the structure of the construction sector and its significance to the Palestinian economy; the definition of the term 'productivity' and the determinates influencing it in the special context of the West Bank; Israeli policies and occupation; and Palestinian construction labour. Furthermore, the overall aim is broken down into the following objectives:

- To define and explore the meaning of the term 'productivity' and indicate whether the context implies a different method to understand, read, and interpret productivity through a comparison of selected case studies.
- To draw up a framework of the multi-layer determinants impacting on productivity and indicate how these can be contextualised.

- To identify the impact of political instability and interdependent economies on the qualification and migration of construction workers.
- To analyse the workforce's formal qualifications and to understand the impact of labour mobility and the effect of economic, political and social conditions, including Israeli policies (structure), on the construction sector's productivity in various project locations.

Accordingly, the main research question of this thesis is ‘ What are the structure and agency determinants at macro, meso and micro levels that impact construction labour productivity in a volatile and colonised context, West Bank as an example? The research sub-questions addressed to answer the main research question and achieve the objectives of this thesis are:

I. How can productivity be defined in the context of high uncertainty, political instability and complex geography?

II. What is the impact of external and internal structures on the construction sector's productivity, assessed at macro, meso and micro levels?

III. What are the agency factors that influence construction labour productivity at macro, meso and micro levels?

IV. Based on the interaction between structural and agency factors, what are the determinants of construction labour productivity in the West Bank? Furthermore, how similar or different are these determinants according to the project locality?

1.4 Scope of the thesis

1.4.1 Chapter 2

This chapter discusses confusions concerning the meaning of the term ‘productivity’ and the debate surrounding the definitions and factors impacting productivity. It shows how different authors have focused on factors contributing to productivity and, to a lesser extent, on the meaning or definition of the term. The chapter examines how the factors impacting construction labour productivity have changed considerably over time and become more sophisticated. It also shows that the factors and definitions vary from country to country, between macro, meso and micro levels, and draws out the implications of previous studies and what is needed to move forward.

1.4.2 Chapter 3

Chapter 3 summarises the Palestinian construction sector's historical background, particularly in the West Bank. This chapter elucidates the effects of the Israeli occupation on the Palestinian construction sector since 1948, focusing on the challenges that the construction industry in the West Bank has faced since 1993, i.e. after the signing of the Oslo Accords.

1.4.3 Chapter 4

Chapter 4 examines the effects of Israeli policies and political instability on the Palestinian economy, with a particular emphasis on the construction sector, utilising unique data extracted from various reports by local and international organisations, such as the PCBS annual reports and MAS, as well as the World Bank, ILO, and ETF. It also indicates the extent to which GDP can represent labour productivity.

1.4.4 Chapter 5

In this chapter, the thesis's theoretical framework is developed based on Giddens' Structuration theory and a socio-technical approach in the context of colonisation. It covers criticisms of previous research, human capital theory and structuration theory and ends with a theoretical framework for the factors impacting labour productivity, divided into structural and agency factors within a context that contains drivers suggested for improving productivity.

1.4.5 Chapter 6

Chapter 6 details the constructivist methodology utilised to test and validate the theoretical framework of the thesis linked to the research methods. The methodology adopted is mixed methods, comprising a combination of deductive and inductive reasoning, thus helping to see how different realities are constituted. Finally, this chapter describes the alterations made to the research due to the impact of the Coronavirus epidemic, particularly the travel restrictions.

1.4.6 Chapter 7

Chapter 7, the first empirical chapter, relies heavily on quantitative secondary raw data to determine the agency and structural factors influencing construction labour productivity. The aims of Chapter 7 are threefold: first, to examine the use of the hourly wage of the blue-collar worker as a proxy for labour productivity; secondly, to confirm the influence of

several agency factors and structural factors from the literature on construction labour productivity; and finally, to build the explanatory regression model created using the ordinary least squares estimation and covering the factors impacting labour productivity by adding context-specific factors, i.e., Israeli policies and labour mobility. In this chapter, the debate surrounding the use of the hourly wage as an indicator for construction productivity is solved by adding different labour factors, such as experience, education and skills, which are included in the model as independent variables, and thus the quality of labour hours is distinguished.

1.4.7 Chapter 8

Chapter 8 is more an explanatory than a confirmatory chapter, and thus the primary and explanatory data are collected via thematic and semistructured interviews to achieve its aims. Additionally, the raw secondary data is used to a lesser extent compared to Chapter 7. This chapter, which supports the use of the hourly wage as a proxy for labour productivity, aims to explain some of Chapter 7's findings and solve the open debate regarding the bi-directional mechanism of some results. Nevertheless, the main aim of the chapter is twofold: first, to assess the concepts linked to labour productivity and define the term at the three levels; second, to examine the relationships between structural and agency factors and the impact of their interactions on the productivity of construction workers.

1.4.8 Chapter 9

The aims of the third empirical and explanatory study are threefold, first, to assess the methods used to measure or evaluate productivity; secondly, to investigate whether the determinants differ by project locality; and finally, to examine the determinates of construction labour productivity associated with the interaction between structural and agency factors. Thus, multiple case studies that focus on going beyond the individual case to understand broader phenomena of interest are adopted as a study design for this chapter. Accordingly, multiple quantitative and qualitative sources contribute significantly to its conclusions. By combining the findings of this chapter with those of the preceding empirical chapters, a clear understanding of the notion of construction labour productivity emerges.

1.4.9 Chapter 10

This chapter demonstrates how the thesis contributes to knowledge by integrating the empirical chapters' findings, tieing them to the pertinent literature, and discussing them in

depth simultaneously. In this chapter, the responses to the research questions are summarised and linked with the literature. Furthermore, the chapter is divided into four themes; each theme discusses and links the relevant literature and findings to the theoretical framework. Finally, a modified theoretical framework is presented.

1.4.10 Chapter 11

The conclusions and recommendations for future research are presented in Chapter 11. This chapter presents conclusions at theoretical, practical, and industry levels. In addition, theoretical and policy implications are discussed in this chapter, which also includes a section highlighting the contribution of the knowledge and the novelty of the thesis. The chapter concludes with suggestions for future research that this study could not address due to time, data availability, and software and methodology constraints.

2 CHAPTER 2

A more nuanced and accurate understanding of Productivity in the Construction Industry

2.1 Introduction

Construction productivity is much more than a managerial or technical concern. It incorporates a social dimension, as labour is the sector's most valuable asset (Chan & Kaka, 2003). The presence of technology itself cannot make any difference without capable people having the know-how to use it. Moreover, the factors and drivers of productivity cannot be separated from the sector's political and economic contexts. Political, social, and economic conditions, the availability of natural resources, and tangible and intangible factors are crucial determinates for construction labour productivity (Prokopenko, 1992). As shown in Chapter 4, the focus on vocational training by the employers and firms (structural factor) is unsatisfactory, thus detrimental to the development of workforce skills (agency factor). The existence of two powerful and attractive construction labour markets in Israel and the Israeli closures and movement restrictions on labour and construction materials (structural factors) are among the more central factors that play a critical role in the construction sector in the West Bank.

The thesis aims to study the factors impacting construction labour productivity in the West Bank in a broader sense by considering the influence of political instability and the economic suppression of these factors. It also aims to explore whether economic and political suppression and the complex geography in the West Bank, discussed in Chapter 3, add a new layer of complexity in defining and unpacking the determinants impacting labour working in the sector. These determinants can be divided into external, including the educational, economic and political systems and the social trends (Chapter 3), and internal, including the construction firms' structure, management practices and R&D (Chapter 5). This chapter is about the definitions provided for construction labour productivity and an overview of the factors impacting this. It discusses how the concept of labour productivity in the sector is frequently defined and used. Factors impacting productivity at different levels, which are often interdependent and influenced by each other, can be divided into structure and agency and, together with their definitions, cannot be isolated from their temporal and spatial contexts. Moreover, Human agents are not only

creative and experiential beings, but their contexts of action constantly shift. Accordingly, this chapter reviews previous research to investigate whether the dynamic and contextual relational links between agent action and structures at macro, meso and micro levels are entangled. Additionally, it will explore whether the researchers who studied the term and its determinants in Palestine or any country with a similar context have considered the unique volatile context.

The chapter begins by situating labour productivity within broader debates by discussing the term as per the dictionary definition and assessing to what extent the definitions provided reflect the dictionary meaning. Next, the chapter examines explicitly whether the construction industry's key features, particularly the sector's idiosyncratic project-based nature, are reflected in the definitions and concepts linked with the term. Developments in the definition of the term and changes that occurred in the concepts linked with it over time are explored. Fourthly, the factors and drivers for improving construction labour productivity are discussed. Then, the methodological approaches and research methods adopted in studies of labour productivity within the sector are explored and discussed. Finally, the implications of previous literature are drawn out, and considerations of how to move forward to have a more precise definition and a better understanding of the determinants impacting on labour productivity in the sector.

2.2 History of Productivity

2.2.1 The definition of the term and its history

Due to the importance of productivity to the economic growth of both developed and developing countries, many articles, texts and reports of research studies conducted by many organisations belonging to various academic and industrial disciplines have attempted to interpret and define the concept of 'productivity' (***Table 2. 1***). All express enthusiasm for the concept though having a misguided perception of the term's simplicity and the mistaken assumption that all share the well-accepted and conventional definition of the term (Quinn, 1978). However, as shown in ***Table 2. 1***, although productivity is an old expression that appeared in the eighteenth century and was first defined at the end of the nineteenth century, the term appears to be in greater and greater disarray and poses issues on which people differ (Burkhead & Hennigan, 1978; Fabricant, 1981). For example, productivity has been defined as the ratio of inputs to outputs (Halligan, et al., 1994; Lowe,

1987) mainly by academics with analytical tendencies, engineers and economists (Hanna, et al., 2008).

However, for administrators with practical tendencies, the expression is equivalent to the concept of overall performance (Hanna, et al., 2008). Additionally, the term has been philosophically used as a synonym for 'welfare' or 'well-being' (Burkhead & Hennigan, 1978; Fabricant, 1962; Lowe, 1987; Rees, 1979). Accordingly, most of the available definitions are closer to explaining productivity components, such as defining effectiveness, technical efficiency and labour efficiency, than giving a precise definition (Jarkas & Bitar, 2011; Olomolaiye, et al., 1998). A salient feature of most of the definitions summarised in ***Table 2. 1*** is that, regardless of researchers' perspectives or orientations, they tend to limit their focus to output while ignoring labour input. Moreover, most of the definitions provided tend to ignore the time and context dimensions of the term (for example, definitions 3, 4,5 and 6). Examining how productivity is defined in a dictionary can explain the confusion and the root cause of having different definitions and perspectives on the same term.

Definition	Year
1. Productivity = faculty to produce	1883
2. Productivity is what man can accomplish with material, capital and technology. Productivity is mainly an issue of personal manner. It is an attitude that we must continuously improve ourselves and the things around us	1958
3. Productivity = units of output/units of input	1988
4. Productivity = actual output/expected resources used	1989
5. Productivity = total income/(cost + goal profit)	1990
6. Productivity = value added/input of production factors	1991
7. Productivity is the ratio of what is produced to what is required to produce it. Productivity measures the relationship between output such as goods and services produced, and inputs that include labour, capital, material and other resources	1993
8. Productivity (output per hour of work) is the central long-run factor determining any population's average living	1993
9. Productivity = the quality or state of bringing forth, generating, causing to exist, yielding significant results or yielding abundantly	1993
10. Productivity means how much and how well we produce from the resources used. If we produce more or better goods from the same resources, we increase productivity. Alternatively, if we produce the same goods from lesser resources, we also increase productivity. By "resources", we mean all human and physical resources, i.e. the people who produce the goods or provide the services and the assets with which the people can produce the goods or provide the services	1997
11. Productivity is a comparison of the physical inputs to a factory with the physical outputs from the factory	1998
12. Productivity = efficiency * effectiveness = value adding time/total time	1999
13. Productivity = (output/input) * quality =efficiency * utilisation *quality	2000
14. Productivity is the ability to satisfy the market's need for goods and services with a minimum of total resource consumption	2001

Table 2. 1*:* Part of the Definitions for Productivity Term

Source: (Tangen, 2005)

2.2.2 Impact of Dictionary definitions on productivity definition in the research

Different dictionaries offer different definitions of the word 'productivity'. For example, the Oxford Dictionary (2020) defines productivity as:

> The state or quality of being productive; the effectiveness of productive effort, especially in industry, as measured in terms of the rate of output per unit of input.

Although ‘production’ as a term does not mean ‘productivity’ (Olomolaiye, et al., 1998; Sumanth, 1984), using the word 'productive' to define productivity is quite essential as it implies that productivity relates to the process of production and not, for instance, to exchange, distribution or consumption processes. Two distinct productivity concepts can be derived from this definition: a) the efficiency and b) the effectiveness of the resources used. On the other hand, the Cambridge Dictionary (2020) defines productivity as:

> The rate at which a company or country makes goods usually judged in connection with the number of people and amount of material necessary to produce the goods.

This, therefore, focuses only on the economic aspect of the term without valuing the quality of human efforts. Interestingly, the two definitions show different orientations regarding the definition of productivity and its concepts, some of which have been reflected in definitions provided by different researchers (**Table 2. 1** and **Figure 2. 1**).

The economists' definition of productivity, linking the term to global market competitiveness, national growth, and rising wages (Quinn, 1978), predominates in both reports and articles that deal with productivity from either technical or managerial perspectives (***Figure 2. 1***). However, a complete and universally accepted definition of productivity is missing (Olomolaiye, et al., 1998) due to the different purposes and interests that the term serves (Adrian, 2004 ; Cox, 1948; Sutermeister, 1963). As shown in **Figure 2. 1**, various professionals have provided definitions of productivity and have intertwined the term productivity with multiple concepts, such as efficiency, cutbacks, cost-saving, effectiveness and overall performance (English & Marchione, 1983; Goshu, et al., 2017; Lema, 1996; Mwamadzingo & Chinguwo, 2015; OECD, 2015).

Most definitions focus on output and its quality and how to produce more for less input. As shown in ***Figure 2. 1***, the intention and focus of the researchers are on the physical effort of labour (Davis & Hitch, 1949; Steiner, 1950), customer satisfaction (Koss & Lewis,

1993; Quinn, 1978), labour loyalty (Quinn, 1978) and performance (Quinn, 1978) with almost complete disregard for job satisfaction (Koss & Lewis, 1993; Quinn, 1978), quality of work-life (Imoisili & Henry, 2004), quality of labour (Imoisili & Henry, 2004), labour qualifications, and training (Fabricant, 1962).

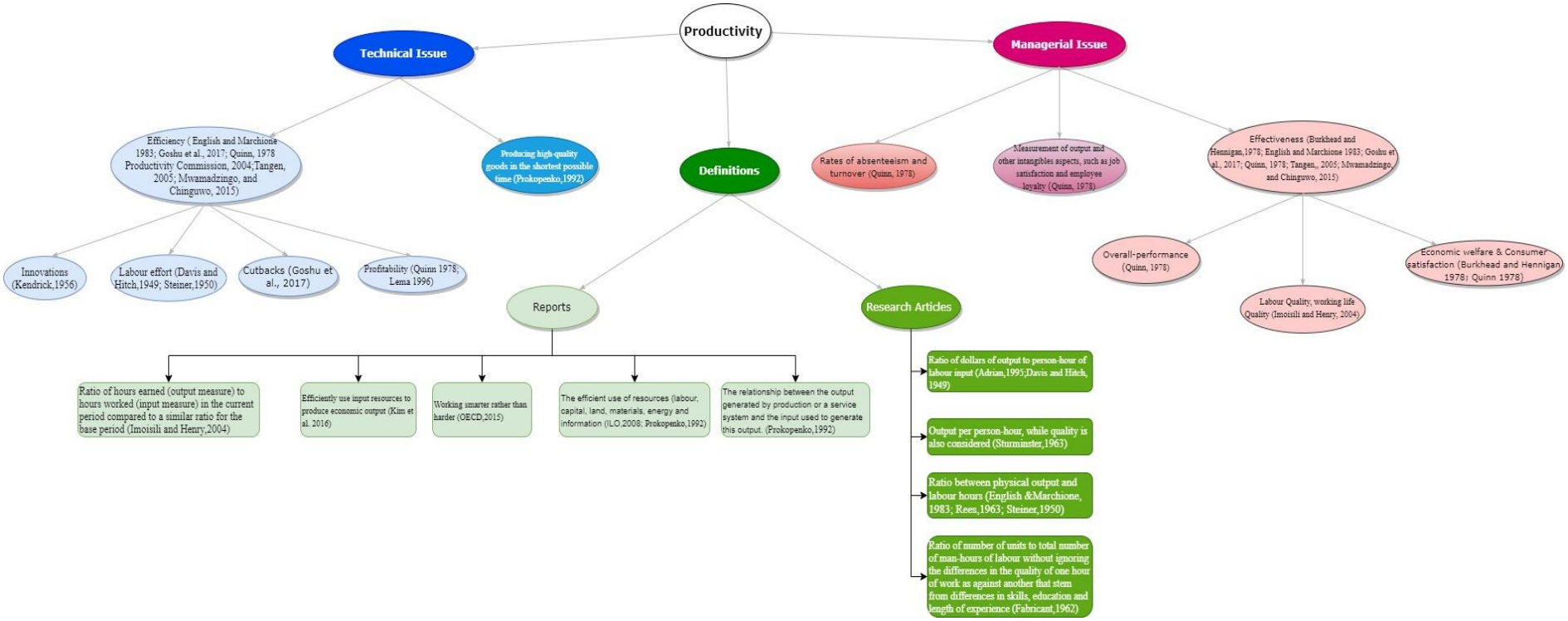


Figure 2. 1: *Productivity-related concepts and definitions included in part of the research reports and articles concerning productivity*

Working more intelligently through optimising the allocation of resources, whether human or financial, is the essence of productivity improvement (OECD, 2015 ; Productivity Commission, 2004; Prokopenko, 1992). Consequently, productivity neither means profitability obtained through price recovery (Prokopenko, 1992; Tangen, 2005) nor can it be improved only by cost-cutbacks (Prokopenko, 1992). Furthermore, productivity, which includes producing high-quality goods in the shortest possible time, is more than efficiency and is not a synonym for performance (Prokopenko, 1992; Tangen, 2005). The debate and confusion that occurs due to the interpretation of productivity as equivalent to performance, efficiency, effectiveness or profitability have been partially solved by the model provided by Tangen (2005) (***Figure 2. 2***).

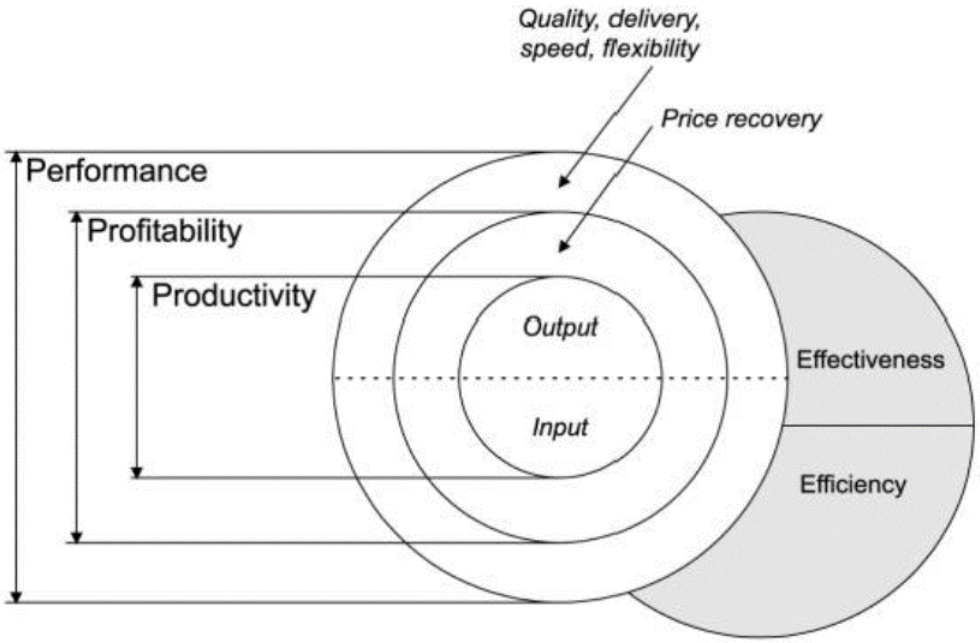


Figure 2. 2: The Triple P Model

Source: (Tangen, 2005)

As shown in ***Figure 2. 2***, productivity, the central core, has several indirect relations with different concepts and is seen as a ratio of output to input. The model shows that productivity and profitability are interdependent. However, increasing productivity does not mean increasing profitability, at least in the short term. According to Tagen (2005), profitability is a monetary relationship between the output and the input, and thus, the effects of price recovery are included. Moreover, overall economic and operational aspects are part of the performance, whereby profitability, productivity and other intangible

factors, such as quality, flexibility and speed, are covered. The model also shows that the two concepts, i.e. effectiveness and efficiency, interact with the other three terms. How well resources are utilised is known as efficiency, while the degree to which desired results are achieved is effectiveness (Tangen, 2005). Thus, it is possible to have an effective and ineffective system and vice versa. For example, reaching the requisite quality for a certain construction activity may necessitate close supervision, mainly if there is a skill shortage, raising the project's overhead. Consequently, while discussing productivity, efficiency and effectiveness are inseparable (English & Marchione, 1983; Tangen, 2005), which is not the case in most research (***Figure 2. 1***). Nevertheless, neither the time factor, a critical point in defining and measuring productivity (Koss & Lewis, 1993; Prokopenko, 1992), nor the context, which includes the economic, political and social situations, were covered in the triple P model.

Productivity, which is much more than a measure of production (Michelle, et al., 2016; Mwamadzingo & Chinguwo, 2015), is highly contested being rooted in: technical and managerial issues (Mwamadzingo & Chinguwo, 2015); the balance of power between workers and managers (Michelle, et al., 2016); and other economic and social aspects (Prokopenko, 1992). Moreover, given the complexity of the construction sector in terms of supply chain relationships with other industrial sectors and other challenges, such as implementing green and affordable buildings, the study of productivity in the context of the construction sector is expected to lead to further complexities in its definitions and the factors influencing it. Consequently, as the main aim of the thesis is to study the factors impacting construction labour productivity in building subsectors, the focus of the remaining literature will be only on the production process.

The literature covering the definition and factors affecting productivity shows that capital, material and the workforce are the main pillars of productivity in the construction sector. According to Prokopenko (1992), labour productivity cannot cover all aspects of productivity, such as increased energy and raw materials costs and unemployment. Nevertheless, construction workers are the main assets for any construction project (Chan & Kaka, 2003; Chan, 2002) and, in so far as many inputs affect the overall output of construction productivity, the construction industry is still largely people-oriented (Kaka & Chan, 2003). Since the planning, controlling, supervising, constructing and operating functions are carried out by humans, the labour element could be considered the most

crucial element to improving productivity. Therefore, the remainder of this chapter will focus on definitions of labour productivity and the factors impacting it. Additionally, other inputs that directly impact labour productivity will be studied.

2.3 Labour Productivity Definitions in the Construction Sector

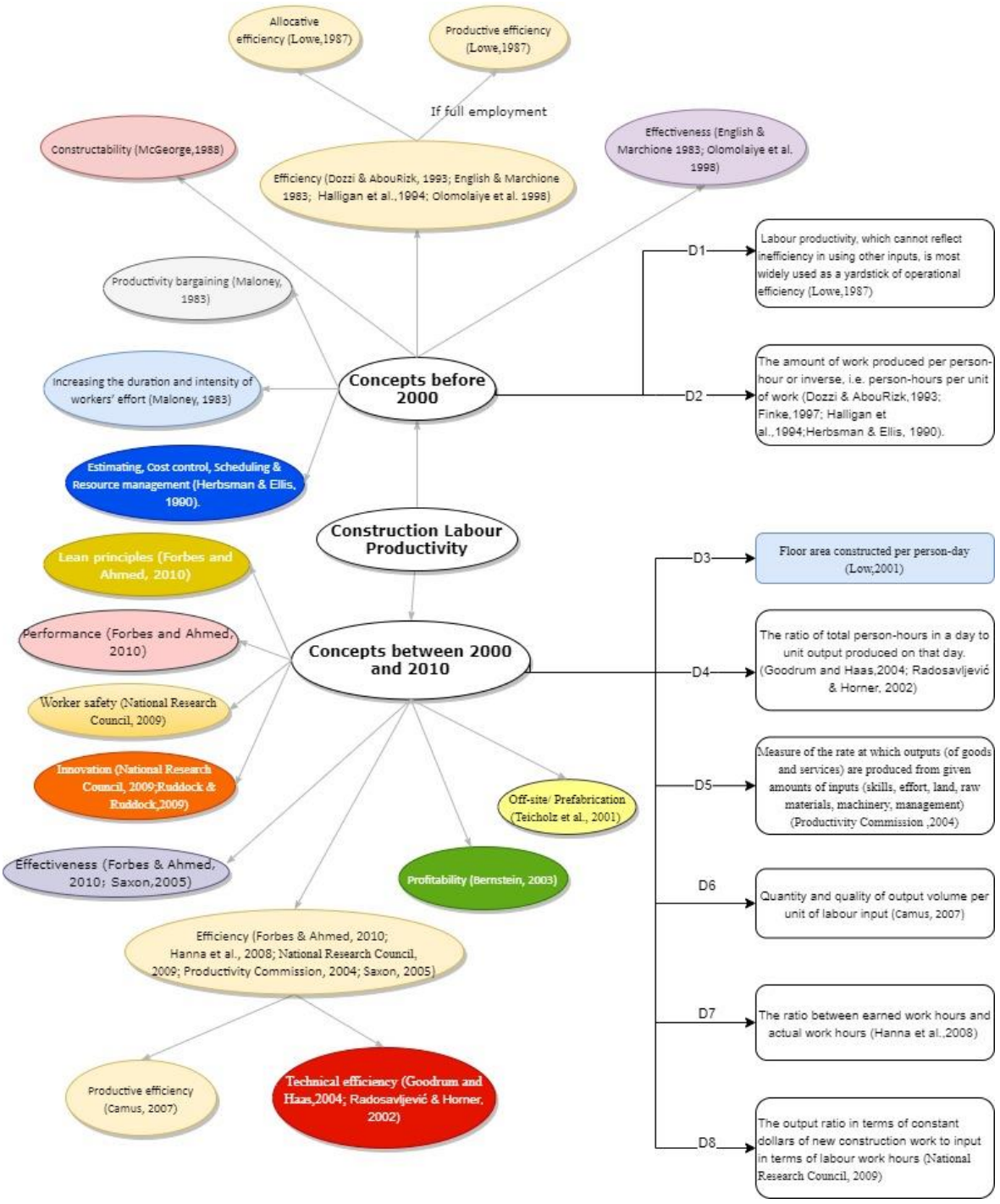
Several authors, such as Barbosa et al. (2017), Ganesan (1984), Gruneberg (2019), Hegazy (2002), Mahamid (2013 a), Mahamid (2013 b) and Nasir et al. (2014), have linked construction labour productivity with cost and time overruns in construction projects. The traditional success criteria of construction projects, i.e. achieving time, cost and quality outcomes (Jaafari & Manivong, 1999), are considered to be too simplistic in the context of today's complex construction project environment because they do not include many variables that are outside the control of the project team and also directly impact on the overall performance of the team (Dainty, et al., 2003). Moreover, the construction industry is fragmented, involves a complicated production system, is surrounded by high uncertainty, faces ever-increasing challenges and produces a unique end product (Ganesan, 1984; Hegazy, 2002; Winch, 2010). Thus, the outputs and inputs that vary across diverse projects, companies and industry subsectors (Nasir, et al., 2014; National Research Council, 2009) add a new layer of complexity to defining construction labour productivity, which is a concept that is difficult to measure and a multifaceted and complicated topic (Chan, 2002; Nasir, et al., 2014; National Research Council, 2009). For instance, having different units of measurement for each construction activity complicates the statistical analysis of construction productivity (Nasir, et al., 2014).

Reviewing the literature concerning construction labour productivity in the sector shows that most of the authors in the field have not considered the construction workers as the very heart of productivity (***Figure 2. 3*** & **Figure 2. 4)**. The omission of providing a clear definition of construction productivity is a striking feature of some research articles concerning construction labour productivity (Dolage & Chan, 2013) (***Figure 2. 3*** **& Figure 2. 4)**.

2.3.1 Definitions and Concepts before 2010 and after 2010

As shown in ***Figure 2. 3,*** **a**ll definitions, except D5, of the term concern only one dimension of the task: the part related to the physical actions carried out by the

construction workers. The cognitive actions are not acknowledged in most definitions provided.



*: Similar colours indicate that the same concept has continued to appear in the literature over time.

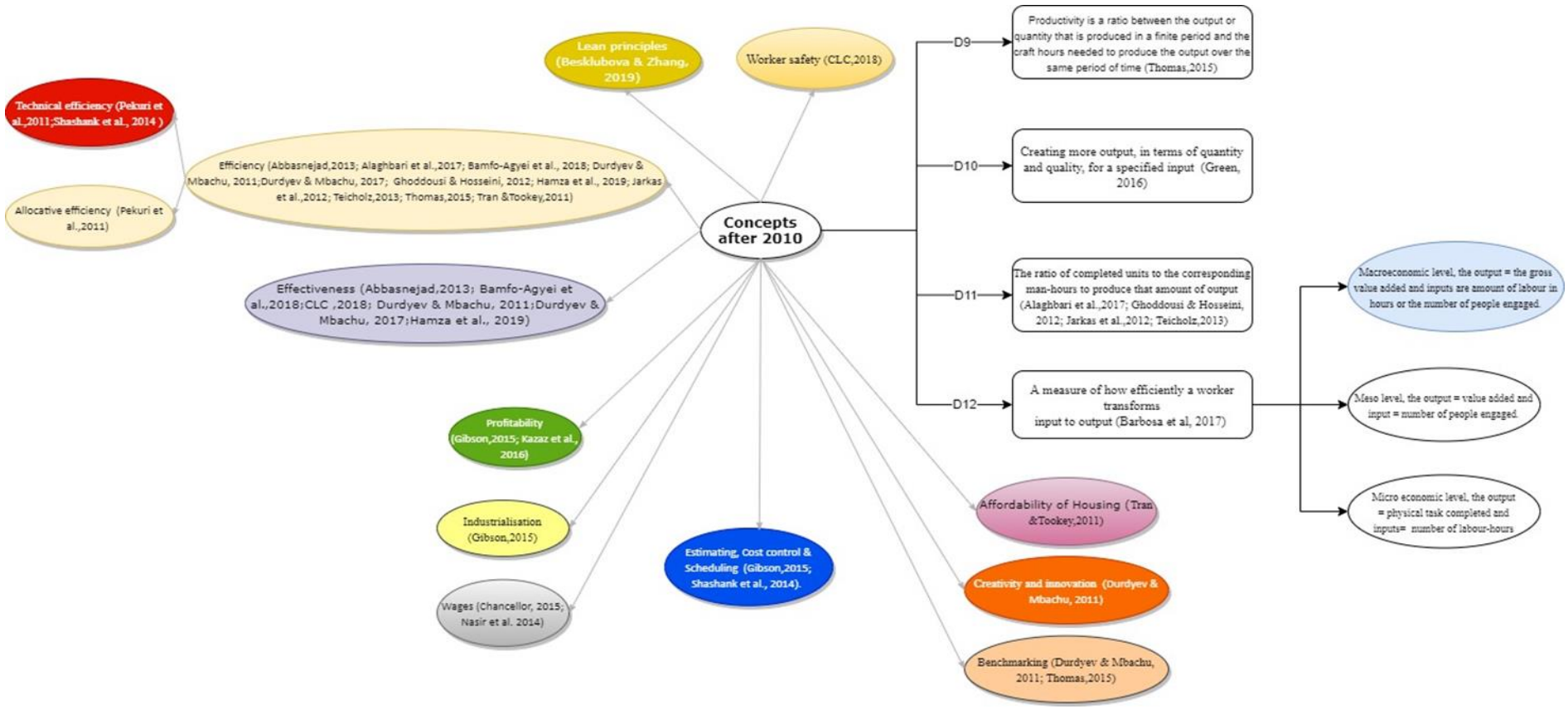
Figure 2. 3: Construction Labour Productivity Concepts and Definitions before 2010

Several authors have widely used the economist's concept of labour productivity, which is interchangeable with the term efficiency, i.e. the ratio of output to labour input in hours

(***Figure 2. 3***). Nevertheless, as shown in ***Figure 2. 3***, labour productivity is a complex concept that has been related to various notions, such as efficiency, effectiveness, and performance. As new interconnected concepts such as Total Quality Management (TQM), Building Information Modeling (BIM), and digitalisation were introduced after 2000, labour productivity became more intricate.

Decades of criticism have resulted from the lack of innovation, poor safety record, unfriendly operational climate, and overall underperformance of the construction sector (Egan, 1998; Fairclough, 2002; Glass, et al., 2008). Recent initiatives, such as enhanced teamwork, procurement practices, and sustainability, are among the essential industrial and cultural shifts required for radical change in the new construction sector (Egan, 2002). The industry seeks to achieve its objectives of better productivity, lower carbon emissions, and new skills by employing innovative technology to construct more durable and flexible buildings and structures (Adams, 2020). Since 2010, labour productivity has been related to new conceptions, reflecting demands for radical transformation (**Figure 2. 4**). Among the most current notions associated with the phrase are (Hwang, et al., 2017): global warming and construction productivity (ILO, 2019; Yi & Chan, 2017); low energy construction (Clarke, et al., 2017); and modularisation and digitisation (Adams, 2020; Oesterreich & Teuteberg, 2016).

Nonetheless, these intricacies and novel ideas are not reflected in the definitions (**Figure 2. *4***). The hybrid system of the construction sector, which consists of social & technical components, is not accounted for by any of the definitions depicted in ***Figure 2. 3*** & **Figure 2. 4**. In addition, only a few researchers, such as Clarke et al. (2017), Clarke et al. (2020) and Winch et al. (2020), have evaluated the skills required and connected these new notions to the sector's setting, such as firm size, the infrastructure required, and the types of vocational education and training (VET). Yet, the majority of research on the factors influencing labour productivity in emerging and developed nations, which share a commonality in ignoring workers' participation in the production process, tends to overlook or examine these crucial concerns in isolation from the sector's employment conditions and other factors including firm size (**Figure 2. *4***).



*: Similar colours indicate that the same concept has continued to appear in the literature over time.

Figure 2. 4: Current Construction Labour Productivity Concepts and Definitions

Five Techniques widely used to measure the efficiency (and, indirectly, the productivity) of construction workers and teams on the construction site (Dozzi & AbouRizk, 1993) have also been applied by researchers, e.g. Enshassi et al. (2011) and Olomolaiye et al. (1998) to measuring construction labour productivity. These methods - time study, activity sampling, craftsman questionnaire and foreman delay surveys(FDS)[1] - do not acknowledge workers' cognitive effort and emphasise only the physical output to improve construction labour productivity. However, according to Marsden (1999), the task relates to the employee's physical and cognitive actions, and the function could be understood as referring to output, contribution to the collective effort of production or service provision to be carried out by the employee. Yet, the definitions of the term 'productivity' emphasise the output of the construction worker, i.e. the cognitive contribution and competencies required of the worker are not acknowledged (***Figure 2. 4***). Furthermore, with these techniques, labour time is divided into productive, contributory and idle time, and thus research adopting these methods does not regard labour as a cornerstone for improving productivity but rather as a machine in need of close supervision.

Most of the concepts linked to the term and some definitions (e.g. D7, D10 and D11) are inspired by Taylor's objectives to ensure: efficiency by increasing the output per worker and reducing deliberate 'underworking'; predictability of job performance by standardising tasks; and control by establishing discipline through hierarchical authority (Taylor, 1919). The views of most researchers tend to be very mechanical and use a very traditional approach in economic terms to define labour productivity in the sector (e.g. D6, D9, D10 and D12). Additionally, most definitions (e.g. D12) focus on efficiency to improve labour productivity. Notwithstanding, it is possible to utilise resources efficiently without achieving the desired results. Accordingly, the definitions should cover both efficiency and effectiveness, as argued by several authors, such as English and Marchione (1983) and Olomolaiye et al. (1998).

Drucker (2001) emphasises the importance of the knowledge worker, who owns his/ her means of production, i.e. his/ her knowledge, to improve productivity:

[1] The Foreman Delay Survey (FDS) identifies and eliminates impediments and demotivators based on a questionnaire filled out by the foreman at the end of each workday in accordance with a predetermined survey schedule, such as one workweek every month. The questionnaire is designed to measure time lost due to delays. Most FDSs distinguish rework from delay. Following the completion of the form, percentages and actions are retrieved to address reasons for delay.

> One does not "manage" people. The task is to lead people. And the goal is to make productive the specific strengths and knowledge of each individual (Drucker, 2001, pp. 21-22).

This quote appears to stress the importance of the workforce, which should not be seen as an asset or resource but as a partner to achieve optimal productivity. Thus, it can be concluded that the agency or workers' position is not a conceptual 'straw person'. However, as shown in ***Figure 2. 3*** &***Figure 2. 4***, most of the available definitions of productivity do not consider skills, experience, education and the value of construction labour efforts. As a result, the majority of definitions of labour tend to take a strictly quantitative approach and fail to account for a number of crucial factors that influence labour productivity, such as qualifications and skills, training, and education. Consequently, such definitions may be deemed extremely restricted since they are mainly derived from the perspectives of contractors and administrative personnel.

2.3.2 Categories of authors regarding construction labour productivity definitions

Research on the productivity of construction labour can be classified into two categories, that which defines the term (**Figure *2. 3***) and that which discusses it without offering a definition, e.g. (Enshassi, et al., 2011; Enshassi, et al., 2007; Hiyassat, et al., 2016; Mahamid, 2013 a). However, the common ground between these two groups is their tendency to ignore the labour's cognitive and rehabilitative inputs and consider the term as a technical or managerial problem only. For instance, the majority of authors in the discussion of the productivity of the sector treat construction workers as passive victims rather than actors to improve productivity, such as Enshassi et al. (2007), Hiyassat et al. (2016) and Mahamid (2013 a), viewing them - and never the employers - as a factor delaying productivity. Other authors, such as BIS (2013), Kazaz and Ulubeyli (2006) and Ponmalar et al. (2018), stress the necessity of reducing labour costs and total construction costs to improve construction labour productivity.

Furthermore, Horner and Duff (2001) show the importance of increasing construction labour productivity for UK construction industry clients and almost totally ignore the benefits of this increase for blue-collar workers. For example, they state that an increase in construction labour productivity by 10% is equivalent to a saving of £1.5 bn to the client in the UK industry, sufficient to obtain an additional 30 hospitals or 30,000 houses yearly. Accordingly, these views and definitions, depicted in ***Figure 2. 3***, show the domination of

economic considerations and ignorance of other dimensions, such as social and political aspects. Most studies covering the topic recommend and push for improving productivity through structural rather than agency factors, i.e. focusing on technical solutions for improving labour productivity in the sector (see next section). For instance, the UK Government's industrial strategy states that delivering more sustainable, quick and efficient buildings can only be achieved by implementing Building Information Modelling (BIM) (BEIS, 2018; BIS, 2013). The CIC (2012), Cao et al. (2014), and Green (2013) also argue that BIM is the solution to any problem. These statements posit BIM beyond being a technological improvement tool to become the vehicle for realising the radical and transformational change espoused within the industrial strategy (Dainty, et al., 2017).

Furthermore, these statements overlook the agency effect, i.e. they deal with the human as an object, not a subject, as well as other structural factors related to the sector, such as the firm size and the ability of construction firms to train and upskill their workers (Dainty, et al., 2017). The link between the traditional objectives of the project in terms of cost, time and quality, and productivity without taking into account other factors, such as VET and working conditions, is a striking feature of the majority of research in this category, particularly that pertaining to labour productivity in developing countries. In addition, M^4I states that:

> Financial indicators must be augmented by a variety of non-financial measurement techniques, including indicators on people issues […] failure to respect people can damage the bottom line, perhaps irreparably. Perhaps most damaging of all, there is often a chasm between the respect demonstrated towards operatives 'blue collar' workers and that shown for 'white collar' workers, yet project delivery is equally dependent on good performance from everyone (2000, p. 9).

Despite the undoubted fact that construction is a labour-intensive industry (Chan & Kaka, 2003), there is a tendency to draw biased conclusions towards the perspectives of the 'white collar' segment of the workforce. According to Macarov (1982):

> The criteria used by most researchers are closer to those of management than those of workers [as] much research requires prior agreement on the part of management, if it is not actually management-sponsored (p. 14).

Additionally, such research has extensively emphasised the processing of inputs rather than inputs. Moreover, how differences in the capabilities of the workers account for differences in productivity levels has rarely been referred to, highlighting the disregard for the blue-collar workforce's effort (Chan, et al., 2001).

Only a few authors, whilst not defining labour productivity, such as Clarke (2006) and Williams (2005), consider construction labour as at the heart of productivity and radically challenge the image of construction labour claimed by most of the authors who discuss productivity in the sector, such as Green (2013), Hiyassat et al. (2016) and Mahamid (2013 a). For instance, Williams (2005) states that a radical improvement to the existing process, which will only be brought about by innovation, particularly in the way construction labour is employed and deployed, will lead to improving productivity in the sector.

However, other authors who posit a link between productivity on the one hand and construction cost, unemployment and paucity of skilled and expert workers on the other, such as Gruneberg (2019) and Winch (2010), have reduced the worker to a mere stock of capital and end up with one-dimensional analysis whereby work experience and skills, and worker mobility are just regarded as part of the accumulation of capital (Clarke, 2006). Gruenberg (2019, p. 43) states, for instance:

> Nevertheless, productivity is ultimately the source of wages, profits and the standard of living of all those engaged in construction. Labour productivity is improved the more plant and equipment are used, and there needs to be a drive to encourage investment in plant and equipment in construction.

Gruenberg's (2019) approach to discussing the sector's productivity tends to treat construction labour as an extension of the machine rather than as complementary to it. Additionally, construction workers become passive victims rather than actors to improve productivity. Problems, such as skill shortages and the size of construction firms, and their impact on the training of construction workers are discussed only briefly. However, Gruenberg (2019) does assert that learning new skills appropriate to new technologies by construction workers is one of the main pillars of improving labour productivity. In this, he is inspired by human capital theory, regarding investment in labour as the key to raising the quality of labour and services in the sector:

> Raising quality requires investment in human capital. Training and education support quality improvement as it becomes necessary to train workers and managers in the use of the latest technology. Those individuals and firms that make use of the latest technology will be the overall winners, and they can do that only if they and their staff are equipped to make use of it and its potential. More key performance indicators may be needed to monitor quality improvements as new ideas spread throughout the sector' (Gruneberg, 2019, p. 56).

Furthermore, in accordance with a Taylorist or human capital perspective, Bresnen et al. (2005) and Winch (2010) perceive the human and financial resources inputted for each construction stage as a return on capital for each participating firm in a project. Whilst workers gain more and new experience, this stays only with the individual. Thus, this view leads them to conclude that workers inhibit the spread of innovative practices, and the learning capabilities of construction firms are inhibited because of the low-profit margins. Among the foremost causes of stagnant labour productivity, Teicholz (2013) considers a) the tendency to reduce costs by reducing the training of the labour force and using the cheapest labour available; and b) having too many tiny construction firms that control the industry. The construction labour structure is affected by the approaches adopted to VET, whether a production or a training approach (Marsden, 1999). Casual self-employment, output-based remuneration and rigid occupational divisions underpin the British construction labour process (Clarke, 2006) along the lines of a production approach (Chan, et al., 2010; Clarke, et al., 2020). Accordingly, the work of Bresnen et al. (2005) and Winch (2010) needs to be situated within this context.

2.3.3 Concepts missing in the definitions provided

Low-profit margins of construction firms, small or micro construction firms, industry fragmentation, environmental issues, higher performance and security demands, and limitations on the supply of several resources, especially skilled labour, render understanding construction productivity a complex and elusive task (Bernstein, 2003; Teicholz, 2013; Teicholz, et al., 2001). Productivity is attributed by Chan & Kaka (2003) to two aspects: a) administrative and organisational and b) operational, charged with the actual implementation of tasks. From both aspects, humans are the only component that can be influenced to use their full efforts combined with the rest of the inputs to enhance and achieve higher productivity. However, many researchers, such as Cheetham & Lewis

(2001), Cottrell (2006), Eddie et al. (2001), Fernie |& Thorpe (2007), Fulford & Standing (2014), Hawkes (2010), Hughes & Thorpe (2014) and Nasirzadeh and Nojedehi (2013) have neglected the importance of workers' participation and contribution to improving construction productivity. For example, Hamouda & Abu-Shaaban (2014), McGeorge (1988) and Naoum (2016) argue that productivity improvement in the construction phase is almost impossible and that workers' contribution to the improvement process is negligible.

Consequently, valuing labour has not been extensive in most of the definitions offered of productivity in the sector. Most authors do not mention the labour quality and the difference between workers' inputs to the process, which is improved through training and education (***Figure 2. 4***). Furthermore, the concepts linked to the term are mainly managerial, e.g. wages, profitability and performance, and technical,e.g. industrialisation, benchmarking and constructability. The many occupational divisions in the sector and their interactions are among the essential factors that have led to a dilemma in defining the term, particularly at the micro-level (***Table 2. 2*** &***Table 2. 3***). As shown in ***Table 2. 2*** &***Table 2. 3***, wages for most of the building occupations in the West Bank, which have different units of measurement even for similar activities, such as concreting (***Table 2. 3***), are output based. Accordingly, the question raised is whether the hourly labour wage is an indicator of construction labour productivity.

Activity	**Avg. Daily output**	**Crew**	**Technician daily wage**	**General worker's daily wage**	**Prime Contractor price***
Falsework and formwork	$50m^2$	Technician and general worker	160	90	$8/m^2$
Steel Rebar	2 tonnes	Technician and general worker	180	100	300/tonne
Concrete Blocks* Blocks with adjustment	$20m^2$ $16m^2$	Technician and general workers	$14/m^2$ $18/m^2$	90	-
Plastering work	$24m^2$	Plasterer and general workers	$12/m^2$	90	-
Tiling works	$20m^2$	Tiler and two workers	$25/m^2$	90	-

* without considering the deduction of the openings, such as doors and windows.

Table 2. 2: The construction worker productivity rates for some occupations in building projects at Birzeit University

Activity	**Avg. Daily output**	**Crew**	**Technician daily wage**	**General worker daily wage ***	**Prime Contractor price***
Concrete work including formwork, steel rebar • Footing and beams in school • Footing and beams in residential building • Columns • Slab		Subcontractor	210/m^2 190/m^2 230/m^3 100/m^3	100-110	
Stone building ***	30ml	subcontractor	55/m^2		
Concrete Blocks	15 m^2	Plasterer and general workers	(15-16)/m^2	110	-
Plastering work	27-30 m^2	Plasterer and general workers	15/m^2	130-140	-
Vertical Tiling works	14-15m^2	Tiler and helper	30/m^2	110	-
Horizontal Tiling work	25-30 m^2	Tiler and 2 helpers	25/m^2	110	
Painting	40-50 m^2	Technician and general worker	4/m^2	90	10/m^2
Stone pointing**		Subcontractor	15/m2		

* The currency is the New Israeli Shekel (NIS).

** The price including delivery of the materials

*** The price and rate, including pouring concrete behind the stone

The Tiler wage in the Israeli market is 70NIS/m^2

Table 2. 3: Construction labour productivity rates for some occupations for several residential and non-residential building projects in Ramallah

Do the contexts of political instability, complex geography, and high uncertainty require that new concepts and perspectives be added to the term productivity?

2.4 Factors impacting construction labour productivity as per literature

Regardless of the context within which construction labour productivity has been studied, labour is treated in purely quantitative terms in most previous literature. As shown in ***Figure 2. 4***, health and safety, job security and labour mobility are rarely mentioned in discussing productivity. However, when it comes to ranking the factors impacting labour productivity, factors such as security guarantees for labour (Maloney, 1983), local labour skills (Finke, 1997), human quality, quality of working life, exploitation of humans (Imoisili & Henry, 2004), the balance of power between workers and manager (Michelle, et al., 2016), and the number of site deaths (CLC, 2018) are considered. Nevertheless, neither the factors affecting the productivity of construction workers nor the categorisation of these factors are constant or universally agreed upon them. For instance, several authors, such as English & Marchione (1983) and Olomolaiye et al. (1998), divide the factors influencing construction productivity into internal and external categories. Nonetheless, they differ in the way they define these categories and attribute components or factors to these two groups.

For instance, three research articles examine the factors affecting labour productivity in Palestine, categorising these under the following main groups: a) managerial, labour, material and equipment (Mahamid, 2013 a); b) experience, external, physical, time and workload, psychological, supervision and leadership (Hamouda & Abu-Shaaban, 2014); and c) material/tool, manpower, leadership, supervision, motivation, and time major groups (Enshassi, et al., 2007). Additionally, labour competencies as a factor impacting labour productivity in the Palestinian construction market have been considered under the main group - labour (Mahamid, 2013 a), experience (Hamouda & Abu-Shaaban, 2014) and workforce (Enshassi, et al., 2007). Rework has been ranked as the factor with the highest impact on labour productivity by Mahamid (2013 a), while material shortages and skills and experience have been respectively classified as the factors with the highest impact on labour prodcutvitiy based on the studies of Enshassi et al. (2007) and Hamouda & Abu-Shaaban (2014). Exploring key and universally accepted factors affecting construction productivity is impossible (Olomolaiye, et al., 1998).

The construction industry has witnessed substantial improvements by introducing new construction methods, materials and technologies (Goodrum & Haas, 2004; Goodrum, et al., 2009). On the other hand, a decline in construction labour productivity has been witnessed in many economies (Green, 2016; Javed, et al., 2018; Teicholz, 2013). Furthermore, Williams (2005) claims that construction is always carried out with less than optimal productivity. The following sections summarise the factors impacting construction labour productivity.

2.4.1 Factors with a direct impact on construction labour

Labour skills, level of labour organisation, degree of mechanisation and automation of production process, and development of moral and material incentives are among the main underlying forces affecting construction labour productivity (Levit, 1973). Skill shortages have significantly influenced construction labour productivity (***Figure 2. 5***). Several authors have also referred to construction workers' experience and training as factors impacting productivity as well as the importance of supervision on construction sites. Few have emphasised the importance of education in improving labour productivity. However, it is unclear what type of education is required, i.e. technical or non-technical. Furthermore, most authors do not clarify the reasons for skill shortages and the interrelation between these factors, such as the training of the workforce and skill shortages. Even when some researchers, e.g. Javed et al. (2018), Maloney (1983) and Nasirzadeh & Nojedehi (2013), have studied the impact of several factors on labour productivity, a rather old-fashioned managerialist perspective has been used to represent the effects of drivers and barriers on labour productivity.

According to Dacy (1965), the lower average age of construction workers is among the main factors of increased construction productivity since 1947. Similarly, productivity in the construction sector has decreased in several countries due to the ageing problem of the construction workforce (***Figure 2. 5***). Furthermore, absenteeism and labour turnover, high accident rates and a high rate of reworking, which are categorised as part of working conditions as shown in ***Figure 2. 5***, have been associated with extensive shift work and overtime (Hanna, et al., 2008). Notwithstanding, other working conditions that increase labour absenteeism, turnover and disloyalty remain to be investigated.

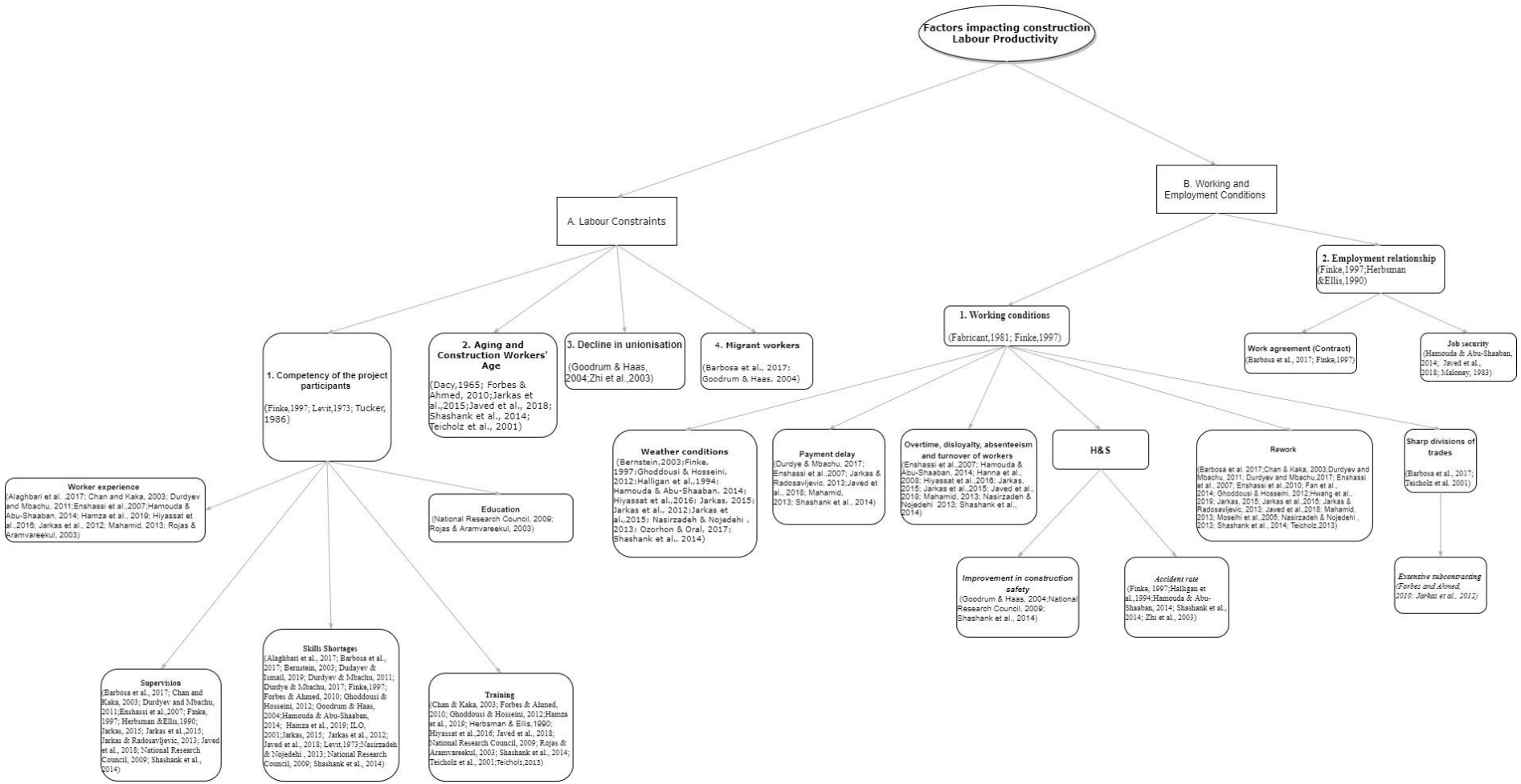


Figure 2. 5: Factors impacting construction labour productivity: Labour issues

Some researchers, such as Goodrum & Haas (2004), perceive that the decline in unionisation, skill shortages, the increase in migrant workers, improvement in construction safety, and increase in fringe benefits affect the productivity of construction workers as they tend to decrease real wages. Nevertheless, health and safety regulation enforcement mechanisms and challenges companies face in applying the rules remain to be examined in contexts such as company size (Teicholz, 2013), low-profit margins and high competition between contractors to win the bid (Winch, 2010) at the meso level and the growing emergence of subcontracting (Forbes & Ahmed, 2010) at the micro-level. In addition, a few researchers, such as Barbosa et al. (2017), Finke (1997), Hamouda & Abu-Shaaban (2014) and Javed et al. (2018), have recognised work agreements and job security as factors impacting labour productivity.

Many authors, particularly those who discuss labour productivity at the site level in developing countries[2], neither link productivity to contextual factors, such as the economic or political situations, nor with other factors at the macro or meso levels, such as the firm size and training institutes. For instance, most research has not discussed the relationship between employment conditions and the supply of skills in the industry. However, labour-only subcontracting and self-employment have complicated the supply of skilled construction labour, which is disjointed and fragile (Chan, et al., 2010).

Additionally, Burrow (2015) states that migrant construction workers in Qatar operate under a model that denies workers' rights and institutionalises abuse. Their wages are well below the minimum wage, and their working and living conditions are harsh and squalid (Burrow, 2015). The risk of late or non-payment of wages is one of the most severe factors facing migrant workers in the construction industry, particularly in the countries of the Gulf Cooperation Council (GCC), where migrant workers constitute up to 90% of the construction workforce working under the kafala system, where workers cannot change their employer even when they are not paid (Wells, 2015; Wells, 2018). Yet, none of these problems has been discussed in the different articles that studied the factors impacting labour productivity in the GCC states. For instance, the power imbalance in subcontracting and exploitation of subcontractors operating at the lower levels of the chain (Wells, 2015)

[2] e.g. Chan (2002), Durdyev & Mbachu (2017), Durdyev & Mbachu (2011), El-Gohary & Aziz (2014), Enshassi et al. (2007), Ghoddousi & Hosseini (2012), Hamza, et al. (2019), Hiyassat, et al. (2016), Jarkas & Bitar (2011), Jarkas (2015), Jarkas and Radosavljevic (2013), Jarkas, et al. (2015), Jarkas, et al. (2012), Kazaz, et al. (2016), Mahamid (2013 a), Nasirzadeh and Nojedehi (2013), Shashank et al. (2014)

and consistent late or non-payment of construction workers' wages, which is common in all GCC states (Wells, 2018), are not discussed by Jarkas (2015) and Jarkas & Radosavljevic, (2013).

2.4.2 Factors with an indirect impact on construction labour

Figure 2. 6 shows the factors impacting labour productivity at industry and firm levels, including health and safety regulations, institutions for training, project finance, firm size and planning and scheduling for construction projects. Material management has been considered a significant cause of labour productivity loss in developed and developing countries (**Figure 2. 6**). Multiple handling of materials, inefficient distribution, and shortages of materials are examples of mismanagement reported by, for instance, Abdul Kadir et al. (2005); El-Gohary and Aziz (2014). The impact of political instability and the economic situation on construction labour productivity through the availability of construction materials remains to be examined.

Furthermore, design changes have been considered one of the most critical factors affecting labour productivity (Faniran & Caban, 1998). Changes and variation orders lead to an average loss of efficiency ranging between 10% and 30% (Leonard, 1987; Thomas & Napolitan, 1995; Zink, 1990). However, research indicates that changing orders does not directly decrease productivity or efficiency but affects the workforce. This view does not consider human effort as a part of labour productivity.

Moreover, most research following a positivist methodology and depending mainly on cross-sectional survey data does not examine the interdependence of factors and their influence on and complicated relationships with each other, e.g. Chan (2002), Ghoddousi & Hosseini (2012), Enshassi et al. (2007) and Jarkas, et al. (2015). Furthermore, the analytical methods used by several authors to rank the impact of these factors are: a) relative importance index (e.g. Enshassi et al. (2007), Jarkas et al. (2015) and (Mahamid, 2013 a) and b) analytical hierarchy process (Hamouda & Abu-Shaaban (2014). Others, such as Halligan et al. (1994), deploy technical methods and tools that do not acknowledge labour value in studying the impact of certain factors on labour productivity.

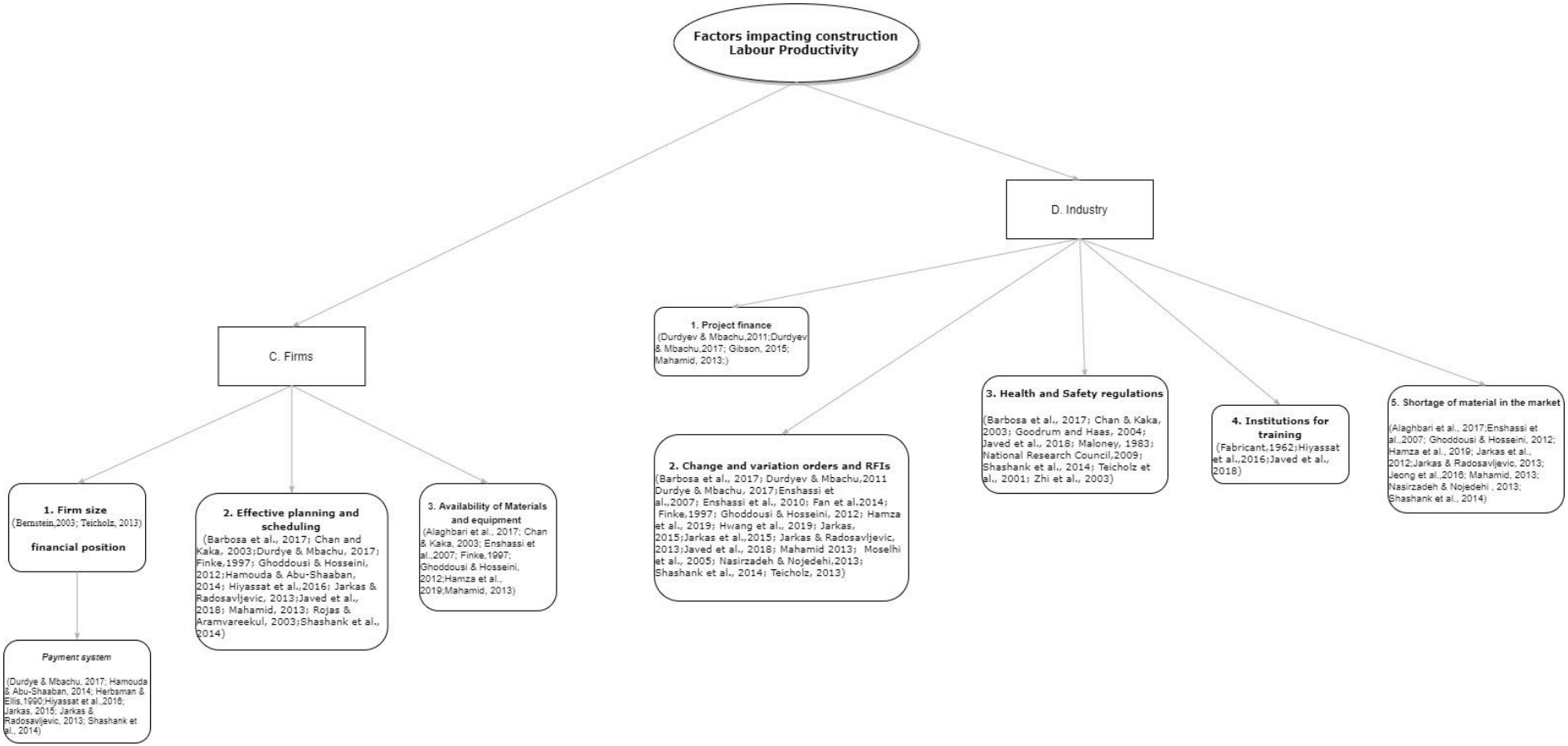


Figure 2. 6: Factors impacting construction Labour Productivity at the macro and meso level

2.4.3 Drivers to improve construction labour productivity

According to Clarke (2006), the construction labour process in the UK rests not only on causal self-employment but also on low levels of training, focusing on importing the necessary skilled labour (Clarke, 2006; Egan, 2004; Pearce, 2003). This cannot be considered a sustainable solution and delays the consequences of the skill shortage problem instead of focusing on employment regulation and a comprehensive industry-wide training scheme (Clarke, 2006). For instance, Clarke et al. (2017) summarise the expertise needed for low-energy construction, which is almost similar to that mentioned by Egan in his 2004 review of the skills required for sustainable communities.

The most important factors that influence the shortfall in construction skills are reduction in commitment and investment in training within the industry due to the growth of self-employment and the use of labour-only subcontractors (agency factor) (Briscoe, et al., 2000; Clarke, 2006; Harvey, 2001), the poor image of the sector (Dainty, et al., 2000), failure to develop multi-skilling as a route to overcoming an overwhelming shortage of skills (structural factor) (Chan, et al., 2010; Clarke, 2006; Clarke, et al., 2017; Scott & Cockrill, 1997), reduction in the number of people entering the construction labour market due to demographic downturn (agency factor) (Druker & White, 1996) and the introduction of new technologies that have reconstituted the skills required (structural factor) (Agapiou, et al., 1995). Furthermore, according to Clarke and Wall (1998), the construction training system in Britain is employer-led, dominated by qualifications broken into narrow task-related units and confined mainly to the traditional trades. Many construction firms have a relatively low commitment to working towards high standards and see training and development as secondary activities (Dulaimi & Beckinsale, 2001). Accordingly, the low level of training investment in Britain, which leads employers to poach staff from each other and other countries and inflates wage rates, is one of the main reasons for the higher costs and lower productivity (Dainty, et al., 2004; Prais & Steedman, 1986; Winch, 1998). Authors, such as Dainty et al. (2004), do not however consider labour mobility, a significant issue affecting construction productivity in the West Bank, as a cause of skills shortages.

Other authors, such as Camus (2007) and, Mwamadzingo and Chinguwo (2015), perceive productivity as a technical and managerial issue only and do not mention the quality of labour effort. Accordingly, as shown in ***Figure 2. 7***, most of the drivers suggested for

improving productivity are either technical, such as using BIM or managerial, such as applying the TQM and lean planning. For instance, Ballard et al. (2003), González et al. (2008), and Liu et al. (2011) have considered the last planner system (LPS) a successful tool for improving productivity. Additionally, Hewage et al. (2008) and Yi and Chan (2014) stress the importance of technology, including material and information technology, to improving labour productivity. In developed countries, such as in Europe, the government and the industry examine several scenarios, such as the viability of offsite construction and prefabrication and on-site innovations (***Figure 2. 7***), for instance, mobile communication and robotics, as means of reducing the reliance on on-site labour (Glass, et al., 2008).

This view that puts labour at the bottom of the ladder in improving productivity has been criticised by several researchers, such as Dainty et al. (2017). While industrial strategy and most research recognise skills shortages in the sector, they are essentially blind to the constraints and challenges facing applying their suggested solutions. For instance, even though the strong commitment to training programmes increases the capacity for implementing standards and improving construction labour productivity, small and medium-sized construction firms tend only to approach standards if there is an immediate financial benefit stemming from the implementation of the standard (Upstill-Goddard, et al., 2016). Furthermore, technological innovation seldom yields expected outcomes (Van Lente, et al., 2013). Nevertheless, there is surprisingly little criticism of the technology and the policy used to mandate it (Dainty, et al., 2017). Williams and Edge (1996) argue that the difficulty of implementing new technologies and the need to invest in developing the organisation and training are underestimated by firms and suppliers. Another barrier is the skills usage access, which goes beyond the technological properties to include a wide range of economic, cultural and political factors (Van Dijk, 2005).

According to Dainty et al. (2017), when mandated incorrectly, BIM has the potential to generate power imbalances that could have negative consequences for the industry and what it produces. At the very least, the extent to which reduced competition would result in better value for money for public sector investment appears dubious. They state that:

> The inevitable corollary of the BIM mandate will be to create a two-tier market where benefits are mostly accrued by the already most privileged and the less powerful are marginalize. […] If, on the other hand, we were to shift the focus

> towards skills access usage access, then BIM becomes a potential problem rather than a solution... However, the IS, whilst recognizing skills gaps in the sector, is largely blind to the specific needs of SMEs to overcome skills access with a little explication of interventions to address skills and usage access (Dainty, et al., 2017, p. 25).

Thus, while adopting any digital or technical solutions, such as BIM, motivation, skills, and the resources necessary to deploy the technology should not be overlooked (Dainty, et al., 2017). As shown in ***Figure 2. 7***, construction labour productivity becomes more complex and challenging due to the industry's new challenges, such as insufficient training for blue-collar and white-collar workers, fewer younger workers entering the workforce, further health and safety procedures, increased complexity of the construction projects, more fast-paced projects and greater fragmentation of the work process (Teicholz, et al., 2001).

Solutions, such as industrialisation (CLC, 2018), to reduce the amount of on-site labour and accidents have been suggested. Clarke (1992) observes that:

> Whilst training creates skills; these skills have different values for the worker who owns, sells, employs and attempts to conserve them than for the builder (employer) who buys and consumes them (p. 6).

Nevertheless, these perspectives regarding the meaning of skills are rarely discussed while discussing the skill shortage problem and its realistic solutions. Furthermore, the uniqueness of the construction sector, whose output is a different kind of production (Chan, et al., 2010), is rarely discussed by those who advocate making construction more like manufacturing. Construction labour productivity has a social dimension. Accordingly, studying the term and its factors, such as the use of BIM and skill shortages, from social and technical perspectives, remains to be undertaken, contributing to understanding the interrelationships between structural and agency factors within a context that includes but is not limited to, economic and political conditions.

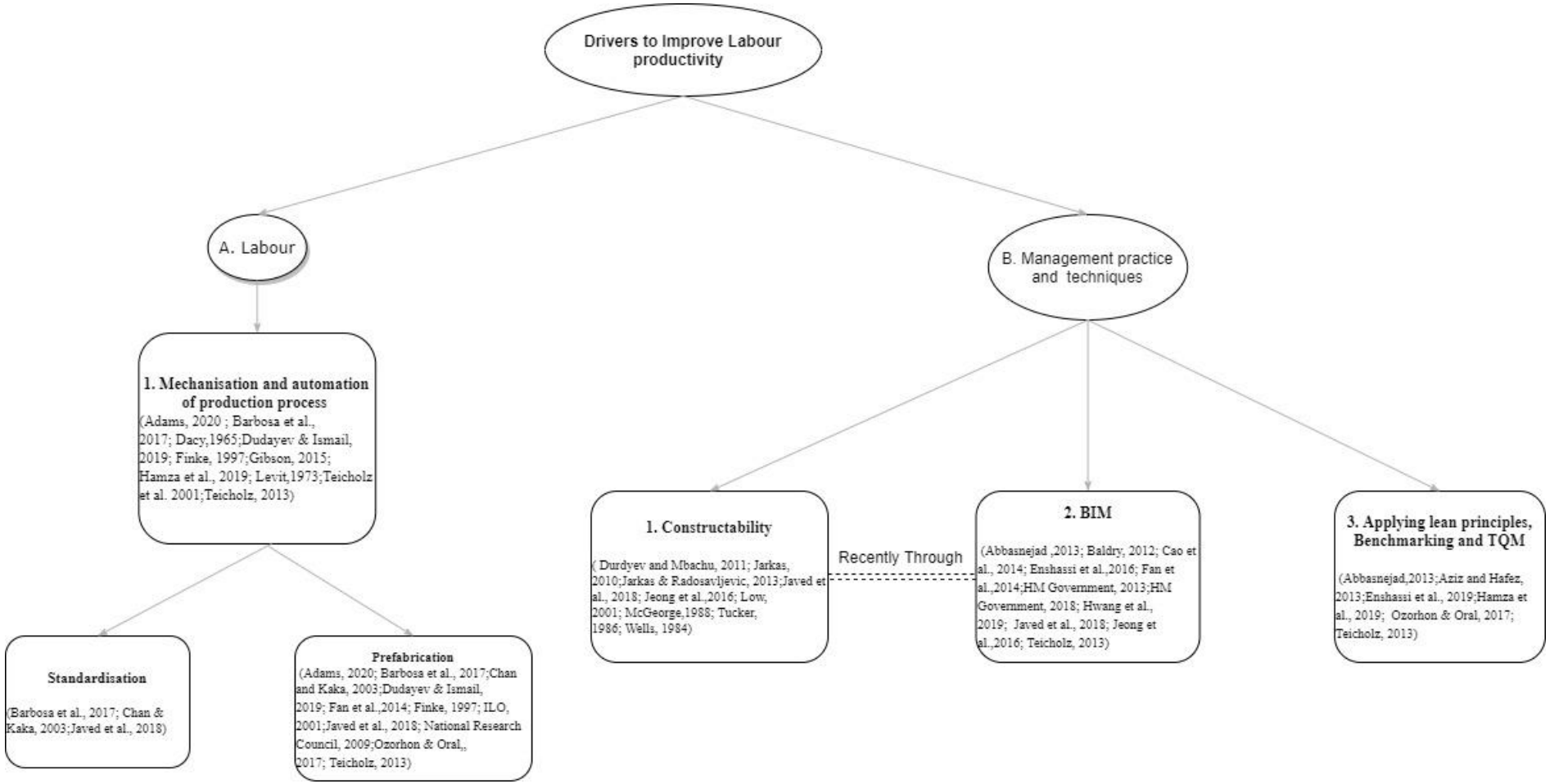


Figure 2. 7: Drivers to improve construction labour productivity as per literature

2.5 Methodological approaches to previous research

Articles and reports that discuss the productivity of the sector can be divided into three categories: [a] Industry level, which can be considered the macroeconomic level;[b] firm level, which can be considered as meso-level; and [c] project or site level, which can be considered as micro-level. The research carried out at the industry level relies mainly on abstract statistical data, which are used either to compare construction productivity across different countries, for example, the OECD (2015), or to build statistical models to study the effects of several events, such as political instability, on construction labour productivity, for example, Asteriou & Price (2001) and Fielding (2003). However, given the limitations of statistical data, for example, to capture the material supply chain or professionals engaged in planning and design and consider working offsite as part of the manufacturing sector (Green, 2016), data at this level must be treated with great caution. Most of the research under this category uses secondary data and positivist and quantitative methods.

Other aspects impacting construction labour productivity, such as construction firm size, environmental issues, skill shortages, use of technology, and availability of resources, are covered under both industry and firm levels. Authors such as Agapiou et al. (1995), Clarke & Wall (1998), Dainty et al. (2004), Dainty et al. (2000), and Scott & Cockrill (1997) have studied the problems facing the construction industry in general, such as the casual workforce and shortages of skills. However, the effects of these problems on construction labour productivity are not clearly explained. The ability of these researchers to explore productivity aspects and compare, for example, labour input and employment relationships in different nations depending on the research methodologies and methods adopted. For instance, the case study approach used by Clarke & Wall (1996) allows an international comparison of the construction of social housing in terms of labour input, construction training approaches, construction process and quality. The researchers use secondary and primary quantitative and qualitative data at the meso-level. Yet, positivist and quantitative methods still dominate the research under this category.

Factors impacting productivity on the construction site are covered under the site-level category. Authors under this category almost follow a similar structure and methodology, using positivist and quantitative methods in their articles (***Figure 2. 5*** &**Figure 2. 6**). The written literature about factors affecting labour productivity in building projects is mainly

based on the point of view of construction contractors, even though productivity problems are best known by the workers involved in executing projects. Most of the articles covering construction labour productivity are based on questionnaire surveys, which generate productivity factors on the basis of previous research work on construction productivity, see, for example, Enshassi et al. (2007); Hamouda and Abu-Shaaban (2014) and Mahamid (2013 a). Instead of linking the highly ranked factors at the site level with structural or agency factors at the industry and firm levels, most authors, particularly those who cover this topic in developing countries, go to great lengths to find out whether or not their findings align with those of previous authors, see, for instance, Enshassi et al., (2007) and Mahamid (2013 a).

The first criticism of their approaches is that the factors influencing the productivity of construction labour and their ranking vary from country to country, from project to project or even in the same project. Therefore, it is pointless to compare the results obtained from different countries. Furthermore, such comparisons will not help improve labour productivity as a similar factor impacting productivity could be attributed to different economic and social factors. The second criticism is the use of positivist and quantitative methods for most construction management research (Dainty, 2008). Thus, most of these articles, particularly on developing countries, are neither theoretically grounded, able to explain reasons for skill shortages, nor able to draw the interrelationships between agency and structural factors. The interactions between drivers and factors underpinning construction productivity enhancement are rarely covered in most studies of the factors impacting productivity at the activity level. Few studies, such as Javed et al. (2018), explore the interactions between drivers and constraints underpinning construction productivity enhancement at macro and micro levels. However, they do not divide the factors into the agency and structural factors, nor do they explain how changes in agency factors can influence structural factors. Additionally, most of these articles have ignored the social dimension of the construction sector, which also detaches the sector from its context while discussing and ranking the factors impacting productivity.

Based on the perceptions of several authors, such as Burkhead & Hennigan (1978), the OECD (2015) and Prokopenko (1992), the social, economic and political environment should be covered when discussing the productivity of labour. Thus the productivity of the sector should not be considered only a technical or managerial problem. The construction

industry can be neither isolated from changes in management practices, societal problems and trends, or the economic and political system (Prokopenko, 1992) nor detached from its context. Humans are affecting and affected by other actions, policies, and economic, environmental and social conditions. Therefore, studying productivity should consider all these conditions to give a holistic picture of the factors affecting productivity.

2.6 Implications

Not all factors impacting construction productivity are controlled by construction labour (agency). Yet, authors, such as Mahamid (2013 a), attribute the sector's low productivity to construction labour. Nevertheless, blue-collar workers are constrained by administrative decisions, such as those made during design and planning. For instance, Doloi (2008) and Naoum & Hackman (1996) find that improving productivity is inherently linked to other latent factors, such as planning. Ineffective planning and design errors, which could lead to rework, delays and extra material costs, are the most crucial factors impacting construction productivity (Gao, et al., 2014). These internal decisions are considered structural factors that directly impact the agency of labour and are beyond labour control.

As shown in the literature, most current research concerning the definition and factors affecting construction labour productivity has neglected most aspects related to blue-collar workers, e.g.job, security, health and safety, and valuing labour. Moreover, the main focus of the research is on output rather than on the production process. For instance, despite the importance of labour in construction, which can be considered the key input for the construction process, most research concerning the factors impacting construction labour productivity reflects the views of construction firms and construction contractors, with few articles reflecting the workers' point of view. Thus, the adaptation of industrial models, such as lean construction, industrialisation and Total Quality Management (TQM), to improve labour productivity is a striking factor in the research, particularly by researchers studying construction labour productivity in developed countries. Yet, these research and reports have not considered a wide range of structural, cultural and economic factors (external structural factors) that influence the industry's labour market, which is exceptionally complex (Dainty, et al., 2004). Currently, there is a focus on BIM and lean construction to improve productivity. However, the level, breadth and quality of construction vocational education and training (VET) at the macro level, the fragmented employment structure in the sector (Clarke, et al., 2017), firm size and financial status

(Dainty, et al., 2017) and the learning infrastructure on sites (Clarke, et al., 2017) are important to consider when discussing improvements in construction labour productivity.

In the construction industry in most nations, skill shortages (agency factor) have been a persistent and recurrent problem. For instance, the British sector has been afflicted by this problem over the previous three decades (DfEE, 2000). There are too many reasons for skill shortages. Additionally, political, economic and educational systems differ from one country to another. Some reasons for skill shortages do not apply in some circumstances or are not acknowledged by other authors. Therefore, tackling the impact of an agency factor, such as skill shortages, on construction labour productivity should be studied within the contexts of the industry's internal and external structures. Instead of focusing on either structural or agency factors impacting productivity, the tension between the two is overcome by viewing them as dynamic and interactive. Consequently, agency and structural factors at the macro, meso, and micro levels can be investigated within their contexts and linked to create a holistic view of factors impacting labour productivity (Chapter 5).

Colonialism is organised around a logic of exploitation, and thus the coloniser seeks the labour of the colonised (Cavanagh & Veracini, 2013). According to Greenstein (2019), in Kenya, Rhodesia, Algeria, Mozambique and South Africa, the bulk of the population and the main source of labour were the indigenous people. Good (1976) points out that African settlers saw African labour as the colony's key asset in development. In order to have better control over labour, more land was confiscated, which settlers could use effectively to acquire these assets. In South Africa, for instance, over 87 per cent of the land was controlled by the whites, who represented only 20 per cent of the population, and the apartheid system mainly existed to organise and control a cheap black labour force for the white industry (Good, 1976).

Conversely, settler colonialism, which is not a new modality of interpreting the conflict and has figured in Palestinian, anti-Zionist and Marxist analyses since the 1920s (Pappe, 2015), is characterised by a logic of elimination, and thus the settler coloniser seeks indigenous people's land, with the elimination and replacement of these people (Busbridge, 2018). The distinctive features of the recent 'settler-colonial turn' bring Israel and its relationship with the Palestinians into direct comparative focus alongside the white settlers in the New World. Many Israeli scholars attempt to derive the driving patterns of land

acquisition (Kimmerling, 1983) and labour market relations (Shafir, 1996) from studying the Israeli colonisation in Palestine. Unlike other colonisations, which acquired value by creating surplus value from indigenous labour, the land was accorded a particular value in the Zionist colonisation of Palestine. Hilal (2015) argues that one in four people in the West Bank is an Israeli settler. Furthermore, the ongoing calls to annex large swathes of the O.P.T. into Israel (Lazaroff, 2014) and the proposed annexation of large swathes of the OPT, particularly in the West Bank, into Israel, according to the Trump deal are among the main challenges facing the sector in Palestine (Chapter 4).

Palestinians in the O.P.T. have been subjected to a military rule restricting their ability to move and access land and jobs (Greenstein, 2019). According to the ILO (2018a), the number of job prospects on the local market is insufficient, leading to either a rise in unemployment or an increase in the number of Palestinian workers employed in Israel and the illegal settlements, which Roy (2001) refers to as 'externalisation'. Greenstein (2019) states that the concept of apartheid can capture the power relations and conflict over resources between different groups inhabiting the same space and state structures. Despite the massive number of workers working in the Israeli construction markets (Chapter 4), the Israeli system towards Palestinians can be called an 'apartheid of a special type' based on land expansion rather than creating surplus labour (Greenstein, 2019). For instance, Chapter 4 shows that Palestinian workers from the West Bank have been employed in dirty, dangerous and demanding jobs in the Israeli construction markets as blue-collar workers. This is related to the limited capacity of the construction market in the West Bank and the lack of job prospects to absorb the significant number of Palestinian construction workers (Chapters 7-9).

Thus, political instability, conflict, complex geography and the perspectives of different participants regarding the term ‘productivity’ have led to an intense debate on its definition and on the decisive impact factors. The detrimental effects of the low-level skills and narrow qualifications of many employed in the industry and the lack of initial and further training on construction labour productivity under politically unstable and harsh economic conditions remain to be investigated. These structural factors must be unpacked, together with other factors leading to skill shortages. Therefore, structural and agency factors impacting labour productivity will be investigated in this thesis. Accordingly, these questions should be addressed: what are the reasons for skill shortages? Is it the quality of

training, its level or both? Do political and economic conditions affect the level and quality of training? Are trained workers valued based on their level of knowledge or their output? Are labour mobility and migration affecting the investment of construction firms in training? Has the presence of two attractive Israeli markets for construction in the Occupied Palestinian Territory affected construction companies and the Palestinian Authority's decisions to invest in training? What are the advantages of labour mobility on the sector's labour productivity? Does labour mobility help upskill the existing workforce by working in more advanced construction markets?

Factors impacting productivity are often interdependent and influenced by each other and might result from the exact cause but have a different impact. However, most research has no theoretical framework and follows a positivist methodology. Therefore, the interaction between agency and structural factors at different levels is difficult to examine. Furthermore, Guy and Henneberry (2000) state that human agents are creative and experiential beings and their contexts of action constantly shift. Thus, research programmes, which commonly adopt the positivist research tradition, often fail to untangle the dynamic and contextual relational links between agent action and structures (Guy & Henneberry, 2000).

Accordingly, juxtaposing multilayer structure and agency determinates within this unique volatile context is a valuable framework for examining the barriers and drivers influencing productivity directly and indirectly. The uniqueness of the Palestinian context, the political instability, the status of uncertainty under occupation and the issue of 'statelessness', as well as the existence of two robust Israeli construction markets that play crucial roles in shaping the economy and its resources, call for new means to interpret, read and assess productivity in the construction sector beyond its conventional definition. Thus there is a need for a framework showing that labour productivity stems from an interaction between multilayer labour agency and structural determinants, which are two ontological dimensions that reciprocally constitute each other. It is also necessary to adopt a theoretical framework appropriate to a particular context and a more comprehensive methodology that tries to comprehend a phenomenon under investigation through the experiences or perspectives of the participants. For example, a constructivist methodology utilising various data collection methods allows several types of data to be interrogated to study the interaction between factors impacting construction worker productivity.

3 CHAPTER 3:

Historical Background of the Palestinian Construction Industry

3.1 The Built Environment in Palestine before 1948

Policies of the Ottoman Empire have played a leading role in shaping the Palestinian built environment and urbanisation history. First, the policies regarding land settlement and the segmentation of large land areas into small tracts, known as parcelisation, were issued during the final decades of the empire. As shown in **Table 3. 1**, the 1858 Ottoman Land Code, which had been amended several times by the British, Jordanian and Egyptian governments and Israeli Military Authority, classified lands under seven categories that are a)Waqif land, b) Mulk land, c) Khuraj land, d) Miri Land, e) Matruk land, f) Mawat Land and g) Masha' land (Abdulhadi, 1994; Bshara, 2019; Haines & McFarlane, 2007). The land tenure system in the OPT is still based on this code. Therefore, the influence of the outdated Othman code on the sector's productivity will be examined in the next chapter.

Land Category	Definition
Waqif	The land has been left for religious purposes
Mulk	The land was initially given out to Muslims by the Ottoman sultan
Khuraj	The land has given out to non-Muslims by the Ottoman sultan
Miri*	It is neither waqif nor mulk land
Matruk	Lands allocated to public purposes like cemeteries and roads
Mawat (Dead)	Unoccupied land since it is very far from the village
Masha'	Land surroundings the village could be used either for the future development of the village or as shared pastures by the villagers

* The practical differences between Mulk and Miri lands were eliminated under the Jordanian Law No. 49 of 1953, and thus this category of land falls within municipal areas transferred to the Mulk land category.

Table 3. 1: Land Classification under the Amended Ottoman Land Code

Developed from: (Abdulhadi, 1994)

Secondly, during the decades between 1850 & 1917, many infrastructure projects were constructed, for example, the Hijaz railways and clock towers and many cities planned in historical Palestine, such as Beersheba and Haifa, were developed. Also, in 1892, Jaffa was connected to parts of Jerusalem using the Hijaz railway line, and then Jaffa was connected to Lod and Beersheba railway lines with construction completed in 1915 (Bshara, 2019; Tamari, 2012). The transformation of the Palestinian economy from agro-based to wage-

based in the late nineteenth century led to a change in land ownership from communal to private. A radical transformation in the built environment occurred, such as replacing traditional family houses with individual mansions and linear multi-storey buildings and constructing parks, wider streets and non-residential buildings, e.g. banks and retail stores (Bshara, 2019; Mansour, 2006). After the First World War, the British Mandate for Palestine began. The British authorities created the Palestinian planning institutes by issuing The Town Planning Ordinance in 1921, which was replaced in 1936 by a more flexible and less centralised ordinance. In each town, the local Building and Town Planning Commission had the right to prepare a detailed planning scheme, determine the land allocation for public purposes, preserve archaeological and beautiful objects and decide on the size, height, design and external appearance of new buildings (Bshara, 2019). During the British Mandate period, a drastic change occurred in the building materials used. For instance, lime was replaced with cement as a binder, and stone facades became mandatory.

Consequently, the details and shapes of buildings in historic Palestine, dominated by new western styles such as neoclassic, changed dramatically, especially in the major cities *(Ghadban, 2000; Ministry of Local Government, 2002; WAFA, 2016)*. Furthermore, most of the development in the transportation systems was carried out during the British Mandate *(WAFA, 2016)*, such as the new Haifa Bay and Port, which was constructed in the early 1930s (**Photo 3. 1**).

Photo 3. 1: Haifa City and Port in 1935

Source: (PLO, 2019)

Photo 3. 1 shows Haifa's new building styles and infrastructure development during the Mandate period. Several researchers, such as Bshara (2019) and Mansour (2006), stated that during the Mandate, besides the port, Haifa's internal road networks were constructed around the commercial centres in and around the heart of the city. However, the dramatic transformation in building construction in Historical Palestine suddenly ended in 1948 due to a disastrous event known to the Palestinian people as the Nakba, which also affected the landscape of the West Bank and the Gaza strip (Bshara, 2019; Mansour, 2006).

3.2 The impact of 1948 on the built environment in the OPT

In 1947, the Palestine partition plan proposed and adopted by United Nations General Assembly as Resolution 181 (II) was approved with minor changes (**Figure 3. 1**). The British Mandate was to be terminated no later than October 1st 1948, and Arab and Jewish states were to be created. According to the agreed resolution, Jerusalem city came under the administration of the United Nations Trusteeship Council. However, this resolution was never implemented (United Nations Department of Public Information, 2003).

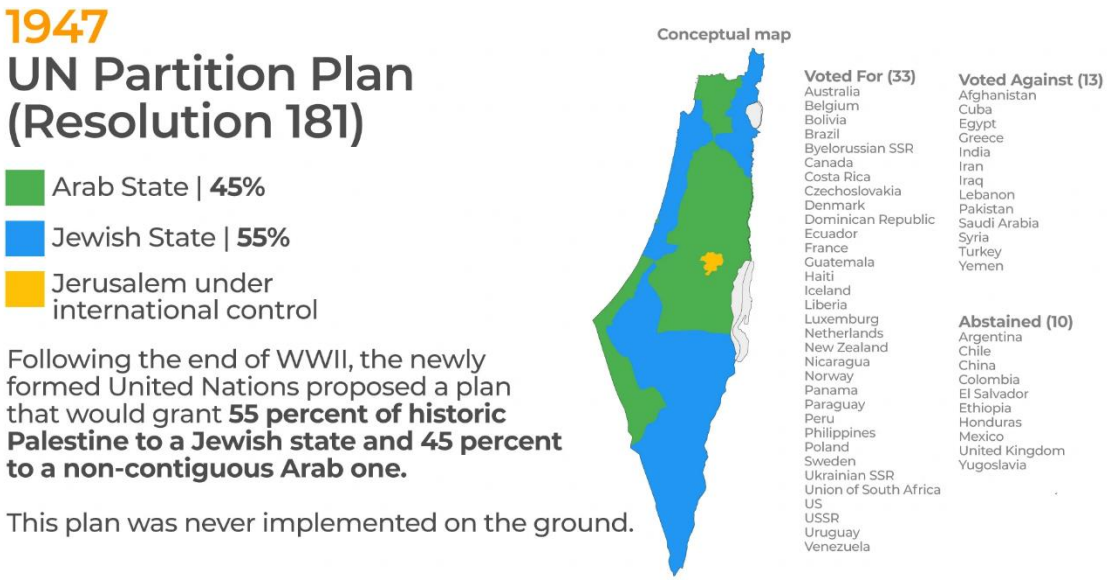


Figure 3. 1: *The UN Partition Plan*

Source: (Haddad, 2020)

After the British Mandate over Palestine ended on May 14th, 1948, a new state known as Israel, which occupied and controlled much of the territory allotted to the Arab State, including the western part of Jerusalem, was established. In 1949, UN efforts led to the signing of the Armistice Agreements between Israel and Egypt, Lebanon, Syria, and Jordan. The 1949 cease-fire agreement called the border between the West Bank and Gaza Strip and the newly established state known as 'Israel' the Greenline (**Figure 3. 2**). From 1948 until 1967, Jordan and Egypt ruled the West Bank, including the eastern part of Jerusalem, and the Gaza Strip, respectively (Nathanson, 2017; United Nations Department of Public Information, 2003).

The Nakba event of 1948 affected the West Bank and Gaza Strip landscape. However, while the large influx of 1948 Palestinian refugees who adopted the West Bank as their home has shaped that region's urbanisation, the consequences of the Nakba were more pronounced in the Gaza strip, whose population suddenly increased by more than 300% post-1948[3] (Bshara, 2019). Moreover, as a consequence of establishing the Israeli state in 1948 on 78% of historical Palestine, more than 750,000 Palestinians (**Figure 3. 2**) were depopulated from their homes by the Israeli occupation force (Abdulhadi, 1994; Haddad,

[3] The Negotiations Affairs Department (2016) states that 26.5% of the 7.2 million Palestinian refugees distributed among different countries live in the OPT. However, approximately 770,000 refugees, of whom 190,000 are spread over 19 camps in the West Bank including East Jerusalem, are registered with UNRWA in the West Bank, including East Jerusalem.

2020). Accordingly, nineteen refugee camps were constructed to accommodate those Palestinian 'indigenous residents' who became homeless and sought refuge in the West Bank (Abdulhadi, 1994). Bshara (2019) points out that between 1948 and 1967, styles of Western architecture persisted in many major cities of the West Bank, such as Jerusalem, Nablus and Ramallah, where various buildings and gardens were also executed. Traditionally, the primary type of construction in the OPT is house building, which flourished mainly in the late 1950s and early 1960s by the private sector (Abdulhadi, 1994). Additionally, the central authorities were responsible for constructing public non-residential buildings, including hospitals and schools, and infrastructure projects, such as new roads and water and electricity distribution networks. While the sector's contribution to GDP during that period was 16% in the West Bank and 6% in the Gaza Strip, the sector's efficiency was low due to the lack of appropriate planning and management tools (Abdulhadi, 1994).

Figure 3. 2: *Map of the new state established and the West Bank and Gaza stip based on the Armistice Agreements*

Source: (Haddad, 2020)

3.3 The Built Environment in the OPT between 1967 and 1993

Since 1999, The UN has used the terminology Occupied Palestinian Territory (OPT) for the parts of Palestine occupied after 1967 (Ben-Naftali, et al., 2005). Even though the State of Palestine replaced the term OPT on November 29th 2012, OPT is the most commonly

used term nowadays in most international reports, publications and websites (Ben-Naftali, et al., 2005; UN, 2012). The area of the West Bank, which comprises around 21% of the total area of historical Palestine and approximately 93% of the OPT, is 5,655KM^2 (See **Figure 3. 3**). According to several researchers, e.g. Abdulhadi (1990) and Kelley (2012), land confiscations in the West Bank never ceased after the Israeli occupation in 1967. The local and district Israeli settler councils control most of the lands confiscated, and thus Palestinians are not allowed to use these lands (Institute for Palestine Studies, 1996; Kelley, 2012; World Bank, 2013).

In the aftermath of the 1967 Six-Day War, Israel occupied the Gaza Strip and the West Bank, including East Jerusalem (**Figure 3. 3**), and destroyed and depopulated certain Palestinian villages in the West Bank, such as Emmaus, Yalu and Beit Nuba (Abdulhadi, 1994). Until 1993, the Israeli occupation authorities controlled the West Bank and the Gaza strip (Bshara, 2019; Nathanson, 2017). Consequently, the planning and management of land were deployed by Israel as tools to control the newly occupied territory, and thus, most efforts by the Palestinians to introduce new western architectural styles ceased. Furthermore, while the expansion of the built-up area of the Palestinian towns in the West Bank and Gaza was only permitted once during the 1970s, many illegal Israeli settlements, by-pass roads and massive road networks were constructed to serve only the Israeli people (Bshara, 2019).

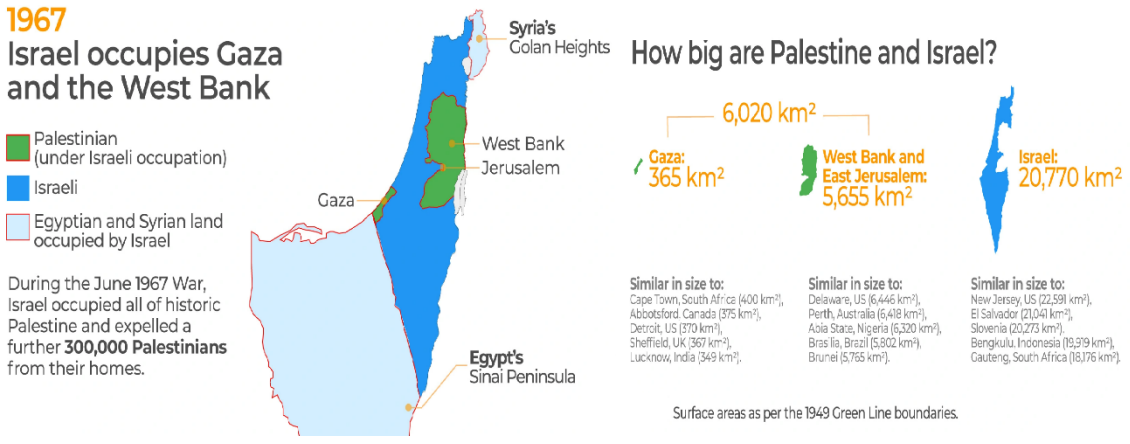


Figure 3. 3: Territories occupied by Israel after the Six-Day War of 1967

Adapted from: (Haddad, 2020)

According to Hanafi (2009), under the Israeli government's modern style or policy, 'Broader Land and Fewer Residents', the Israeli government seized lands in the West Bank

and ignored their indigenous people, i.e. the Palestinians. Mansour (1988) states that Palestinians' interest in and development of the construction sector in the West Bank, particularly in housing, which became more notable after the 1967 occupation due to their experience in 1948, has become a significant concern for the Israeli occupation force. Therefore, Israel has taken many actions to restrict construction and housing development in the OPT (Abdulhadi, 1994; Mansour, 1988). Consequently, these politically destabilising events and Israeli policies illustrate shortcomings in the perception of, for instance, Ogunlana et al. (1996), concerning the problems facing the construction sector in developing countries. The authors confine these problems to three main categories: a)shortages or inadequacies in industry infrastructure, b) contractor incompetence, and c) client' and consultant related-problems. The events in the OPT elucidate the importance of the construction sector in the West Bank in providing adequate shelters for Palestinians living in that region and, above all, in its crucial role in preventing Israeli policies from appropriating the Palestinian territories. They show that industry challenges go beyond these three categories to include political problems.

Abdullah (2015) and the UNCTAD (2016) state that since the occupation of the West Bank, two different regimes have been created by Israel: first, the Jewish regime ensures that Israeli citizens in Israel and the OPT all enjoy the rights granted by Israel. The second regime consists of harsh military rules, amounting to more than 2,400 military commands created to ensure Israel's interests and protect illegal settlers in the OPT, which are applied against the Palestinian people living in the West Bank (Abdullah, 2015; UNCTAD, 2016). In addition, among the commands, more than ten major military orders amended the planning laws and regulations in use at the time and led to the extreme centralisation of the planning process (Abdulhadi, 1990; Abdullah, 2015). For instance, Abdullah (2015) and Lein and Weizman (2002) indicate that between 1967 and 1979, dozens of military orders led to the annexation of nearly 47,000 dunams (one dunam =1,000m^2) of private Palestinian land in the West Bank under the pretext of urgent and essential military needs.

Different mechanisms, such as preventing land levelling and registration, confiscating Palestinian lands, building and expanding the illegal settlements in the West Bank, and controlling the process of issuing building permits for Palestinians, have been used by the occupying force to implement its plans (Abdulhadi, 1990; Abdullah, 2015; Lein & Weizman, 2002 ; MAS, 2013; UNCTAD, 2016). Although the Israeli government allowed

the establishment of Local Arab Councils, all of these were without any autonomy and power to decide on planning and land use in their regions (Abdulhadi, 1990; Abdullah, 2015; Lein & Weizman, 2002).

The land is one of the five production factors of the construction industry. For instance, Gruneberg (2019) emphasises that land markets play an essential role in construction investment, which is influenced by land speculation linked to several variables, such as economic growth, government policies and changes in taxation. However, Israeli physical restrictions, which include land seizure, closure of large areas of land and preventing the expansion of Palestinian municipal and village boundaries, have limited the availability of land in the OPT and thus led to land speculation in the OPT (Abdulhadi, 1994; Sabra, 2015). These mechanisms could be considered an obstacle to the productivity growth of the sector and the Palestinian economy as a whole (Chapter 4).

Year	GDP (US$ Million)	% of the sector	GDP (US$ Million)	% of the sector
1972	24.86	9	17.87	9
1974	65.84	12	43.48	11
1976	104.08	16	63.69	14
1978	108.06	16	69.79	14
1980	167.04	16	105.88	14
1982	196.08	19	120.80	17
1984	177.98	18	116.38	16
1985	161.45	17	120.19	17
1986	245.87	16	178.35	15
1987	303.73	18	212.67	17
1988	1,789.9	17	1,345.4	15
1990	2,220	22	1,674.4	23
1991	2,052.1	25	1,513.3	28
1992	2,468.6	22	1,841	23

Table 3. 2: Construction Sector Contribution to GDP in the OPT and the West Bank for selected years

Adapted from: (Abdulhadi, 1994; Makhool & Atyani, 2002)

As a result of the unstable political situation and Israel's restrictive policies, the construction sector's contribution to GDP experienced a sharp decline between 1967 and 1972 compared to its contribution between the late 1950s and early 1960s (***Table 3. 2***). Additionally, Abdulhadi (1994), Farsakh (2005) and Mansour (1988) point out that from 1967 until 1993, governmental and local authorities' spending on development represented only a minor contribution to overall investment (Gross fixed capital formation (GFCF)) in

the sector. According to Abdulhadi (1994), before 1967, public and infrastructure projects accounted for nearly half of the investment in the construction sector in the OPT. The share of the public construction sector in the GFCF was estimated at 6 to 8 per cent in the mid-1970s and ranged between 1 and 2 per cent in the 1980s (Abdulhadi, 1994; Farsakh, 2005; Mansour, 1988). Farsakh (2005) and Mansour (1988) report that as of the mid-1980s, infrastructure spending and needs related to illegal Israeli settlements have been included in public construction sector investment statistics related to OPT (***Table 3. 3*** and **Figure 3. 4**). Abdulhadi (1994) and Abdullah (2015) claim that, during the Israeli occupation of the OPT, housing facilities and infrastructure, including roads, water and electricity supply and distribution, and sewage collection and disposal, were insufficient.

Year	1968	1970	1975	1980	1984
A. Governmental and local authorities (%)	**56**	**38.9**	**17.4**	**8.8**	**23.5**
B. Private Sector (%)	**44**	**61.1**	**82.6**	**91.2**	**76.5**
1. Building and construction work	32	40.7	66.3	74.5	62.2
2. Machinery, transport and other equipment	12	20.4	16.3	16.7	14.3
Total =A+B (%)	100	100	100	100	100

Table 3. 3 The share of private and non-private sectors in GFCF in the West Bank for selected years

Source: *(Mansour, 1988)*

As shown in ***Table 3. 3***, private sector investment in the West Bank continued to be mainly in the building subsectors. The total construction area for residential and non-residential buildings in the OPT between 1984 and 1987 was 4,530,600 m^2, 82% residential. In the West Bank, the built-up area for residential and non-residential construction projects was 3,388,600 m^2; almost 81% was residential (Abdulhadi, 1994). Israel has taken restrictive measures to reduce the size of the private sector investments, particularly in housing, as shown in **Figure 3. 4**.

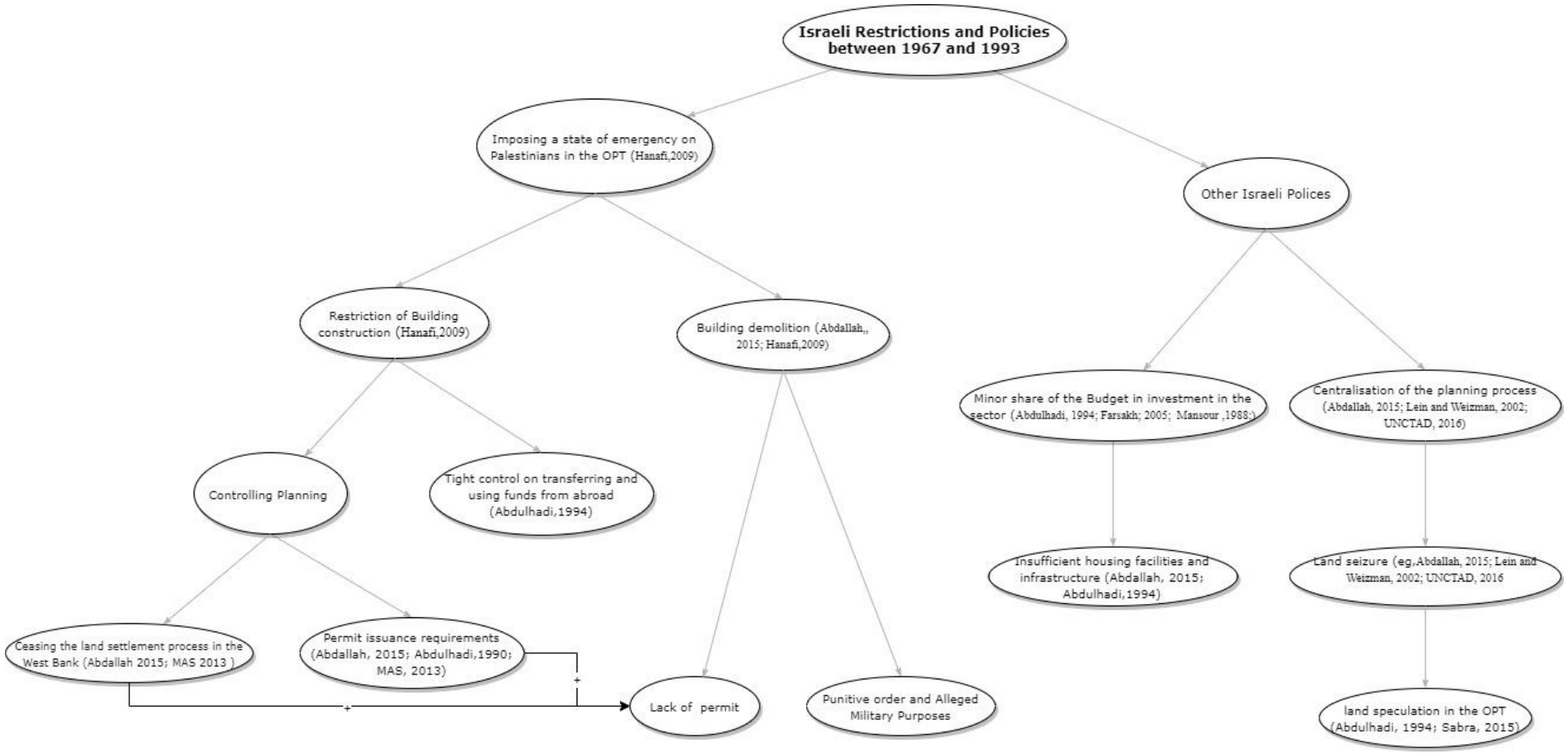


Figure 3. 4: *Summary of the Israeli policies and restrictive measures against the construction sector in the OPT between 1967 and 1993*

Israel, a security state, has used five forms of exceptions to manage instead of regulate Palestinians in the OPT (Hanafi, 2009). One of these forms is imposing a 'state of emergency ' by designating the territories occupied in 1967 as military areas under the command of the military commander, who still controls Area C in the West Bank after signing the Oslo Agreements (next section) (Hanafi, 2009). As shown in **Figure 3. 4**, Israel can restrict housing construction (Abdulhadi, 1990; Abdullah, 2015; MAS, 2013) on the one hand and destroy built homes without legal permits on the other hand (Abdullah, 2015; Hanafi, 2009). For instance, due to the Israeli Military order No.291 in 1968, the land settlement process in the West Bank, which the Jordanian government began, ceased (Abdullah, 2015; MAS, 2013). At the same time, Israel issued building permits for Palestinians in the West Bank if they had proof of land ownership (Abdulhadi, 1990; MAS, 2013). According to the World Bank (2013), the number of building permits issued was 2,134 out of 2,199 in 1972 and 1,409 out of 1,466 in 1973. However, the number of building permits issued during 1986 and most of 1987 was zero (Abdulhadi, 1994). In 1988, only 532 out of 1,682 and in 1989, 402 out of 1,586 applications for building permits were approved (World Bank, 2013).

Furthermore, in the OPT, many Palestinian houses constructed were demolished by the Israeli occupation force either on building permit-related or security-related grounds, which can be divided into collective punitive orders and alleged Military Purposes (for example, Abdulhadi (1994) and Abdullah (2015)). According to Abdullah (2015), between 1967 and 1971, nearly 10,000 homes were demolished, and between 1972 and 1987, the annual average number of homes demolished was 41. More than 1,760 homes were destroyed between 1988 and 1991, i.e. during the first Palestinian Intifada (Abdullah, 2015), which shows that the Israeli occupation force used planning as an instrument of reward and punishment for political and security purposes. **Figure 3. 4** shows that many Israeli physical and financial restrictions were imposed on the construction sector, particularly after the outbreak of the first Palestinian Intifada, and thus its growth was adversely affected. After the Oslo Accords, constructing 100,000 new houses in the OPT was one of the PA's foremost challenges (Enshassi, 1997).

Consequently, between 1994 and 1996, many international and Arab organisations financially supported the PA in constructing new houses and infrastructure and improving the existing infrastructure in OPT (Enshassi & Mayer, 2004). However, Israeli policy

regarding land confiscation in the West Bank has never ceased, even after signing the Oslo Accords (I) in 1993. Between 1993 and 2000, the Israeli government confiscated tens of thousands of acres of Palestinian land to expand illegal settlements and build new roads (Roy, 2001).

3.4 The Oslo Accords and Built Environment in the West Bank

The West Bank comprises 11 governorates: Jerusalem, Ramallah and Al-Bireh, Jericho and Al-Aghwar, Bethlehem, Jenin, Tulkarm, Qalqiliya, Tubas, Nablus, Salfit and Hebron (***Figure 3. 5***). As a consequence of the Oslo Accords, the PA was established in 1994. Based on the 1995 Israeli-Palestinian Interim Agreement known as Oslo II, the West Bank areas were divided into three different types: Area A, for that part under the full control of the PA; Area B, for which the PA is only responsible for civil affairs; and Area C, including all illegal Israeli settlements, military installations and the border area with the kingdom of Jordan, ruled by Israel. The lands in Areas A, B and C constitute about 18%, 22% and 60% of the West Bank area, respectively (**Figure 3. 6** and ***Table 3. 4***).

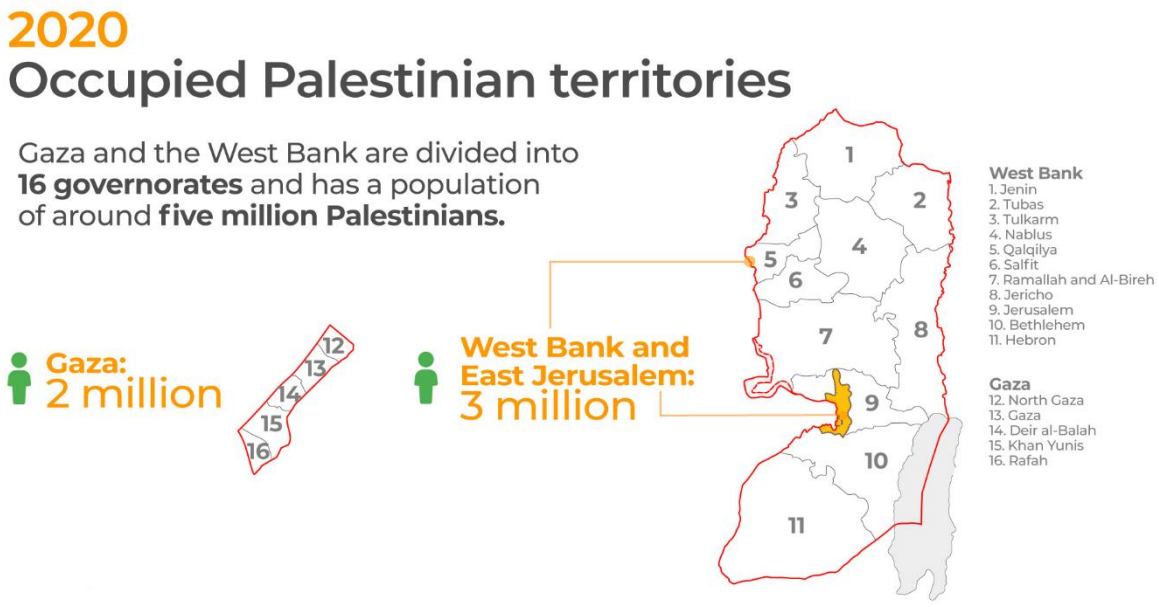


Figure 3. 5: The OPT governorates

Source: *(Haddad, 2020)*

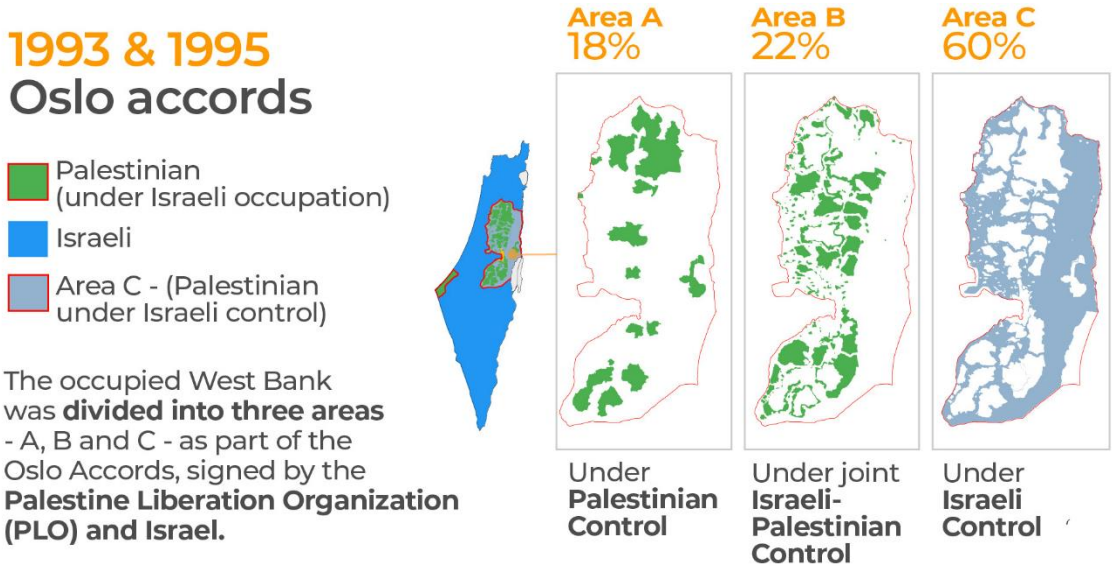


Figure 3. 6: *Division of the West Bank Based on the Oslo II Agreement*

Source: (Haddad, 2020)

Term	Definition
Area A	An area covering the major Palestinian cities in the West Bank except for Hebron and East Jerusalem. Under the Oslo Accords, the State of Palestine (previously known as the Palestinian Authority) is responsible for law enforcement and civil affairs, for example, health and education, in Area A. Israel retains overall military control.
Area B	An area comprising almost 450 Palestinian towns and villages in the West Bank. Under the Oslo Accords, the State of Palestine is responsible for civil affairs, while Israel is responsible for security. Some 90% of the Palestinian population of the territory lives in Areas A and B.
Area C	A zone comprising 60% of the West Bank's geographic area. It contains most of the Israeli settlements, as well as most of the territory's agricultural land and other natural resources. Israel retains both civil and military control in Area C
East Jerusalem (J1)	A part of the West Bank that Israel illegally annexed in 1967 and where Israeli civil law applies, contrary to the provisions of the international law of occupation
H1	A sector of Hebron, where most of the city's 115,000 inhabitants live and which is under the administration of the State of Palestine, is similar to Area A.
H2	A sector of Hebron where 800 Israeli settlers and 40,000 Palestinians live and where Israel retains direct administrative and military control, similar to Area C
Oslo Accords	Agreements between Israel and the Palestinian Liberation Organization in the mid-1990s led to the creation of the Palestinian Authority (now known as the State of Palestine) and the division of the West Bank into Areas A, B and C.
OPT	The West Bank, including East Jerusalem, and the Gaza Strip, captured by Israel in 1967
West Bank	Areas A, B and C, East Jerusalem and H1 and H2 constitute the entire territory of the West Bank.

Table 3. 4: Glossary for some political words used in the West Bank

Adapted from: *(Amnesty International, 2019)*

The main pre-existing urban Palestinian land is in Area A, and the land in Area B consists of pre-urban areas and small towns. Thus, only regions densely populated by Palestinians were transferred to the PA (Institute for Palestine Studies, 1996; World Bank, 2013). Moreover, all Palestinian investment efforts in area C, which was supposed to be gradually transferred to the PA by 1997, face many physical, legal, regulatory and bureaucratic Israeli controls (MAS, 2013; Roy, 2001; World Bank, 2013). Furthermore, Lein and Weizman (2002) stress that settlement activities continued at full pace after 1993.

While the history of the Palestinian and Israeli conflict shows that the struggle in terms of casualties is of low intensity[4], it can be described as intense in its impact on the land and the economy. For instance, the UNCTAD (2016) indicates that prior to the Israeli occupation of the OPT in 1967, the Palestinian economy, which would have been twice its current size had the occupations not taken place, was sustainable and thriving. However, the Israeli occupation has impacted the OPT due to heavy economic costs imposed on the Palestinian people and their economy. Palestinian people in the West Bank cannot access their land, water and natural resources, and Israel has seized control of or destroyed Palestinian assets and property. The tight restrictions on the movement of Palestinian people and goods internally using the checkpoints and externally via controlling all the borders, expansion of the Israeli settlements, construction of the separation wall, and segmentation of the West Bank by settlements and checkpoints are some of the current conditions, as shown in ***Figure 3. 7*** (ILO, 2018a; UNCTAD, 2016). These situations, mainly the Israeli reoccupation of the West Bank in the year 2002 and the building of the separation wall, have imposed a new division for the lands in the West Bank to be A, B, C, J1, H1, H2 and no-man lands (***Table 3. 4***) (Amnesty International, 2019; Hanafi, 2009).

[4] According to Hanafi (2009), the data available of the Israeli-Arab wars show that the number of victims from both sides during the sixty years of conflict is estimated to be 89000 (72,000 Arab and 17,000 Israeli). On the other hand, in the four-year conflict in Bosnia, the number of Bosnian and Serb people killed is estimated to be 100-200 thousand. Furthermore, around 800,000 Rwandan people were killed during six weeks of conflict in Rwanda.

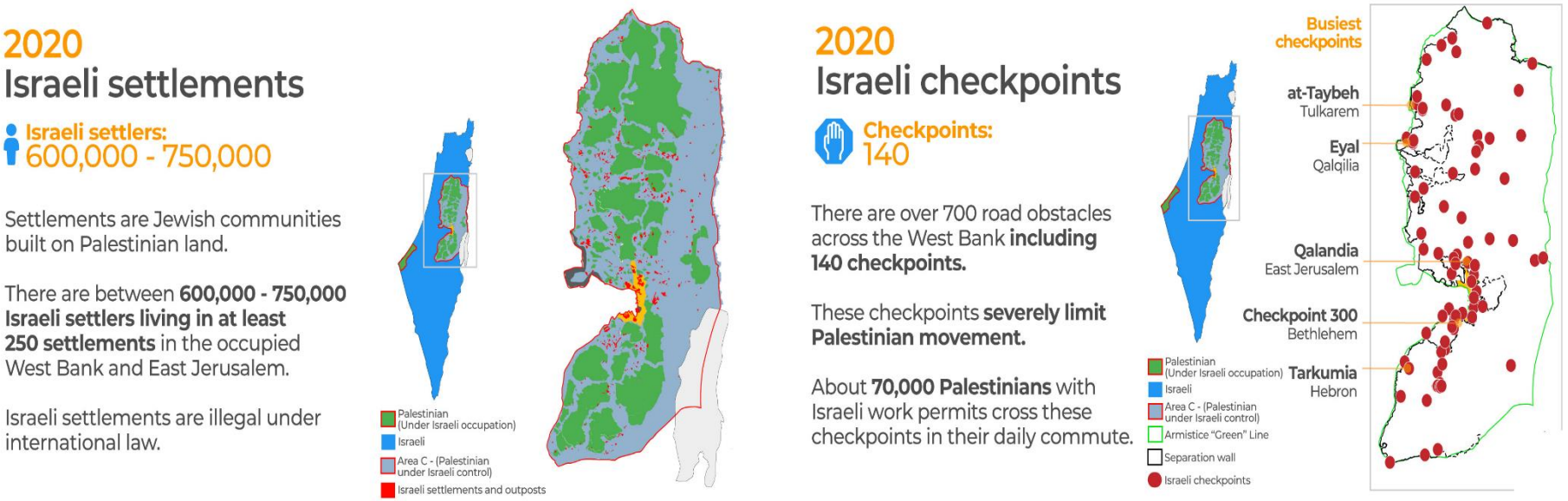


Figure 3. 7: The Distribution of Israeli illegal settlements and Checkpoints in the West Bank

Source: (Haddad, 2020)

Although the structure or economic system for the OPT exists, its ability to be productive or sustainable has been destroyed by Israel. Policies used by the occupying power, such as the confiscation of Palestinian land and natural resources, the restrictions on importing, exporting, travelling and issuing building permits and the crushing of unions, have trapped the weaker economy, i.e. the Palestinian one, in vicious cycle of underdevelopment and reliance on international aid to survive (AIDA, 2017; Bornstein, 2001). The small, informal and service-based Palestinian economy is highly vulnerable to external shocks (AIDA, 2017). The ILO (2018a) and the World Bank (2017) indicate that political and security tensions and donor support that have been mainly outside the control of the PA have made real GDP growth in the OPT volatile and spasmodic over the years post-Oslo. Thus, the growth of the Palestinian economy is transitional rather than sustainable (AIDA, 2017; Farsakh, 2005). Israeli policies caused a significant structural change in the whole economy, particularly in the construction sector in the West Bank, in terms of shifts in production patterns and employment. Sabra (2015) argues that the long-term dependency of the Palestinian economy on Israeli and land confiscation have distorted the structure of the construction sector.

Furthermore, the OPT's unstable political and economic conditions have adversely affected the opportunities for investment in the sector. According to Enshassi et al. (2007), the construction sector's share in GDP increased significantly from 15.2% to 23% between 1994 and 1996 and remained unaltered until 2000, when the second Palestinian Intifada began. Nevertheless, the highest construction sector's contribution to the GDP of the West Bank economy after signing the peace agreement was 11% in 1999 (***Figure 3. 8***). However, as shown in ***Figure 3. 8***, since 2000, the sector's contribution to GDP has fluctuated due to Israeli restrictions and policies imposed on the Palestinian economy, particularly the construction sector. The Israeli actions and restrictions imposed on Palestinians after 1967, shown in **Figure 3. 4**, continued even after signing the Oslo Accords. For instance, between 2000 and 2010, only 6% (187) of building permit requests in area C were approved (World Bank, 2013).

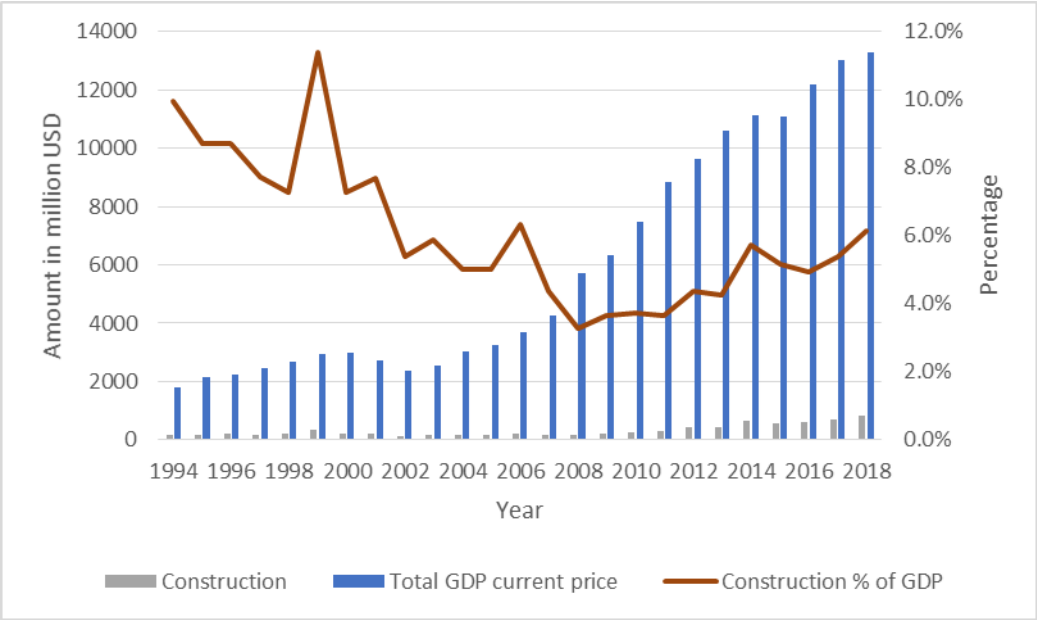
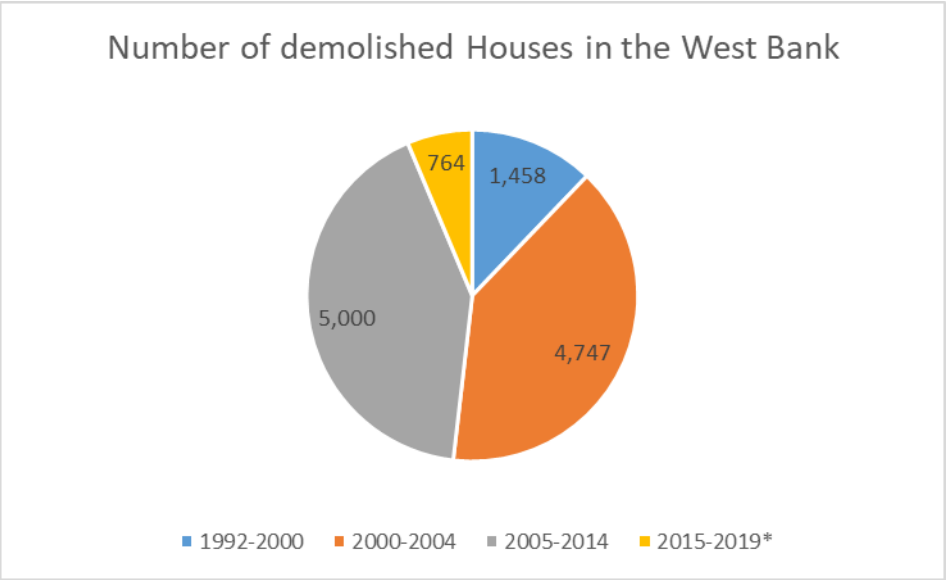


Figure 3. 8: The contribution of the construction sector to GDP in the West Bank between 1994 and 2018[5]

Additionally, Abdullah (2015) points out that the total number of houses demolished by Israeli authorities in the OPT, including both demolished on building permit-related grounds and security-related grounds, numbered at least 48,000 between 1967 and 2014. ***Figure 3. 9*** indicates that the rate of demolition of Palestinian homes is connected with political events and political stability in the OPT. The number of Palestinian houses demolished during the second Intifada, i.e. between 2000 and 2004, in the OPT is approximately equal to the number of houses demolished between 2005 and 2014.

[5] Researcher's Calculations based on the PCBS annual reports



*: *the data covered the West Bank, and its source is is B'tselem Database*

Figure 3. 9*:* The number and rate of demolished houses in the OPT between 1992 and 2019

Source: *(Abdullah, 2015)*

Abdullah (2015) indicates that the OPT infrastructure, especially roads, did not witness significant improvements from the beginning of the occupation until 1995. After signing the Oslo Accords, millions of US dollars were contributed to the PA by the international and Arab communities to improve the infrastructure in Palestine and build residential and non-residential buildings (Enshassi & Mayer, 2004; Makhool & Atyani, 2002). From 1996 to 2000, nearly 93% of grants and donations, amounting to $1.55 billion, were disbursed to the public construction sector in the OPT (**Figure 3. 10**).

Since 2000, Public investment in the construction sector has declined due to the deteriorating political situation, converting a large part of the aid directed to investments into humanitarian aid (Hever, 2010; Makhool & Atyani, 2002). From the second Intifada, the ratio of the funds was reversed from 12.5:1 in favour of development to 4.3:1 in favour of budgetary support (**Figure 3. 10**). Additionally, **Figure 3. 11** indicates that expenditure on development projects has been dependent on external sources to the fund. Of all expenditures on development projects between 1996 and 2018, which amounted to 5.75 billion USD, 17% of the expenses were financed by the PA Treasury (**Figure 3. 11**). Thus, the impact of the construction sector's dependence on unsecured sources of financing on labour productivity needs to be explored.

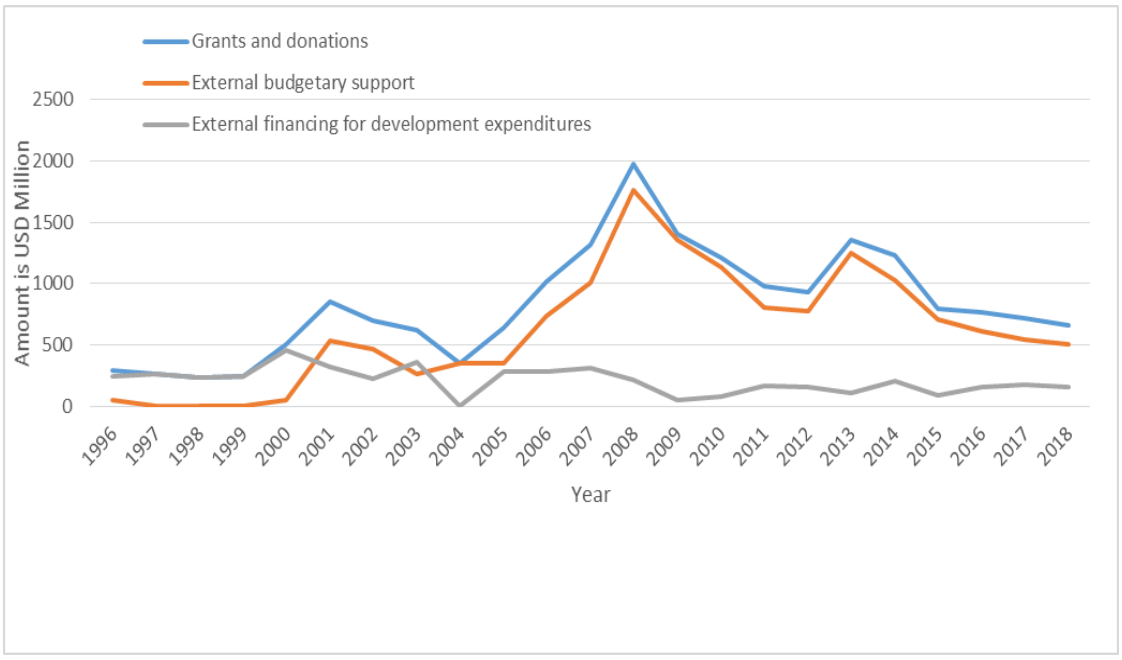


***Figure 3. 10**: Distribution of international grants and donations in the OPT between 1996 and 2018*[6]

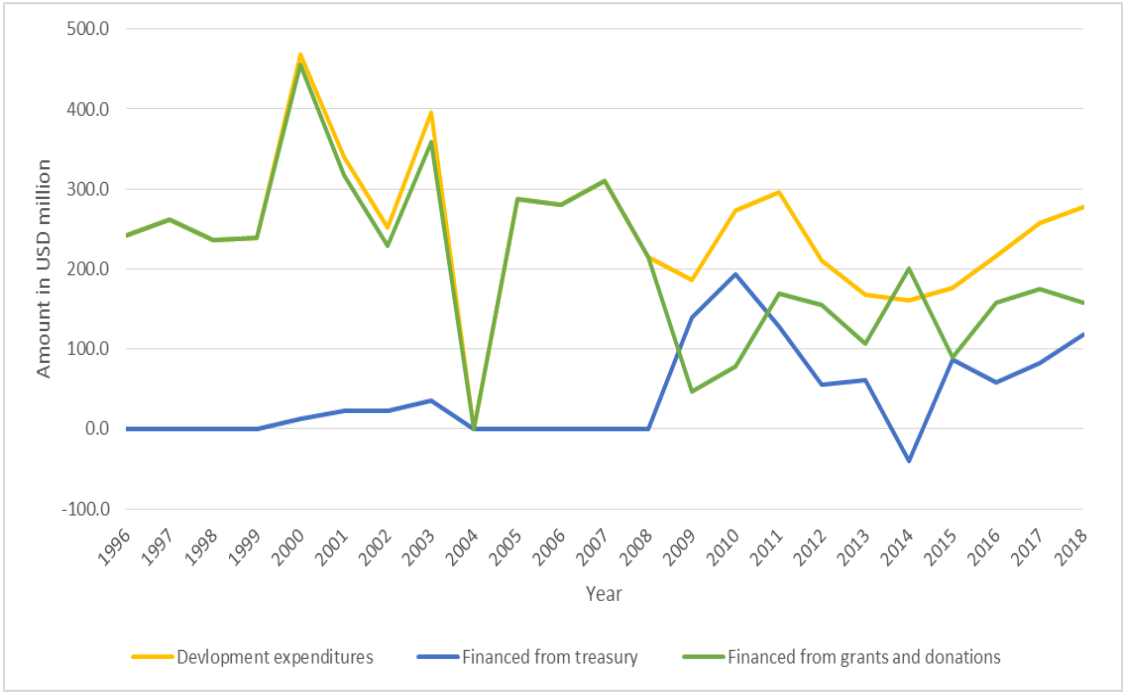


Figure 3. 11: Share of grants and donations and Palestinian treasury in the development expenditures in the OPT between 1996 and 2018[7]

[6] Researcher's Calculations based on the PCBS Annual reports
[7] Researcher's Calculations based on the PA Ministry of Finance

After signing the 1993 peace agreement, a new form of Israeli restrictions and measures against the construction sector emerged in the OPT, particularly in the West Bank, as shown in ***Figure 3. 12***. The new restrictions and measures can be described as the systematic destruction of an indigenous economy (Roy, 2001) and led to a scarcity of land available for construction and for the production of building materials, which has affected the construction sector's productivity in the West Bank. Large proportions of Palestinian lands and natural resources have been expropriated by constructing many illegal settlements in the West Bank. Furthermore, Israeli construction companies have set up many quarries in the West Bank, and thus, many Palestinian natural resources in area C, mainly stones and gravels, have been depleted (ARIJ & Palestinian Ministry of National Economy, 2011; Hever, 2010; MAS, 2018). Abdullah (2015) points out that thirty Israeli crushers, which annually produce about 12 million tons, work to produce the stone from quarries in the West Bank without supervision and do not follow the environmental standards used in Israel.

Israeli policies and restrictions, which are summarised in **Figure 3.** ***12***, have led to an increase in the prices of the inputs, such as land and construction materials, and thus the value-added of the sector has dramatically decreased (**Figure 3.** ***8***). For example, the PA cannot implement water tank projects for a group of villages if the pipes pass through Area C. Furthermore, urban development in areas A and B is permanently blocked by many illegal settlements and lands in area C, which Israel controls, hindering any possibility of urban expansion, whether industrial or residential (Hanafi, 2009; Lein & Weizman, 2002 ; World Bank, 2013). The expansion of eleven cities in the West Bank is constrained at least in one direction by Area C lands. According to the World Bank (2013), some cities, such as Tulkarm, are surrounded by Area C's lands or the separation wall. Since Ramallah, Al-Bireh, Bethlehem and Nablus are the largest towns expecting population growth in the West Bank, urban expansion has not been accommodated through horizontal but through vertical buildings (World Bank, 2013). This type of planning could increase the cost of construction, as it requires pumping water, more costly construction equipment, earthquake-proofing, and vertical transportation systems (World Bank, 2013).

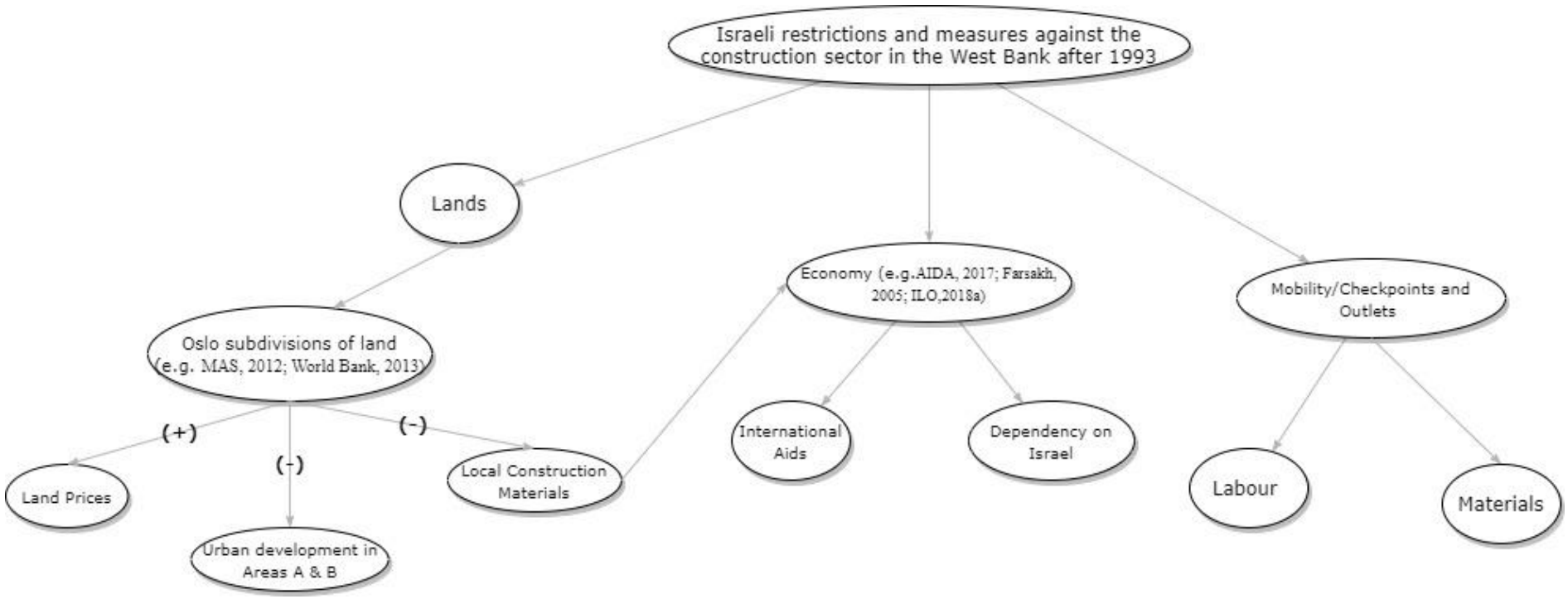


Figure 3. 12: Other Israeli restrictions and policies against the construction sector in the West Bank after 1993

Furthermore, only 35.5% of the total area of lands A and B has been surveyed and registered (MAS, 2012). As a result, the price of equivalent parcels of land in areas B and C are very different. Areas B and C's evaluation price for one dunum (1,000 m^2) is USD 250,000 and 80,000 (MAS, 2012). These fluctuations in the land price reflect the difficulty of development in Area C and the inflation of land prices in areas A and B, which has directly affected the increase in housing costs in the West Bank. In Ramallah, the price of one square meter of construction dramatically increased from US$ 500 in 2006 to US$1000 in 2012 (MAS, 2012). According to Abdallah (2015), the cost of lands registered in areas A and B constitutes more than 30% of the apartment prices in most cities in the West Bank. Abdel Razeq (2015) indicates that the share of land in construction costs in the West Bank is approximately 23.3%. In addition, Abu Hantash and Salah (2009) claim that the cost of land in urban areas constitutes between 30% and 45% of the total construction cost for a detached house.

According to the World Bank classification of countries based on their economies, the OPT is positioned under a lower-middle-income group list. Nevertheless, construction costs in the West Bank are higher than in other countries in the same category. According to Abu Hantash and Salah (2009), the World Bank stated that the construction cost per square meter in Palestine amounted to 300 USD, compared to 212 USD in ten countries with similar incomes. It increased significantly to 400 USD in large housing projects in 1994 mainly due to land prices; the average price of $1m^2$ in the OPT was 60 USD compared to 23 USD in Joran during the same period (Abu Hantash & Salah, 2009; Makhool & Atyani, 2002). Also, the construction of a personal residential building carried out under personal supervision and financing in the West Bank exceeded 42 months (Abdel Razeq, 2015).

According to Lein and Weizman (2002), since 1994, military seizure orders have been reintroduced to seize the land to construct by-pass roads, replaced by new ones after the outbreak of the second Palestinian intifada 'uprising' in 2000; thus, a new wave of land requisition through military orders began. Until 2013, the Israeli government confiscated almost 294 km^2 (5.2% of the West Bank area) of privately-owned Palestinian lands in the West Bank to build massive bypass road networks (Abdullah, 2015; Bshara, 2019; Kleibo, 2014).

The Palestinian Investment Promotion Agency (2010) claims that housing and building construction is the most attractive sector for most investors since an estimated annual demand of 50,000 new houses cannot be supplied. Investment in this sector, which has an annual average value of around US$1 billion, is the highest in comparison with the amount of investment in other sectors in the OPT (Palestinian Investment Promotion Agency, 2010).

According to Ganesan (1984), in most countries, the contribution of new construction output to gross domestic capital formation is somewhere between 45-60%. In the West Bank, it is reported that investment in construction activities constitutes around 66% of fixed capital formation, and thus, it can be argued that one of the critical elements of fixed capital formation in the West Bank is the construction sector (***Figure 3. 13***). Gross fixed domestic capital formation in the West Bank (nominal price) increased from about $724.4 million in 1994 to about $ 3,925.5 million in 2018, as shown in ***Figure 3. 13***. The contribution of the building subsector to gross fixed domestic capital formation in the West Bank was 74% in 1994 and 62% in 2018, which indicates the significance of investment in the building sector. ***Figure 3. 13*** also shows that the political situation affects the construction sector's gross fixed capital formation share.

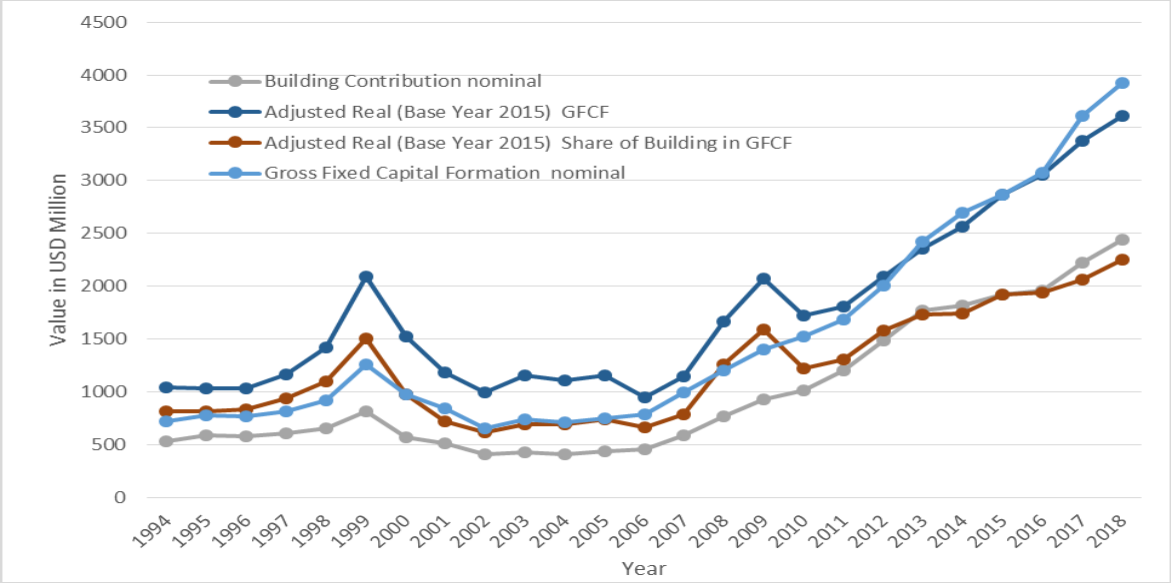


Figure 3. 13: Construction Output Contribution to Gross Fixed Capital Formation in the West Bank at nominal and real prices between 1994 and 2018[8]

[8] Researcher's Calculations based on PCBS Annual reports

The long-term dependency of the Palestinian economy Israeli, land confiscation, inappropriate policies, and speculation in real estate have distorted the structure of the construction sector. ***Figure 3. 12*** illustrates that Israeli restrictions have directly impacted the mobility of construction workers in the West Bank through checkpoints and the separation wall. Therefore, studying the situation of workers in the OPT, particularly in the West Bank, is essential. It is also essential to investigate how the complex geography and unstable political conditions add new layers to the definition of productivity and the factors impacting it. In the next chapter, the impact of Israeli policies on construction workers in the West Bank will be explored.

CHAPTER 4:

Construction Labour in the West Bank and Israeli Policies: History and Current Status

4.1 History of construction workers in the OPT

During the nineteenth century, the whole construction process, except for building the roof, which was built by the whole community's participation, was carried out by the extended family members (Ghadban, 2000). Furthermore, according to Ghadban (2000) and the Ministry of Local Government (2002), the Palestinian workers, who have transferred their accumulated skills from one generation to another, were capable of constructing different types of buildings. For example, the stonemasons were skilled enough and well-managed to build cross vaults with a long span that could reach 10*10m using traditional materials (Ghadban, 2000; Ministry of Local Government, 2002).

Demographic, economic and social changes affected the development of the Arab working class in Palestine. According to Charif (2019), the first nucleus of the Arab working class in Palestine began after the colonisation and ruling of Palestine by the British Mandate authority, particularly in the early 1920s, which marked the beginning of their search for wage-based jobs. The estimated number of Palestinian workers in 1926 was 55,000; almost 70% of them worked in agriculture or construction, as shown in **Table *4. 1***.

Sector	**1919**		**1923**		**1926**	
	Arab	**Jews**	**Arab**	**Jews**	**Arab**	**Jews**
Agriculture	15,000	2,500	20,000	4,000	25,000	5,000
Construction	2,800	200	14,000	3,500	17,000	13,600
Total	**25,000**	**4,000**	**45,000**	**15,000**	**55,000**	**25,000**

Table 4. 1: Number of Arab and Jew workers in the Agriculture and construction sector during the beginning of the Mandate

Adapted from: (Charif, 2019)

In the early 1930s, many projects, such as expanding the road networks and improving both the railways and Haifa port proposed by the British Authorities, were carried out by Arab workers who were neither able to be absorbed by the small Arab industrial sector nor access to Jewish economy due to policy known as Hebrew labour (Bshara, 2019; Charif, 2019; Mansour, 2006; Ross, 2018).

On the other hand, according to Ross (2018), the contribution of Arab workers to construction began during the Mandate and continued after the Nakba of 1948, in which Israel employed many Palestinian construction workers to build new homes for the influx of Jewish immigrants into Palestine. The Zionist efforts to exclude Palestinian workers from the building sector, which began in the early twentieth century, have failed. One of these efforts was the Hebrew Labour policy that aimed to deny Palestinian workers' involvement in Jewish-owned businesses (Ross, 2018). This policy was refused by many Israeli construction employers who preferred the Palestinian workers, who are cheaper and more professional than other workers. In 1948, the construction sector in Israel was empty of Palestinian workers, whom Mizrahi Jews replaced. Nevertheless, many Palestinian workers joined the Israeli construction sector a few months later.

Additionally, Israel considers the West Bank a cheaper labour reservoir and has been dependent on Palestinian construction labour since 1967. Between 1987 and 1991, Israel attempted to replace Palestinian workers with other workers from Romania, Bulgaria, Turkey, Poland, Nigeria, and China and prevent Palestinians from entering Israel (Ross, 2018). However, preference was given to the Palestinian workers in the Israeli construction sector (Ross, 2018). Nevertheless, although Palestinian construction workers nowadays dominate wet construction jobs or low-paid jobs in Israel and illegal settlements, most do not enjoy legal protection (Ross, 2018).

According to Abdulhadi (1994), the three main construction workers categories, skilled, semi-skilled and unskilled, are involved and mixed in most construction activities. The factors that dominate the mix of these workers are the type of construction activity, location, work standard required and financial arrangements. Although the level of construction activities in Israel and the OPT affects the demand and supply of construction workers in the OPT, it is usually difficult to predict the number of construction workers in the OPT (Abdulhadi, 1994).

4.2 Israeli policies and the Palestinian economy in the West Bank

Since 1948, the conditions created by the political development in the OPT have hampered Palestinian socio-economic development and thus stemmed the normal growth of various sectors of the Palestinian economy. The Israeli mechanisms and strategies for integrating the OPT's economy into its own, which are described as "asymmetrical" or "colonial", are dynamic (Farsakh, 2005; Rosenhek, 2003). The four pillars of the Israeli policies that

undermine the capabilities of the Palestinian economy are a) labour integration rather than a capital flow, b) a one-sided customs union with Israel, c) macroeconomic policy and regulatory framework, such as using Israeli currency for trading, restrictions on personal transfers and applying over 200 military commands to regulate the Palestinian economy, and d) controlling the land and infrastructure in the OPT (Farsakh, 2005; Rosenhek, 2003; Roy, 2016). Additionally, Roy (2016) uses the term 'de-development', defined as the systematic destruction of an indigenous economy carried out by a dominant power, to understand what has happened in the OPT since 1967.

Roy (2016) argues that land expropriation and integration into Israel occur through migration, centralising the de-development. Israel's military and economic power, which allow it to confiscate land, expropriate material, and build illegal settlements, creates surplus labour with no choice but to work in the Israeli market. Nevertheless, the exploitation of Palestinian labour in the OPT is not to extract surplus labour but to control Palestinian land (Roy, 2016). According to Ajluni (2003), the economic conditions of Palestinians in the OPT after the signing of the Oslo Accords are harsher than pre-Oslo levels in terms of high unemployment rates and per capita income levels which were 10% higher than the income levels of the Palestinians in 2000. ***Figure 4. 1*** illustrates the distortion of the Palestinian economy, which has been transformed into a service-oriented one. The other sectors, including services, currently account for nearly 75 per cent of the GDP, and the construction sector accounts for almost 7% of the GDP (***Figure 4. 1***).

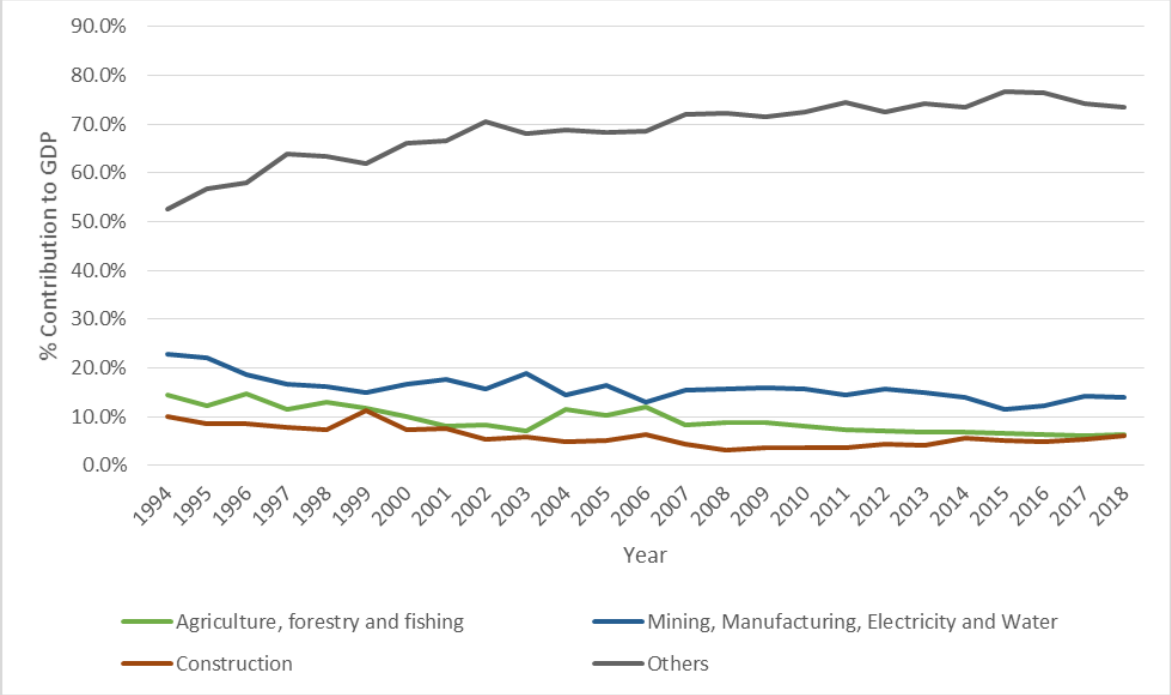


Figure 4. 1: Distribution of GDP by main sectors in the West Bank between 1994 and 2018[9]

According to Rosenhek (2003), Israeli policies, which undermine the capabilities of the Palestinian economy in different ways, have assisted the availability of Palestinians in the Israeli market. The ILO (2018b) states that the number of job opportunities in the local market (Palestinian) is insufficient and accompanied by either an increase in unemployment or a growth in the number of Palestinian workers employed in Israel and the illegal settlements. The data show that the size of the labour force in the West Bank increased from 99,900 (87% of the total number of workers in the West Bank) in 1970 to approximately 551,780 (79% of the total number of workers in the West Bank) in 2018, or 452.3%, equivalent to an average annual increase of about 9.4%.

After signing the Oslo Accords, almost 58% of the Palestinian workforce has been absorbed into the service sector. Furthermore, between 1970 and 2018, the domestic economy absorbed nearly 75% of the Palestinian labour force in the West Bank, and the Israeli market absorbed the rest, as shown in **Figure 4. 2**.

[9] Researcher's Calculations based on PCBS Annual reports

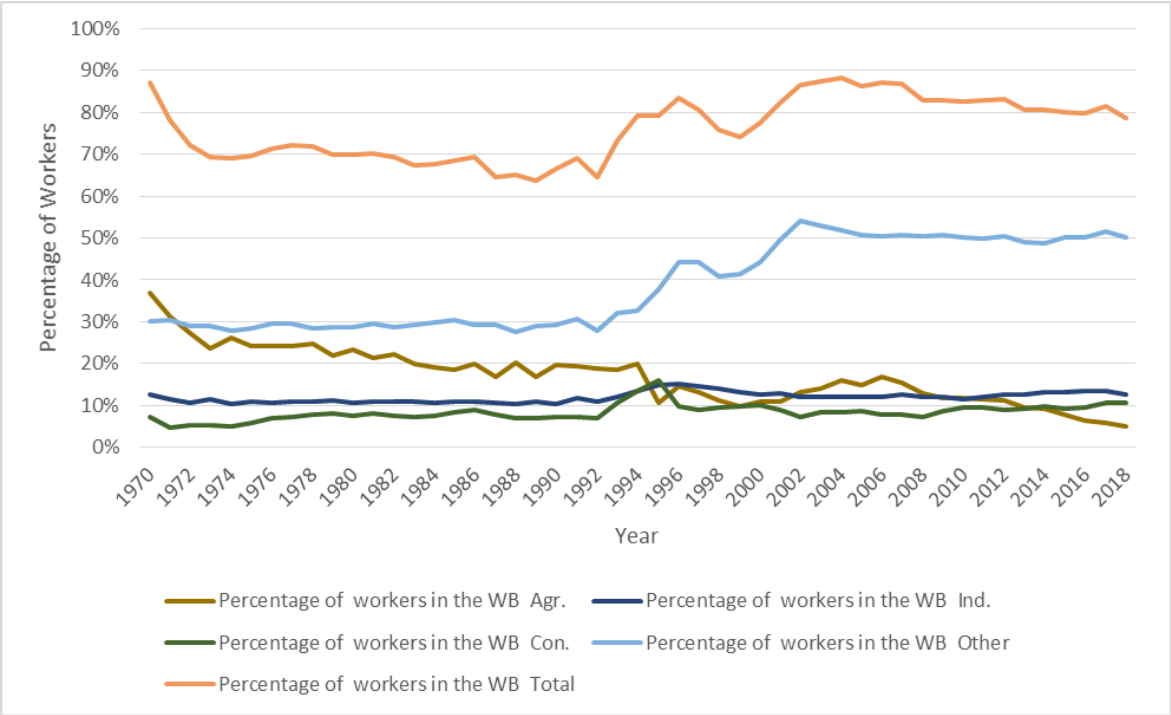


Figure 4. 2: Distribution of Palestinian workers working in the West Bank by sector between 1970 and 2018[10]

Nevertheless, in the OPT, the sector has played a distinct role in reducing unemployment compared to the Palestinian agriculture and manufacturing industries (Enshassi, et al., 2006). As reported by the Palestinian Central Bureau of Statistics (PCBS) in 2018, the construction sector accounted for 25% of the workforce in the West Bank. On the other hand, the existence of two powerful competitors for the Palestinian construction industry, the illegal settlements[11] and Israeli construction markets (external structure), adds new challenges to the Palestinian construction sector (***Figure 4. 3***). As reported in the census provided by the PCBS, more than 50% of the Palestinian workers from the West Bank working in the two Israeli competitive markets are construction workers.

The size of the construction labour force in the West Bank increased from 16,800 in 1970 to almost 172,200 in 2018. ***Figure 4. 3*** shows that the Israeli construction markets absorbed more construction workers than the West Bank's construction sector, except for the second Intifada, i.e. between 2000 and 2004.

[10] Researcher's Calculations based on PCBS Annual reports

[11] Despite the ethical and political issues surrounding the existence of the illegal settlements, which aim to erase the Palestinian presence by uprooting Palestinians from their land, many Palestinian workers from the West Bank, particularly construction workers, still work in these places.

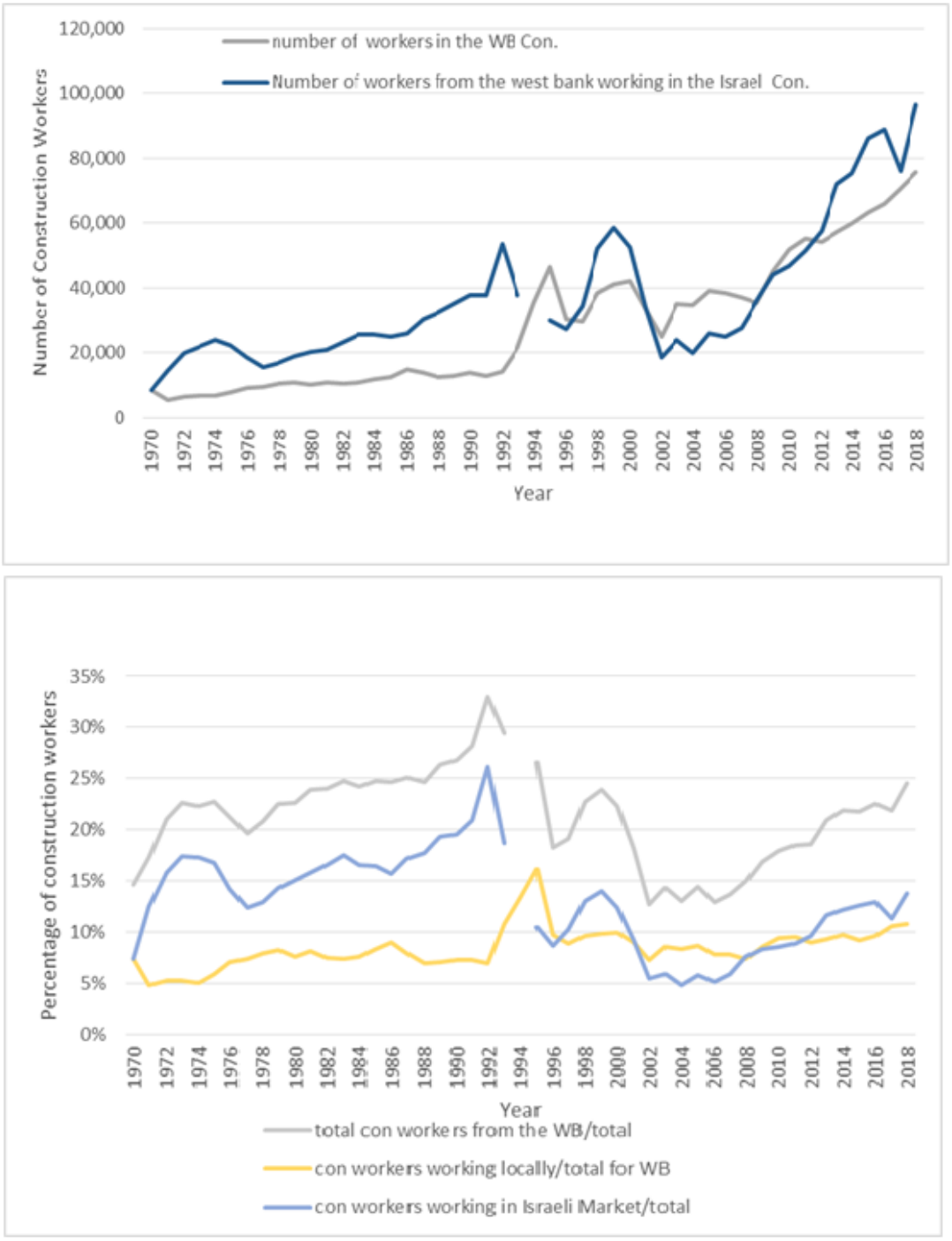


Figure 4. 3: Number of construction workers from the West Bank by place of work and the contribution of the construction sector to employment between 1970 and 2018[12]

Between 1995 and 2018, Palestinian construction workers increased by 225% (***Figure 4. 3***). Furthermore, the domestic construction sector absorbed 61% of the employed workforce in 1995 and 44% in 2018. Such a phenomenon is termed by Roy (2016) as

[12] Researcher's Calculations based on PCBS, UNTCAD & MAS reports.

externalisation. Accordingly, the reasons and effects of 'externalisation' or labour mobility on construction labour productivity in the West Bank will be examined in this thesis.

4.3 Situations of Construction workers working in Israeli markets

The interaction of political and economic factors in Israel created primary and secondary markets. The difference between them is in the bargaining power and labour relations that Israel imposes. All construction workers from the West Bank work in the secondary market (Rosenhek, 2003). The AIDA (2017) and Rosenhek (2003) notify that high unemployment in the OPT and wage disparities between the two economies made Palestinian workers ideal candidates for the Israeli secondary market (***Figure 4. 3***). Israel's complex interplay of political and economic forces has constituted Palestinian labour as cheap and unprotected (AIDA, 2017; Rosenhek, 2003). Israel controls the movement and transit of the West Bank construction workers. Thus in the events of economic crisis or political instability in Israel, these workers will lose their source of income and raise the already high unemployment rate in the West Bank (Borowski & Yanay, 1997; Rosenhek, 2003). According to Angrist (1996), the percentage of Palestinian construction workforce in the total number of Palestinian workers working in the Israeli construction markets was 50% in 1981 and 70% in 1991. Additionally, Nathanson (2017) claims that Palestinian construction workers are very significant for the whole construction industry in Israel. Due to the lack of Israeli labour, Approximately 69% of wage-earning Palestinians from the West Bank work in the Israeli construction industry, representing 15.83% of all workers in the Israeli construction sector, which offers difficult, dangerous and dirty jobs for Palestinian workers (Nathanson, 2017).

Yet, although the earnings of these workers are generally more than construction workers who work locally, their mobility is restricted because of strikes and curfews; thus, wages are highly volatile (Angrist, 1996). For instance, in 1988, Israeli restrictions after the beginning of the first Intifada led to a significant decrease in the average monthly number of working days, dropping to 18 instead of 23 (Angrist, 1996). In addition, the Palestinian construction labour force working in Israel has faced longer daily working hours compared with workers working in the West Bank (Angrist, 1996; Nathanson, 2017). For example, before 1988, the estimated working day for construction workers employed locally was shorter by one hour than for the West Bank workers employed in Israel. However, the working day's length gap has increased to almost 2.5 hours since 1988 (Angrist, 1996).

These extra hours are for travelling and not on-the-job hours, as the Israeli army investigates workers at the checkpoints through a lengthy process that can take several hours of waiting (Angrist, 1996; Nathanson, 2017). Nathanson (2017) points out that getting to the construction site for permit holders workers could be considered an arduous, dangerous and expansive journey toward the checkpoints before starting the working day. Statistics show that in 2015, 13 of the 35 construction deaths in Israel were Palestinian construction workers from the West Bank. The fatality rate in the same group increased to 43.75% (21 out of 48 workers) in 2016 (Nathanson, 2017). According to Nathanson (2017), in addition to these restrictions, each sector has a government quota that limits the number of Palestinian workers in Israel. Thus, many Palestinian workers work in Israel without a permit. In 2015, the number of legal Palestinian construction workers working in Israel and illegal settlements in the West Bank was around 35,828 and 14,525. However, 60,700 is the number of Palestinian construction workers working in Israel and the illegal settlements in 2015 based on PCBS. This means that there were illegally around 10,300 Palestinian construction workers. Most of these workers spend their nights on construction sites facing harsh conditions, such as hot and cold weather, poor nutrition and improper sanitary conditions (Nathanson, 2017).

Furthermore, the Israeli employer has the right to interrupt and renew permits for Palestinian workers. Most Palestinian construction workers in Israel work without signing a written employment contract. For instance, only 2% of all Palestinian workers holding a permit have a written employment agreement with their employers (Nathanson, 2017). Thus, there is no job security and precarious income for Palestinian workers. Additionally, not all workers have the right to work in Israel, as some can be banned for so-called security reasons. Accordingly, offering construction workers from the West Bank dirty, dangerous and demanding jobs in the secondary markets increases the resource gap in the sector (UNCTAD, 2016). The question is why so many Palestinian workers, particularly in the construction sector, prefer to work in the Israeli construction markets.

4.4 Divisions of construction workers and construction firms in the West Bank

The recent statistics provided by the PCBS divide the construction sector into three subsectors: Construction of Buildings (41), Civil Engineering (42) and Specialised Construction Activities (43), as shown in ***Table 4. 2***. The latest Population, Housing and

Establishments Census of 2017 conducted by the PCBS indicates that 576 out of 846 construction companies registered in the OPT operate in the construction sector in the West Bank. The number of construction contracting companies operating in the Construction of Buildings and Specialised Construction Activities sectors is 241 and 271, representing almost 90% of the total companies working in the West Bank construction sector. These companies are distributed throughout the Palestinian governorates in the West Bank, as shown in ***Table 4. 2***.

Governorate	**Total**	**41**	**42**	**43**
Jenin	44	18	7	19
Tubas	12	6	2	4
Tulkarm	29	12	4	13
Nablus	104	50	9	45
Qalqiliya	18	2	2	14
Salfit	5	3	2	0
Ramallah and Al-Bireh	173	60	19	94
Jericho and Al-Aghwar	6	1	0	5
Jerusalem	34	18	0	16
Bethlehem	46	27	6	13
Hebron	105	50	7	48

Table 4. 2: Number of Construction Firms in the West Bank by their Construction Activity and Governorate

Adapted from: (PCBS, 2018)

As shown in ***Table 4. 2***, more than 30% of companies operate in Ramallah Governorate, of which 89% work in the construction building sub-sectors. Over 36% of the firms operate in Nablus and Hebron governorates, and less than 8% of the firms work in Bethlehem. Interestingly, over 91% of the firms in Nablus and Hebron and almost 87% of Bethlehem firms operate in construction building subsectors. The cause of this uneven distribution in the number and specialisation of the firms will be investigated.

On the other hand, according to the Palestinian Contractors Union (PCU) (2018), one of the significant problems in this sector is the existence of hundreds of informal construction firms in the OPT, particularly in the West Bank. The dominance of the informal sector's firms in construction activities has also been claimed by Abdallah (2015) and Abdel Razeq (2015), who state that most residential buildings' financing comes from personal savings and family inheritance. Similarly, as shown in **Figure 4. 4**, between 2007 and 2018, the average contribution of construction companies in the informal sector to construction GDP was about 61%.

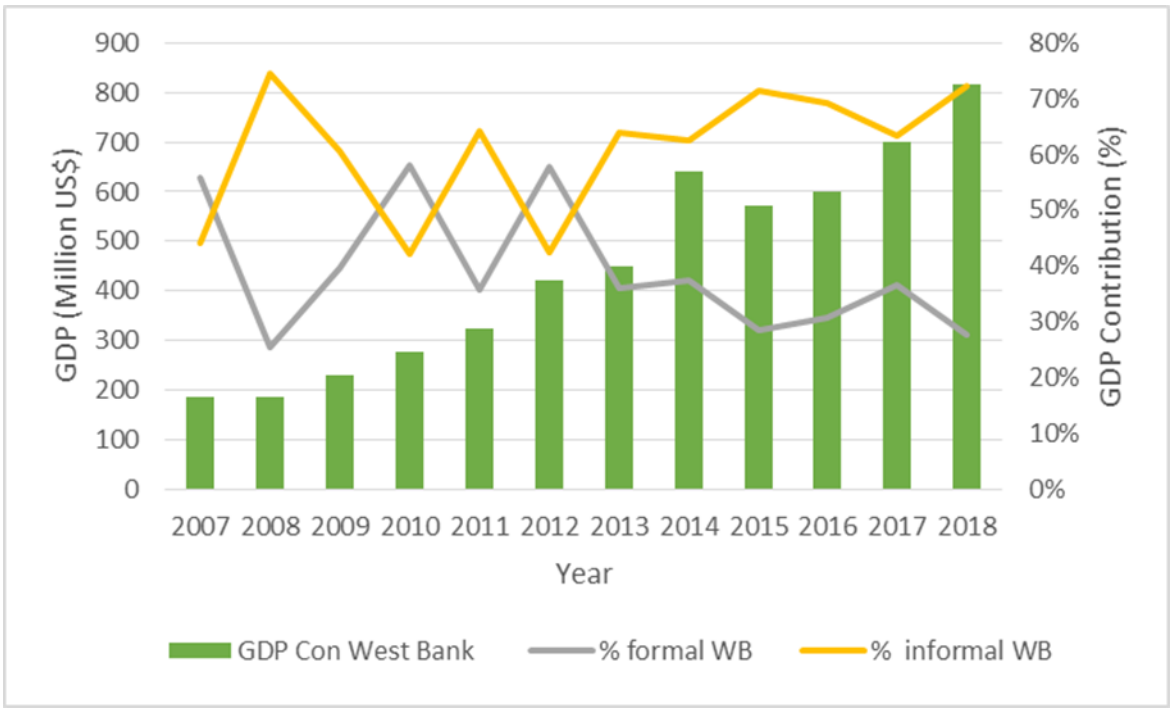


Figure 4. 4: Construction sector GDP in the West Bank between 2007 and 2018 and the contributions of the formal and informal sectors' construction firms to GDP[13]

According to the Palestinian Investment Promotion Agency (2010), most construction firms in OPT are small. ***Figure 4. 5*** shows that almost 58% employ less than five people, and less than 1% employ more than 100 workers. Accordingly, low labour productivity and low capital intensity for such small firms are expected (UNCTAD, 2016). Abdallah (2015) points out that building technologies used by the firms in Palestine are traditional and significantly contribute to the increased construction waste and labour intensity rather than capital intensity. For example, the investments of Bayti Real Estate Investment Company, which is one of the most prominent investors in housing in the West Bank and responsible for constructing 5000 dwelling-house in Rawabi City, are in traditional and unfriendly environmental building techniques (Abdallah, 2015).

[13] Researcher's Calculations based on PCBS Annual reports

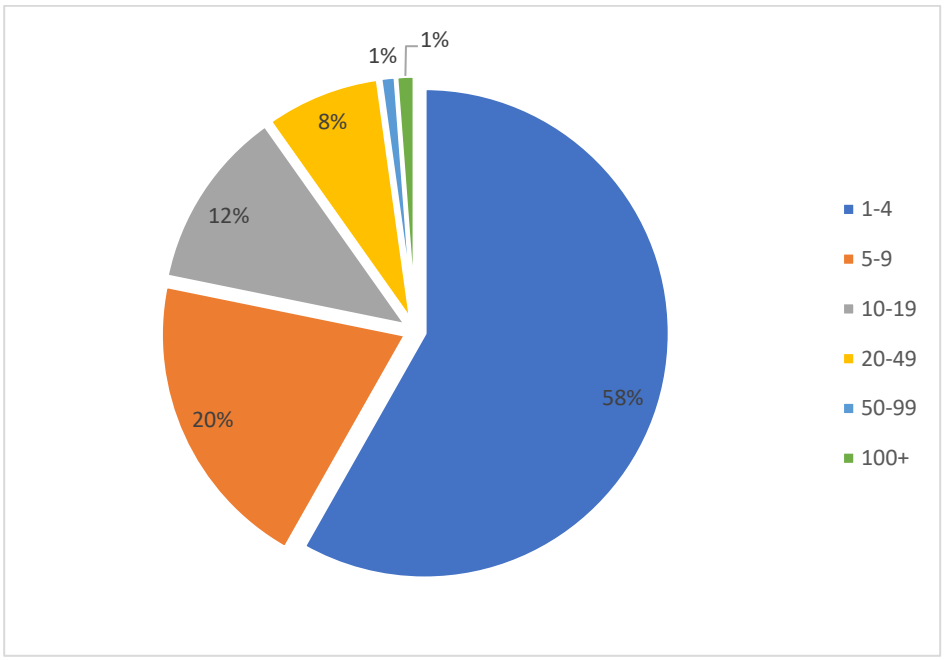


Figure 4. 5: Percentages of construction companies in the West Bank by category of employment size[14]

Additionally, Abdallah (2015), who argues that the training schemes for the construction labour force in Palestine are unsatisfactory, states that the company relies heavily on not a highly qualified workforce for implementation. According to the PCBS (2009a) and PCBS (2009b), between 2001 and 2007, the construction firms operating in the formal sector in the OPT spent less than 1% of their non-industrial services expenditure on training. In addition, the item relating to employee training expenses has been deleted in all economic surveys conducted by the PCBS since 2010.

4.5 Labour qualifications and Labour productivity at Macro-level

4.5.1 Labour qualifications

Although the emergence of vocational education and training in Palestine began 160 years ago during the rule of the Ottoman Empire, the skills of most Palestinian construction workers are acquired during years of work on construction projects in the occupied Palestinian territories and Israel (Palestinian Investment Promotion Agency, 2010). Abdullah (2018) states that although several community colleges offer technical and vocational education for two years, few offer two-year technical education in civil engineering, surveying or architectural engineering programmes. Furthermore, there are 79

[14] Researcher's Calculations based on PCBS Annual reports

technical and vocational secondary education institutions in the West Bank (PCBS, 2018) and twenty technical and vocational schools, which only offer five construction-related jobs in the OPT (Abdullah, 2018). Thus, the services offered by these schools for the construction sector are below expectations (Abdullah, 2018). Accordingly, as the construction industry in the West Bank is labour-intensive (Abdallah, 2015), the scarcity of skilled labour in the West Bank has caused extensive delays in completing many construction projects; consequently, many claims for time extensions have been submitted by construction contractors (PCU, 2018).

According to Abdullah (2018), construction workers from the West Bank can learn cognitive and technical skills by working on construction projects since they have writing and calculation skills, and thus they can participate in complicated and extensive construction activities. Likewise, the secondary data from the PCBS related to the labour force in the West Bank show that more than 50% of construction workers have completed at least ten years of schooling.

4.5.2 Labour productivity at Macro-level

Although the focus of the thesis is on the labour productivity of the construction building sub-sectors, the unique data manipulated from different types of PCBS reports for the period between 1994 and 2019 do not provide data for each sub-sector. The economic reports of the PCBS present the annual GDP of the sector without a breakdown of its components. Similarly, the labour survey reports provide data that could be used to calculate an abstract annual number of construction workers in the sector. Therefore, the annual construction labour productivity is calculated based on the yearly data on the real GDP of construction in the West Bank and the total working hours for workers working in the West Bank (Eq.1 and ***Figure 4. 6***). As shown in ***Figure 4. 6***, neither labour input (hr) nor output (GDP) is steady; reflecting the economic and political conditions.

$$CLP = \frac{Nominal\ \ GDP\ of\ the\ sector\ in\ the\ West\ Bank}{Total\ number\ of\ working\ hours\ for\ construction\ workers\ employed\ in\ the\ West\ Bank} \qquad Eq.\ 1$$

CLP= Construction Labour Productivity

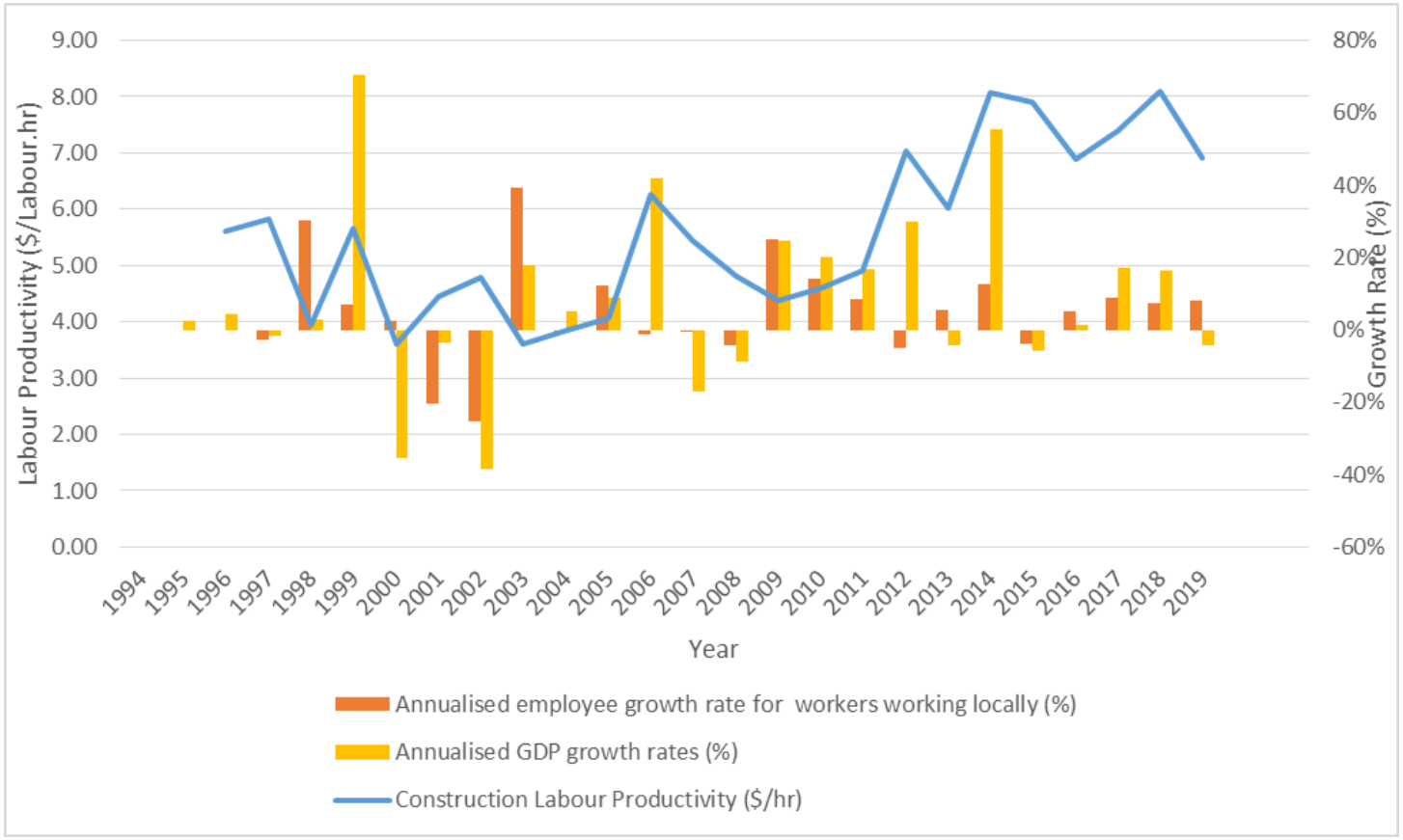


Figure 4. 6: Construction labour Productivity and Annualised GDP growth rates and Annualised workers growth rate in the West Bank[15]

[15] Researcher's Calculations based on PCBS Annual reports

The political instability and the consequences of the second Intifada have harmfully affected the employment capacity of the sector, particularly in the year 2002. Between 2000 and 2005, the construction sector experienced excess capacity, with difficulties facing construction workers from the West Bank to enter Israel (**Figure 4. 7**) and less investment by the Palestinian private and governmental sectors because of the political situation and restrictions imposed on Palestinians (Chapter 3 and **Figure 4. 8**).

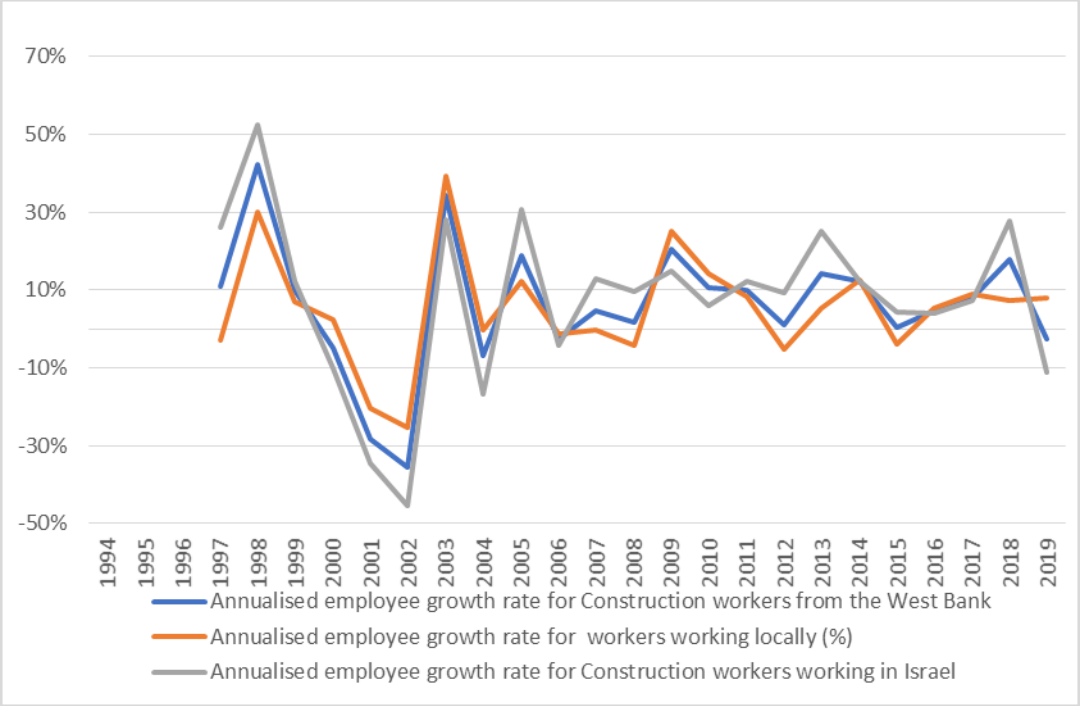


Figure 4. 7: Annualised construction workers' growth rate by place of work[16]

For instance, construction costs in the West Bank and the economic situation of Palestinians have profoundly affected the supply[17] of housing units in the West Bank, and thus the construction sector's productivity fluctuates. As shown in ***Figure 4. 8***, between 1994 and 1999, the pace of development in housing in the West Bank increased rapidly. During the second Palestinian Intifada, particularly in 2002, the development in building construction showed a dramatic decline and then a modest overall increase between 2003 and 2005.

[16] Researcher's Calculations based on PCBS Annual reports

[17] According to Abdel Razeq (2015), the quality and quantity of housing supply depend on different factors, such as the cost of construction inputs, political instability, the profitability of investment in residential buildings and the economic situation of the country.

Between 2005 and 2007, the growth rate in building construction dramatically declined[18]. Since 2008, the pace of growth in building construction in the West Bank has increased, with some fluctuations.

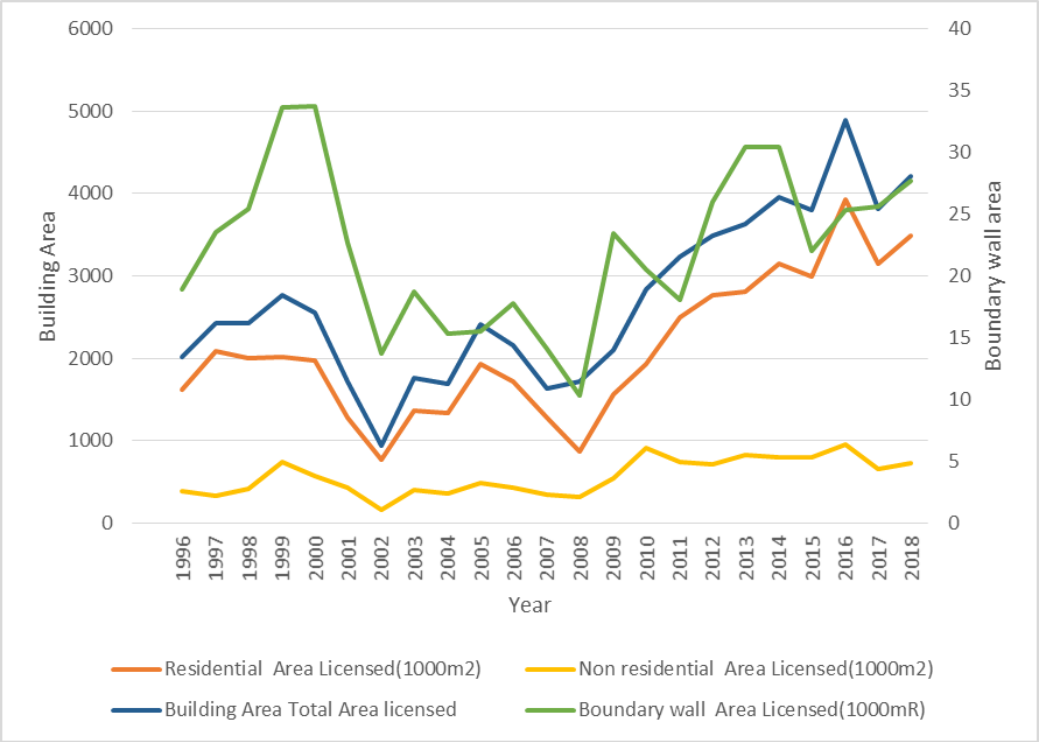


Figure 4. 8: Building and Boundary wall Area Licensed in the West Bank from 1996 to 2018[19]

Furthermore, the PCBS (2016) reports that the average daily wage for graduates aged 19-29 with Associate Diploma or higher in 1) engineering and engineering professions and 2) architecture and construction are $27.60 and $23.44, respectively, which are less than the average wage of construction workers in the West Bank. Also, unemployment rates in the same categories are 27% and 24.4%, respectively. Abdullah (2018) claims an increase in the unemployment rate for engineering graduates and a decrease in their salaries. For instance,

[18] In the year 2006, the second legislative election took place in the OPT. The Palestinian Islamite fundamentalist organisation known as Hamas won the election. Then, all foreign aid was suspended as a sanction and pressure was put on the new government to recognise Israel as a state and accept the previous agreements signed with the Palestinian Authority. Furthermore, the tension between Fatah and Hamas increased after the latter won the election. The consequence of this tension was having two Palestinian governments in the OPT. Since 2007, Hamas has ruled the Gaza strip and Fatah has ruled areas A and B in the West Bank.

[19] The PCBS data do not include construction in the refugee camps, which have been planned and controlled by UNRWA. Additionally, construction in East Jerusalem, which has been planned and controlled by Israel since 1967, is not included in the figures provided by the PCBS for the areas and in the number of building permits issued in the West Bank.

the monthly salary of nearly 38% of engineers in the OPT is $942, and others may earn less or be unemployed. Interestingly, the annual emigration rate among engineers between 2013 and 2015 was estimated at 10% (Abdullah, 2018), reflecting that the sector is not operating at its optimum capacity (**Figure 4. 9**). The amount of cement imported dramatically declined during the second Palestinian Intifada, i.e. between 2000 and 2004. Moreover, the amount of cement imported fluctuated from 1996 to 2017, as shown in **Figure 4. 9**.

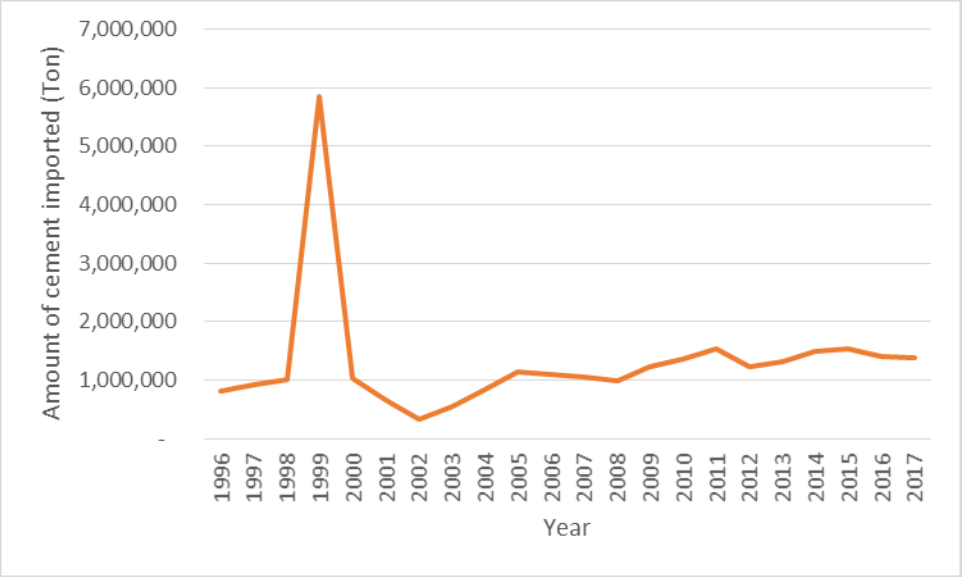


Figure 4. 9: Amount of Cement Imported to the West Bank between 1996 and 2017[20]

Figure 4. 6 shows an increase in construction labour productivity in the West Bank between 2001 and 2002 since the negative growth rate of workers was higher than the decline in the sector's GDP at that point. Definitions of and factors impacting on labour productivity in the previous literature studied in Chapter 2 show that researchers, who compare productivity at the macro level, ignore studying the term within its context. However, **Figure 4. 6** shows the importance of the context when comparing labour productivity with previous or forecasted years at the macro level. The challenges facing construction workers working in the West Bank will be studied in the next section.

4.6 Challenges facing construction workers after 1993

4.6.1 Labour mobility to Israeli construction markets: causes and effect

The fluctuation in the amount of imported cement shown in **Figure 4. 9** and the number of building projects in the West Bank shown in ***Figure 4. 8*** reflect the decline in the sector's

[20] Researcher's Calculations based on PCBS Annual reports and PECDAR Reports

productive capacity in the West Bank and Palestinian construction workers becoming redundant. Thus, the worker agency in the West Bank is heavily constrained by the lack of an internal economic structure and political suppression (Chapter 3), and thus Palestinian workers have been forced to leave their houses to build homes for Israelis in Israel and the illegal settlements in the West Bank. Although the mobility of construction workers from the West Bank to Israel is challenging and restricted by political situations, their earnings are generally significantly more than construction workers who work locally. As shown in ***Figure 4. 10***, construction workers from the West Bank working locally and in the Israeli construction markets have a similar trend regarding annual wages. Nevertheless, the annual wage gap is widening. For instance, in 1996, the annual wage for construction workers employed in the West Bank was approximately 86% of the annual wage paid by Israeli employers to West Bank construction workers. However, in 2018, the annual income of construction workers locally represented slightly over 41% of the wages of construction workers employed in the Israeli construction markets (***Figure 4. 10***).

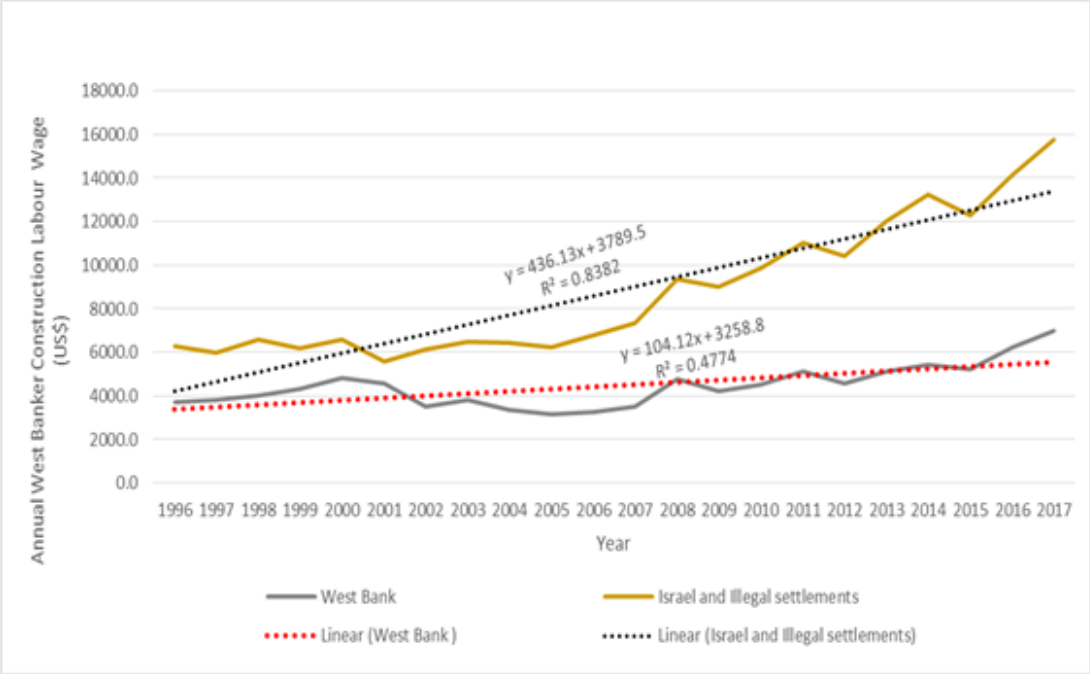


Figure 4. 10: The Average Annual wage for construction workers from the West Bank by workplace place[21]

[21] Researcher's Calculations based on PCBS Annual reports

In addition, although the wages of construction workers are the highest compared to the wages of workers in other sectors in the West Bank (e.g. PCBS (2016)), the average daily working hours of construction workers never exceed seven hours, which is below the average daily working hours for other sectors, as shown in **Figure 4. 11**. Therefore, this could be considered an underutilisation of workers, i.e. the number of workers is higher than the demand. Limited job opportunities in the West Bank, coupled with higher wages earned by construction workers in Israeli construction markets, could explain why construction workers from the West Bank have been promoted to work in Israel and the illegal settlements.

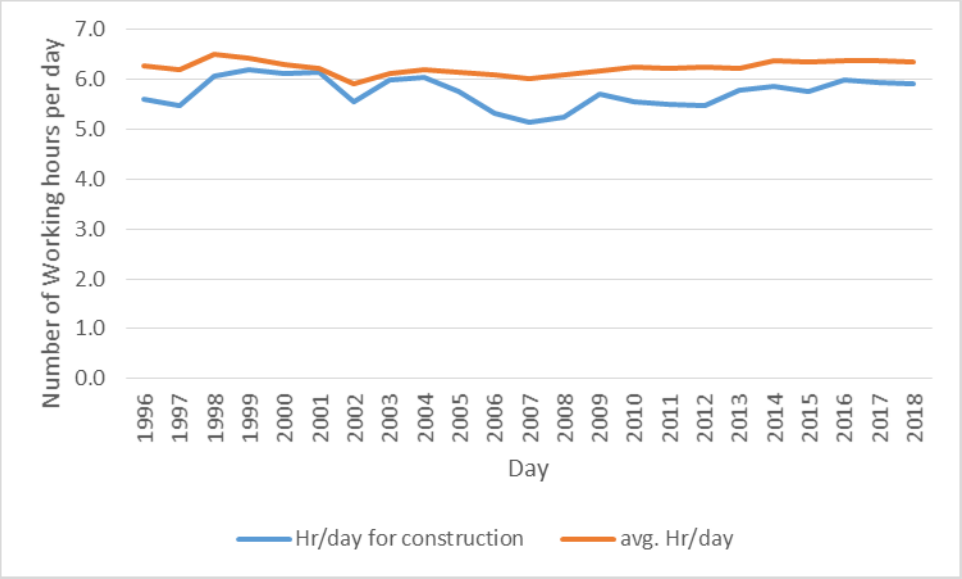


Figure 4. 11: Average working Hours for workers working in the construction sector and for all sectors in the West Bank between 1996 and 2018[22]

Several researchers, e.g.Abdel Razeq (2015) and Abdullah (2015), have discussed the complicated Israeli procedure of issuing building permits for Palestinians, particularly those living in Area C, and other Israeli policies toward the construction sector (Chapter 3). Yet, the impact of the complex geographic and political division of the West Bank on labour mobility to Israel needs to be examined, as neither the PCBS reports nor other researchers have tackled the issue. The impact of mobility on labour productivity must be investigated and linked to the complex and political division of the West Bank. For

[22] Researcher's Calculations based on PCBS Annual reports

example, the relationship between skill shortages or skill gaps and labour mobility and their effects on labour productivity should be explored.

4.6.2 The impact of Israeli policies on labour and material in the West Bank

Building materials account for 51% of the total construction cost and constitute the most considerable construction input (Abdulhadi, 1994; Makhool & Atyani, 2002). Cement comprises the largest share of total construction cost (9.28%), followed by electrical materials, which account for 6.55% of the total cost. Steel, tiles and marbles, and cement blocks constitute 6.24%, 5.97% and 5.93% of the total construction cost, respectively (Makhool & Atyani, 2002). Although some building materials in the OPT are produced locally, many construction materials are imported from or through Israel (Abdulhadi, 1994; Makhool & Atyani, 2002). Due to Israeli customs duties and taxes levied, the prices of imported building materials are high and estimated to be 50% higher than their price in the global market (Abu Hantash & Salah, 2009; Makhool & Atyani, 2002). Furthermore, Abu Hantash and Salah (2009) and Makhool and Atyani (2002) argue that locally produced building materials are expensive, especially building stones, whose price is about 30% higher than the imported stones from Jordan.

The checkpoints in the West Bank, some of which are permanent, and roadblocks turn the freedom of movement into a commodity controlled by Israel (Hever, 2010). Since 2000 Israel has tightly restricted the movement of Palestinian people and goods internally using checkpoints and externally via controlling all the borders (ILO, 2018b; UNCTAD, 2016; World Bank, 2013). Van der Weide et al. (2018) report that the Israeli obstacles in the West Bank have led to a high increase in the travel time between origins and destinations and made the travelling time unpredicted. According to Van der Weide et al. (2018) calculations, without any obstruction, a journey from Hebron in the south of the West Bank to Nablus in the north of the West Bank could take 2 hours and 17 minutes. The same journey between 2005 and 2008 was taken around 7 hours and 4 hours and 40 minutes in 2009. In 2010, the travelling time for the same journey was about 4 hours. Furthermore, the presence of what is known as flying checkpoints could make the situation worse (Van der Weide, et al., 2018).

Due to these restrictions on the movement of goods and people, travel and shipping costs have rapidly increased, and imported raw materials are delayed (Hever, 2010). For example, Israeli requirements and procedures on the checkpoints and the process of transportation

known as back-to-back require renting two trucks, resulting in a delay in the delivery of material and higher final product cost (MAS, 2018). Israeli borders and checkpoints have separated the point of production from the point of labour reproduction (Bornstein, 2001). According to Hever (2010), checkpoints have made Palestinians unsure whether they will be able to get to work on any particular day.

4.7 Conclusions

This chapter covers the effect of Israeli policies and restrictions on construction labour productivity at the macro-level in the West Bank. The sectoral shifts in employment and production patterns of the Palestinian economy, particularly the construction sector, and the 'externalisation' that leads to surplus workers show some of the significant impacts of the Israeli occupation on the Palestinian construction sector in the West Bank. Accordingly, the two adjacent Israeli construction markets (external structure) have absorbed many construction workers from the West Bank, despite the insecure employment conditions and unsafe working conditions. However, the impact of labour mobility on labour productivity and whether the mobility is related to the complex and political division of the West Bank need to be investigated. Furthermore, the internal mobility of construction workers and materials is affected by the system of barriers, checkpoints, and movement permits, leading to a significant increase in the prices of construction materials, particularly imported ones. The impacts of the time and additional cost of importing construction materials into the West Bank and the availability of construction materials in the market on labour productivity should be studied.

Researchers, such as Abdallah (2015), report that the training schemes for the construction labour force in Palestine are unsatisfactory. The PCBS (2009a) and PCBS (2009b) state that the construction firms operating in the formal sector in the OPT spent less than 1% of their non-industrial services expenditure on training Palestinian construction workers. Therefore, the reasons for no investment in labour and the impact on labour skills and qualifications need to be studied. The labour productivity indicator, i.e. the ratio between GDP and the number of hours worked, could be misleading. Therefore, studying productivity should not be separated from its context. The definitions of the term labour productivity provided in Chapter 2 and **Figure 4. 6** illuminate that the economic definition of the term should be modified to include the context (Chapter 10). In the next Chapter, the theoretical framework of the thesis will be covered.

5 CHAPTER 5

Theoretical Framework

5.1 Introduction

Construction labour productivity is an outcome of an interaction between labour agency and structural factors, which are two ontological dimensions that reciprocally constitute each other. Nonetheless, this interaction is ambiguous in terms of the definition of 'productivity'. Chapter 2 shows the complexity of understanding the term in the construction sector context. The lack of a theoretical framework makes this understanding, and the interactions between the different determinants involved more complex and fragmented, thus the difficulty in recommending a policy for decision-makers. It is challenging to apply the recommendations as most of the research disregards the workers' perspectives, and in other studies, the determinants are not derived from the context. For example, skill shortages are a significant factor influencing labour productivity. However, in all previous research conducted in developing countries, in this case of Palestine, the types of VET and employment systems, the size and financial position of construction firms, the presence of two attractive Israeli construction markets, and the distinction between the three sub-sectors, which differ in their reliance on labour and machine, are rarely considered. In addition, most research (Chapter 2) does not respect different definitions of skills[23].

This chapter and the following one aim to present the theoretical framework for the thesis and the methodology adopted to fulfil the thesis's primary aim and answer the four research questions posed in Chapter 1. Structural and agency factors and their interrelations are derived from the literature reviewed in Chapter 2. Construction productivity is much more than a managerial or technical concern. It incorporates a social dimension, as labour is the sector's most valuable asset (Chan & Kaka, 2003). The presence of technology itself can not make any difference without capable people having the know-how to use it. Moreover, the term's factors and drivers of productivity cannot be

[23] Three different perspectives of skill are: a) the skill that resides in the person, accumulated over time, with each new experience adding to the total ability; b) the skill demanded by the job, which may or may not match the worker's skill; and c) the political skill that a group of workers or a trade union can successfully defend against the challenge of employers and other groups of workers (Chan & Moehler, 2008).

separated from the sector's political and economic contexts. Political, social, and economic conditions, the availability of natural resources, and tangible and intangible factors are crucial determinates for construction labour productivity (Prokopenko, 1992). This chapter will show how these factors are linked. The following section illustrates how the reconciliation of structure and agency, as defined in structuration theory, enhances our knowledge of labour productivity determinants, their interactions and their impacts on each other at macro, meso and micro levels. In addition, it elucidates what the structure is, what agency is, and the theory's limitations.

5.2 Structure, Agency and Labour Productivity determinants

Antony Giddens has been claiming since the mid-1970s that structures must be viewed as dual and that people, who do not have a complete choice over their actions and whose knowledge is restricted, recreate the social structure and produce social change (Craib, 1992; Giddens, 1979; Sewell, 1992). Structure and agency at macro and micro levels should not be separated (Lamsal, 2012); otherwise, it is difficult to understand the interactions between workers as agencies and the structures as exterior forces impacting their productivity. The shared bond between the micro and macro levels prevents distortion in understanding the factors affecting productivity and the forces underlying these factors from different levels. Accordingly, the drivers for improving labour productivity reflect the context.

The definition of structuration theory for structure and agency provides a different interpretation of the term productivity and the factors impacting on it because it investigates how the structure interacts with the agency in understanding enablers and constraints for construction labour productivity. These two terminologies can also provide additional explanatory power to the issue of productivity by connecting the different theories and viewpoints surrounding the factors that influence it at the macro, meso and micro levels. The determinants affecting the sector can be divided into two broad categories: a) Structural determinants and b) Agency determinants.

5.2.1 What are structure and agency?

According to Giddens (1979), structures are interrelated elements; change that occurs in one element by agent action will lead to changes in all other elements. These structures involve transformations and allow for a prediction of how modifications in a single element will alter the model. Giddens' concept of duality of structure is an explicit

articulation of Marx's famous aphorism ‘men make their history, but they do not make it just as they please; they do not make it under the circumstances chosen by themselves, but under the circumstances directly found, given and transmitted by history (Sewell, 1992, p. 3)’. Structural factors can be related to determinants that are beyond the control of construction labour. These determinants can be divided into external, including the educational, economic and political systems and the social trends, and internal, including the construction firms' structure, management practices and R&D.

In this sense, not all factors impacting construction productivity are controlled by construction labour (agency). Authors, such as Mahamid (2013 a), attribute the sector's low productivity to construction labour. Nevertheless, blue-collar workers are constrained by administrative decisions, such as those made during design and planning. For instance, Doloi (2008) and Naoum & Hackman (1996) find that improving productivity is inherently linked to other latent factors, such as planning. Ineffective planning and design errors, which could lead to rework, delays and extra material costs, are the most crucial factors impacting construction productivity (Gao, et al., 2014). These internal decisions are considered structural factors that directly impact the agency and are beyond labour control.

Giddens' structuration theory proposes two levels of analysis - a) one at the agency level for individuals involved in the production of specific events and b) another related to the structural properties in which these agents operate (Guy & Henneberry, 2000). The interdependent relationships between structure and agency, known as the duality of structure, bind these two levels together. According to Guy & Henneberry (2000), the interrelationships between structure and agency clarify how one agency layer can become the next structural layer in another context. Accordingly, agency factors adopted in this thesis are those under the control of or belonging to workforce agents, such as labour competencies and qualifications, mobility and migration. However, factors such as change orders, design changes and project procurement methods, either made or chosen by professional agents, are considered internal structural factors.

In the construction industry in most nations, a skills shortage (agency factor) has been a persistent and recurrent problem (Chapter 2). For instance, the British sector has been afflicted by this problem over the previous three decades (DfEE, 2000). As shown in Chapter 2, there are too many reasons for skill shortages. Additionally, political, economic and educational systems differ from one country to another. Some reasons that cause skill

shortages do not apply in some circumstances or are not acknowledged by other authors. Therefore, tackling the impact of an agency factor, such as skill shortages, on construction labour productivity should be studied within the contexts of the industry's internal and external structures. Instead of focusing on either structural or agency factors impacting productivity, structuration theory overcomes the tension between the two by viewing them as dynamic and interactive. Consequently, utilising structuration theory, agency and structural factors at the macro, meso, and micro levels can be investigated within their contexts and linked to create a holistic view of factors impacting labour productivity. This approach to labour productivity differs from that of human capital theory.

5.2.2 Why is the human capital theory not adopted

The methodology of human capital theory, known as methodological individualism, places the individual at the centre and emphasises the human agent over social structures (Hodgson, 2004). In contrast, the methodology of structuration theory is not individualistic. For example, human capital theory regards the 'skills' or 'human capital' of the workforce as the property of individual workers and associated with the work processes of particular firms (Becker, 1993). This narrow conception of 'skills' inevitably ignores the socialisation of labour into production through structures of employment, wage relations, and training (Hodgson, 2004), as well as different perspectives of defining skills (Chapter 2). Accordingly, the human capital theory can not explain and link agency factors, such as mobility and competencies, with other structural factors, such as political instability and construction firm size, yet structuration theory, which perceives individual behaviours as products of social, cultural and environmental factors, can.

According to Tan (2014), individuals, each of whom acts in a particular range limited by their constraints, such as ability, wealth and time, do not act on their own - in contrast, individuals reciprocate each other. Individuals' actions lead to a change in social and institutional rules (Tan, 2014). Accordingly, structuration theory, which considers individual agency and social structure as two ontological dimensions that reciprocally constitute each other (King, 2004) and change over time and space (Giddens, 1979; Sewell, 1992), provides and interprets the dynamic feature of the factors impinging on the sector's labour productivity. Before discussing the unique terminology provided by structuration theory and how its principles will be applied to provide an analytic approach that can shed light on the impact of structural and agency factors on construction labour

productivity at macro, meso, and micro levels, the determinants referred to by authors (Chapter 2) will be extracted and categorised into structural and agency factors. The structural and agency determinants are separated into three categories: a) industry level, b) project level, and c) site level.

5.3 Structural and Agency Determinants

- **Structural Drivers**

A. Buildability/Constructability and, recently, the use of BIM
B. Prefabrication and standardisation
C. Management practices such as Lean Planning

- **Agency Drivers**

A. Investment in research and development and education
B. Investment in training
C. Job security and other workers' motivations
D. Better communication and having an integrated team

- **Structural Determinants**

A. Government regulations and health and safety procedures
B. Fragmentation of the work process and the growing emergence of subcontracting
C. Project finance
D. Availability of materials and equipment
E. Management practices and planning
F. Design quality, variation and change orders and RFIs
G. Construction methods
H. Weather conditions, ergonomics and site conditions
I. Construction firms’ size and financial incentive scheme
J. Supervision

- **Agency Determinants**

A. Skill shortages and migrant workers
B. Ageing workforce
C. Rework
D. Labour qualifications and experience
E. Wage

F. Working Conditions (Labour disloyalty and absenteeism, overtime, shift work, accidents and delayed payment)
G. Employment conditions (job security, insurance, agreement)

Not all of these drivers and determinants impact construction labour productivity in Palestine. Accordingly, those unrelated to the Palestinian construction sector context, such as standardisation, have been overlooked (***Table 5. 1***). ***Table 5. 1*** illustrates the structural and agency determinants that influence construction labour productivity based on previous literature (Chapter 2 & Chapter 4) and the mediators that influence the interactions between these determinants (Chapter 4). Essential aspects, including the mobility of construction labour, vocational educational institutes and the education system, availability of Israeli construction markets and availability of resources and import requirements and procedures, are added to ***Table 5. 1*** to reflect the Palestinian construction context in the West Bank.

	Structural Determinants	Agency Determinants	
Internal	**A. Industry Level** • Government regulations and Health and Safety requirements • Initiative on labour Training • Size of construction firms • Fragmentation of the construction process	**A. Industry Level** • Casual work relation • Subcontracting and labour-only contract • Ageing • Skill shortages	**The productivity of construction labour**
	B. Firm-Level • Project procurement methods • Investment in Training • Project size and complexity • Planning and management practices • Buildability and design quality • Project Finance and cashflow • Information technology and the use of BIM • Assign the cheapest construction labour	**B. Firm-Level** • Formal training and on-the-job training • Job satisfaction and security • Valuing labour and financial incentives • Communication • Labour Union • Investment in labour	
	C. Site Level • Unrealistic Schedule • Delivery and availability of material and equipment • Methods of construction • Weather conditions • Change orders and design changes	**C. Site Level** • Working conditions and Payment delays and method of payment (Output) • Accident on site • Experience and Labour competences • Rework • Overtime and shift work • Quality of supervision • Labour absenteeism and disloyalty • Wages	
External	A. Availability of resources and importing requirements	A. Labour mobility	
	B. Complex geography	B. Higher payment in the Israeli market	
	C. Israeli policies	C. Unemployment	
	D. Political instability	D. Time and cost required to be at the site	
	E. Economic conditions		
	F. Vocational Educational Institutes and education system		

Table 5. 1: Structural and agency determinants impacting construction labour productivity adapted for the Palestinian context

Providing a graphical representation of these factors and their anticipated interactions and relationships necessitates a deeper understanding of various structuration theory-related terminologies.

5.4 Multilayer Analysis for productivity determinants

5.4.1 The duality of Structure and power of agency

Construction labour has an impact on productivity. This impact can enhance or reduce productivity; however, labour works within different structures, enabling or constraining action. Therefore, treating construction productivity as a managerial or technical issue is analogous to changing the agency into intelligently programmed robots or a machine. Technology cannot boost productivity without labour interaction. However, as a structure, technology moulds labour actions that recreate the structure (den Hond, et al., 2012; Sewell, 1992). Actions or practices of human agency cannot be fully explained apart from their history, i.e. the time and space in social systems should be linked to the structure (Giddens, 1979). The factors influencing construction labour productivity classified as structural and agency exist within a context, including space and time.

Moreover, the interaction of agency and structural factors from different levels, i.e. macro, meso, and micro, and their influences on construction labour productivity should be linked with the two types of rules: interpretative and normative (Giddens, 1979). Interpretative rules considered as enabling structures are the guidelines that individuals use to define and make sense of their actions and to define the agentic boundaries of operating (Bresnen, et al., 2005). Yet, normative rules, which are about the legitimisation of action, could be considered a constraint on individuals' freedom to act on their own or in the organisation's interests (Bresnen, et al., 2005; den Hond, et al., 2012). This is known as the duality of structures, i.e. structures constrain and enable human agency (Giddens, 1979; Sewell, 1992). Sewell (1992) claims that working within an enabling structure facilitates the development of agentic capabilities to work creatively, which may lead to a change in that structure. Accordingly, is the Israeli construction market's availability considered an enabling and constraining structural factor? Are the Israeli policies regarding labour mobility within the West Bank and the requirements imposed on imported materials considered constraint structure factors that lead to labour mobility to Israel? What is the impact of these two structures on the skill shortages (agency factor)?

Answering these questions should take into account the two distinct types of resources: authoritative (power relationship) and allocative (economic) (den Hond, et al., 2012; Giddens, 1979). Giddens criticises voluntaristic action theory, which overemphasises the actor's ability to act according to their own will. Instead, Giddens views power, which

employs resources as a vehicle, as relational and as a property of an interaction (den Hond, et al., 2012; Giddens, 1979). According to den Hond et al. (2012), authoritative resources are essential for comprehending power relationships: power is neither possession nor absolute but rather the outcome of the actors' societal position. However, actors always have the power to act otherwise within pre-existing structures (den Hond, et al., 2012; Giddens, 1984). A knowledgeable agent needs resources to create a change (Coe & Jordhus-Lier, 2011; Cumbers, et al., 2010; Katz, 2004). What form of power do workers possess, and how can they utilise this to improve their working and employment conditions?

Three types of power are associated with agency: resilience, reworking and resistance. Resilience refers to the modifications or little actions that allow individuals and groups to cope with day-to-day realities without disrupting their existing social relationships (Coe & Jordhus-Lier, 2011). Rework reflects the efforts of people to improve their conditions of existence by recalibrating power relations and redistributing resources (Coe & Jordhus-Lier, 2011) and includes strategies to leverage better terms and conditions and sabotaging redevelopment initiatives (Cumbers, et al., 2010; Katz, 2004). Finally, resistance attempts to confront capitalist social relations in order to restore control over labour time and its usage in production and social reproduction (Coe & Jordhus-Lier, 2011; Cumbers, et al., 2010; Katz, 2004). Nevertheless, the links between the three power categories must be maintained:

> [resilience] enables people to get by, to enter reciprocal relations, and to shore up their resources, all of which are crucial underpinnings of projects to rework or resist the oppressive circumstances that call them forth (Katz, 2004, p. 246).

Additionally, Mann (2007) states that:

> Much, if not most, of working-class political agency is comprised of efforts to alter the relations of production, exchange, distribution and consumption within the political and ideological framework of capitalism (p. 164).

Considering humans as purposive agents, who not only act according to goals, but are also aware of these goals, could put too much emphasis on the autonomy of action granted to humans, and therefore it is recommended to treat this term with caution (den Hond, et al., 2012; Giddens, 1984). According to Giddens (1984):

> Power is the capacity to achieve outcomes; whether or not these are connected to purely sectional interests is not germane to its definition. Power is not, as such, an obstacle to freedom or emancipation, but it is their very medium (p. 257).

The construction industry is a socially complex arrangement consisting of relationships and interactions involving different stakeholders with diverse mindsets and interests. Actions taken are influenced by resources of domination, which are constituted from authoritative resources, such as power relationships, expertise or social networks, and economic resources (Bresnen, et al., 2005). Although this thesis does not cover the power of those working in the Israeli construction market to enhance their working conditions, research shows that many migrant workers who do not settle down in particular places and regularly commute between contracts, worksites, and countries have relatively tolerated inferior terms of employment and are hesitant to resist their employers individually or collectively (Greer, et al., 2013) since the opportunities for effective action are often limited (Berntsen & Lillie, 2016).

Migration or labour mobility may have a significant impact on the construction labour productivity of the sending country. Moving from one country to another could be considered by migrant labour as an act to resist oppressive structures in the home country (Coyle, 2007) or as a conscious strategy to improve their lives (Datta, et al., 2007). Job insecurity, not valuing the labour based on their knowledge (Chapter 2), political instability, complex geography, checkpoints and other factors (Chapter 4) could push construction workers in a particular country to either commute or migrate to other countries to improve their living and working conditions. The essential sources of workers' labour-power are effort, knowledge, skills and competencies (Clarke, et al., 2013; Hagan, et al., 2011; Iskander, et al., 2013; Smith, 2006). Accordingly, this power could be used by migrant construction in a way that contributes to the resilience of existing oppressive employment relations (Berntsen, 2016), which rest on casual self-employment, output-based pay, rigid trade divisions, low levels of training and a sharp divide between operative and professional/technical skills (Chapter 2 & Clarke (2006). Although the space for manoeuvre of migrant or mobile labour is limited (Berntsen, 2016) in receiving countries, their power of mobility forms an additional and essential source of leverage, especially for those who find employment in flexible work arrangements (Smith, 2006).

In this regard, labour mobility (agency factor) in the Palestinian context could be considered an additional and crucial source of leverage to improve working conditions. Yet, the influence of external and internal structural factors, such as political instability, availability of attractive markets, and employment relationships, on labour mobility remainder to be examined. The effects of labour mobility on construction labour productivity, such as increasing skill shortages, upgrading the skills of Palestinian employees, and increasing labour prices in the West Bank, have yet to be investigated. Consequently, one of the objectives of the empirical chapters of this thesis is to answer the following issues through the lens of structuration theory: a) What are the effects of labour mobility on the construction sector's productivity in terms of labour investment, labour cost, and time? b) In what ways does mobility affect productivity in the West Bank? c) How can workers utilise their power to improve, for instance, their working conditions? d) What are the causes of skill shortages? e) Are the reasons for them attributable to structural or agency constraints? f) Has the labour-power contributed to skill shortages? g) What strategies have been taken by the decision-makers to stop that labour leakage to the Israeli market? h) Are these strategies sustainable and enhance labour working and employment conditions?

5.4.2 Asymmetrical Power and Labour Productivity

Other stakeholders, such as the owners of construction firms, have power that might impact construction labour productivity. Other factors and mediators, such as the political and economic conditions and educational system, could lead to asymmetrical power between labour and other stakeholders. Accordingly, overlooking power asymmetries will lead to a vague notion of structure (Sewell, 1992). According to Giddens (1979), there are two types of power: authorisation and allocation. Authorisation refers to the ability to generate commands over human resources, while allocation refers to the ability to generate commands over non-human resources (Giddens, 1979; Sewell, 1992). According to Sewell (1992), although cognitive and emotional appeals make human resource actions more efficient and effective, power can be enhanced or maintained via non-human resources. Human resources can be used to enhance and maintain power through the capability of the actor to gain, retain control and circulate human or non-human resources. None of these two sorts of power is evenly distributed (Sewell, 1992).

In the modalities, which connect structure and action, structuration occurs and can be observed, just as when the resources, which people may command and play upon, are more, the capacity of people's action will be greater (den Hond, et al., 2012; Giddens, 1984). According to Whittington (2015):

> Resources give power; the plurality of rules affords discretion. Thus, Giddens is able at once to resist individualism and to reject the 'hard' or deterministic notions of [the] social structure previously prominent in the social sciences: structures are not inimical to [the] agency, but essential to it (p. 148).

Furthermore, Giddens (1993) states that:

> The production or constitution of society is a skilled accomplishment of its members, but one that does not take place under conditions that are either wholly intended or wholly comprehended by them' (p. 108).

This means that social actors are not always in control of their actions. Accordingly, this thesis will show how the asymmetries of power between Palestine and Israel (as an external structure) have negatively influenced the construction sector's productivity. In addition, the extent to which white-collar workers use the power of blue-collar workers is explained by addressing several questions, including a) Do construction firms retain their workforce? b) How well do the sector's employment conditions maintain a power balance between employers and employees? c) To what extent do employment relationships and contracts restrain labour productivity through their asymmetrical power distribution between labour and people in administration? Finally, skill shortages will be analysed from a broader perspective, taking into account the priorities and distribution of the Palestinian Authority's development budget, the education system, the size of the firm and its financial position, and the employment relationships within the sector.

5.4.3 Interaction between factors at macro, meso and micro levels

Certain structure or agency determinants at the macro, meso or micro levels are linked to other factors that have an impact on using the term ''dualism of structure'', seeking to overcome the ''phoney war'' between macro and micro perspectives and to transcend the limits of both voluntarism and determinism by seeing structure and agency as being brought into action simultaneously (Coe & Jordhus-Lier, 2011). The structural variables that determine the social, political, and economic relationships in a country influence the agency determinants influencing construction productivity. These determinants are also

affected by internal structural factors, such as the size and training investment of construction firms. Consequently, juxtaposing structure and agency factors is a valuable framework for examining the barriers and drivers influencing productivity directly and indirectly. In addition, a multi-layer analysis of the structure and agency determinants will contribute to developing a new definition for the term that extends beyond its traditional intent.

5.4.4 Criticism of the use of structure and agency in the structuration theory

According to Gregson (1989), structuration theory is a second-order theory as it does not explain the events or contingencies of specific eras or localities but conceptualises the generic constituents of human society. It should be considered a mode of worldview rather than an experimental explanation of social behaviour (Weaver & Gioia, 1994). The structuration theory examines social phenomena at a high level of abstraction instead of their embodiment in a particular context (Gregson, 1989; Weaver & Gioia, 1994). Consequently, the theory may be inadequate to justify and explain all structural and agency elements influencing labour productivity. Archer (1995) criticises Giddens's view of social structure, which emphasises that structure exists only in the instant of action. This view means that structure only exists in the here and now, but what about the effects of previous social practices on the present action (Archer, 1990; Archer, 1995)? Archer (1995), therefore, proposes the morphogenetic view, which argues that structures exist prior to individuals and are replicated through their behaviours.

The view of Giddens for the agent as highly autonomous has been criticised by Bhaskar (1979) and Callinicos (1985), who question whether structural constraint simply places limits on the feasible range of options that are open to an actor in each circumstance. Bhaskar (1979) and Callinicos (1985) state that agents often have only one feasible option in many situations. Archer (1990) believes that constraint and action function sequentially, but Layder (1985) argues that structural power transcends and precedes human action and is relatively permanent. Storper (1985) claims that the potential effects of material artefacts on action have been underestimated in Giddens' structuration theory.

Giddens' power definition should be criticised. Instead of seeing power as a stock of capital, such as land or money that can be possessed or a kind of act, which could make people act against their will, Giddens identifies power as an ability manifested in action. Accordingly, Giddens's definition of power is insufficient to explain agency determinants

that impact labour productivity. For instance, structures, especially external ones, could have more power than agents. There are two schools of thought regarding employment in the construction sector a) viewed as the timed appropriation of workers' labour power (purchase of labour effort) and disposition over workers' labour activity, such as in Germany's construction industry, and b) viewed as the appropriation of workers' labour concretised in products, such as in UK construction sector (e.g., Clarke (2006)). Different assumptions have led to variations in the definition of wages, cost calculation, and employment rights. Giddens has not distinguished these two kinds of labour power as potential or embodied.

The difference between the two definitions of labour is whether the product, in this case, the building, is a sign or an actual object of remuneration (Biernacki, 1995), as well as conceiving the construction firms or employers as managers of labour power or investors. In the former case, the wage should equal the cost of renting labour power, and thus the workers should be paid for idle time, and they can demand safer or healthier working conditions (Biernacki, 1995). However, blue-collar workers are labelled as independent commodity producers in the latter case. Considering the labour power as embodied in the product means that workers' labour no more resides in the output than other production factors contributing to the creation of the building. In addition, wage labour employment stands out as the most significant way capitalism uses to create transformations in the pre-existing patterns of production (Leys, 1975). Employers or white-collar workers rely on the coercive power of the market alone to determine the wages of the blue-collar workers, who will not be compensated for unused time, as the time is embodied in their output (Biernacki, 1995).

Therefore, it is expected that employers who can gain a surplus from this "human merchandise" will be able to purchase labour "cheaply," as opposed to the fair market price due to the over-competition among workers. What is the type of labour power for construction workers from the West Bank? How has this type of power been reflected in their employment and working conditions? Does the government intervene to decide the social benefits workers receive and the wages they receive as wage labourers? These issues are part of labour power that has not been discussed in the structuration theory.

Furthermore, the construction sector's external and internal structural determinants could lead to just one feasible option for construction workers. This thesis will seek to ascertain

whether low productivity is attributable to labour, structural determinants or both. The question of how to account for structural determinants that are not reproduced by agency determinants, such as Israeli policy towards Palestinian lands and Palestinian mobility in the West Bank, which are outside the control of Palestinian agents, may be posed. Thus, there is a need to consider the context to complement structuration theory definitions of structure, agency and labour power and to comprehend the interactions between these factors and their impact on labour productivity.

5.5 Theoretical Framework and propositions

5.5.1 Theoretical Framework

The construction industry, which directly depends on its material means and labour for its output, is a socio-technical process (Trist, 1981). The industry's core interface consists of the relation between human and non-human systems, which are independent of each other as the technological system adheres to the laws of the natural sciences, and the social system adheres to the laws of the human sciences and is a purposeful system (Heller, 1987; Trist, 1981). Yet, they are interdependent for input-to-output conversion (Heller, 1987; Trist, 1981). Construction productivity could be considered a single unit with different stages and elements that come together through the social interaction of different occupations, such as engineering, project management, planning, bricklaying and carpentry, at the micro-level. This unit is also affected by the industry structure, educational system and political situation at the meso and macro levels. Modifications to one part of the system will influence another (Challenger & Clegg, 2011; Christina, et al., 2015). Howcroft and Wilson (2003) state that the power of structures, i.e. the hierarchy within the organisation, has prevented the users at the lower levels of an organisation from participating, even if they wish to. At the same time, the challenges facing the industry at the meso and macro levels are influenced by the problems facing construction companies on construction sites (Chapter 2).

Additionally, fast technological improvements, such as the usage of modular components and BIM, have significantly impacted the skill needs of the building sector (Price, et al., 2004). Such technological advancements have hastened the shift toward multiskilled labour and generated more complex training requirements (Clarke, et al., 2017; Clarke, et al., 2013; Dainty, et al., 2004). However, it is necessary to pay attention to the transient nature of the construction workforce, how workers are employed in the industry (Clarke,

2006; Clarke, et al., 2013; Price, et al., 2004), and other factors, such as firm size and ability to train (Dainty, et al., 2017). According to Williams & Edge (1996), economic and political processes should also be included in forming interest alliances, along with the required resources and technological know-how.

Wars and military conflicts, which destroy individuals, populations and societies and halt economic and social progress by diverting and consuming resources, have links to labour productivity, increasing the factors that contribute to it and their complexity (Krone, 2014) and become more complex over time (Chapter 2). According to Fielding (2003), construction investment is more sensitive to political instability than machinery and equipment investments. Political factors have been considered by construction contractors as among the causes of business failure in Palestine (Enshassi, et al., 2006). The effect of Israeli policies and political instability should be investigated to have a dynamic picture of the factors impacting construction labour productivity. Additionally, the impact of the two powerful competitors for the Palestinian construction industry, which are the illegal settlements[24] and Israeli construction markets (Chapter 4), on improving the working and employment conditions for construction workers in the West Bank via enhancing their labour power remains to be examined.

The structure and agency determinants impacting construction labour productivity at macro, meso and micro levels should be studied within their unique volatile economic and political context, as shown in **Figure 5. 1**. Accordingly, various aspects relating to Israeli policies, political instability, and colonisation, which represent the context in which West Bank construction workers operate, are added to the conceptual framework of the thesis (**Figure 5. 2**).

[24] Despite the ethical and political issues surrounding the existence of the illegal settlements, which aim to erase the Palestinian presence by uprooting Palestinians from their land, many Palestinian workers from the West Bank, particularly construction workers, still work in these places.

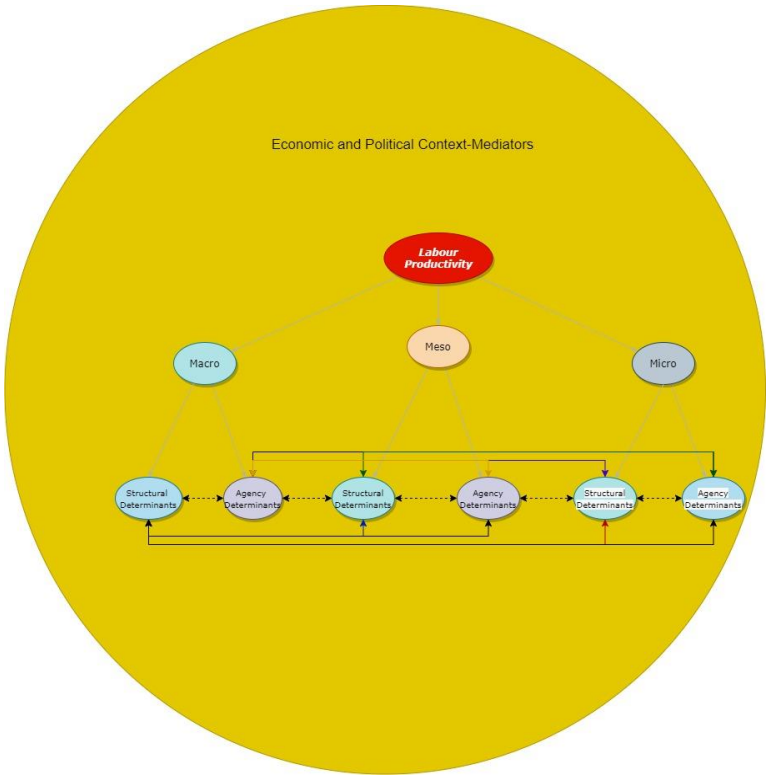


Figure 5. 1: Summary of the conceptual framework

As shown in **Figure 5. 1**, agency and structure determinants impacting construction labour productivity and their interactions will be examined within their context. Then a definition for the term productivity will be derived under a particular context. **Figure 5. 2** shows the conceptual framework for the thesis, with the interactions of different structural and agency factors extracted from Chapter 2. Furthermore, it shows the mediators under which those factors will be tested. These mediators are extracted based on Chapters 3 & 4. Several possible drivers to enhance productivity in the sector are also extracted based on Chapter 2. The drivers aim to check whether technical, social or both aspects are taken while discussing the determinants impacting construction labour productivity for the building subsectors in the West Bank. The methodology used to test the validity of the theoretical framework will be discussed in detail in the next chapter.

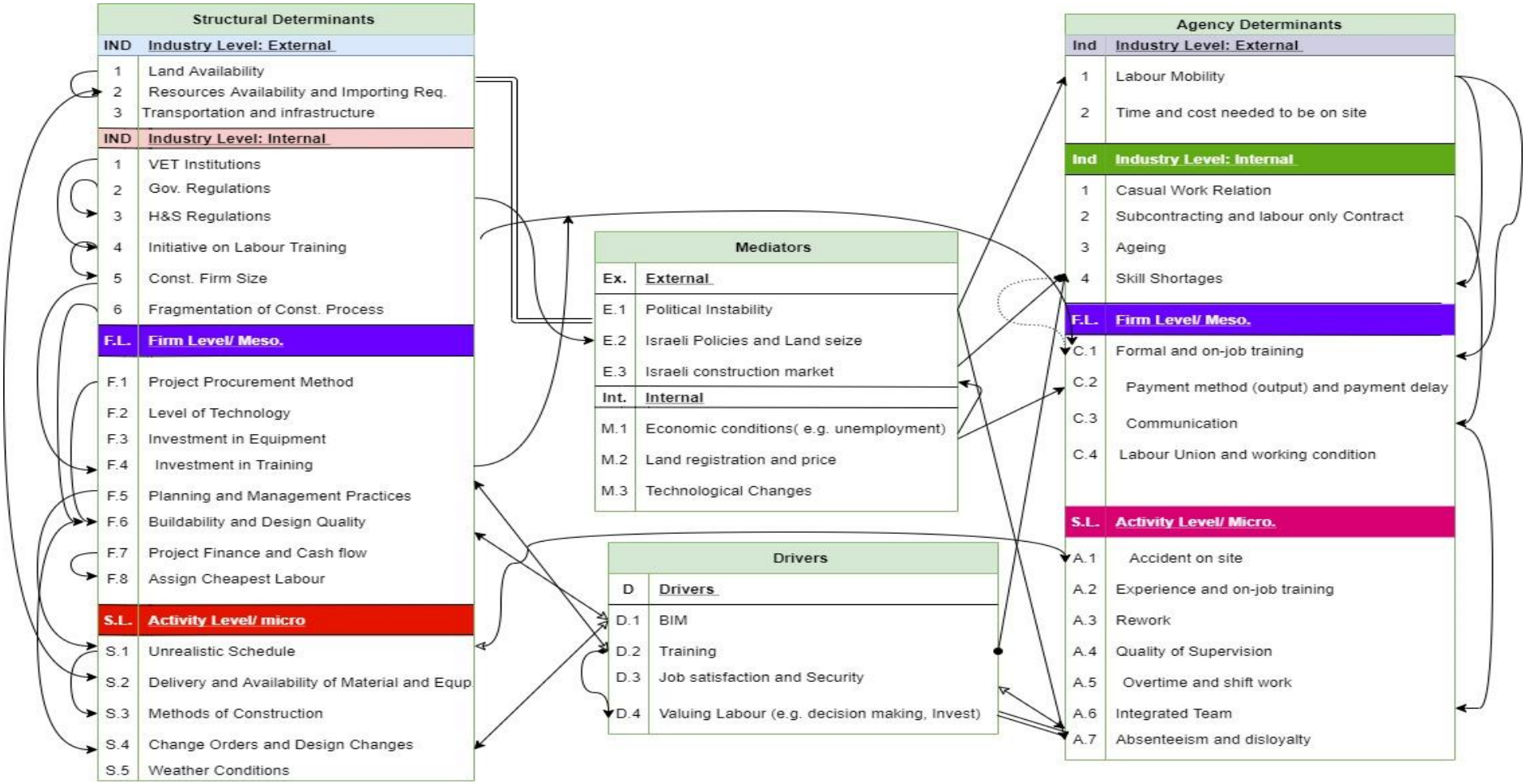


Figure 5. 2: The Conceptual Framework of the Thesis

5.5.2 Propositions

Based on the previous literature and the conceptual framework shown in **Figure 5. 2**, the following propositions have been drawn up:

- The fragmented nature of construction employment with high numbers of self-employed and an ever-extended subcontracting chain have negatively impacted the training and skills system. However, other factors and mediators, such as political instability and the presence of a competitive construction market, lead to skills shortages.
- The political instability and availability of competitive construction markets, such as the Israeli construction markets in the illegal settlements in the West Bank and in Israel, have negatively impacted the ability of Palestinian construction firms to invest in labour. However, labour power has been sustained by the presence of these markets.
- Working in Israeli construction markets has resulted in Palestinian employees acquiring new skills. However, these markets are the primary driver of labour mobility and, consequently, skill shortages in the West Bank.
- Construction labour mobility is linked with the complex geography of the West Bank.
- Defining construction labour productivity as output per labour input should be adjusted to include technological changes and labour value aspects, such as competencies.
- Colonisation and the political instability context have an impact on the factors impacting labour productivity. Yet, the internal structural problems, such as the educational system, industry fragmentation, working and employment conditions and contractual arrangement, have a more significant influence on these factors.
- Green building requirements, low energy technology and climate change are not among the top issues when discussing productivity in developing countries such as the OPT. Instead, occupation, political instability, and the economic conditions of a particular country are among the main obstacles that determine the factors impacting productivity.

- The complex geography and political instability add a new layer of complexity to defining the term. However, white-collar and blue-collar workers mostly use the economic aspect of the term to define it.
- Most construction firms overlook the social-technical approach to enhancing construction labour productivity.

All these propositions will be tested in this thesis. Some might be adjusted based on data collection, analysis and results. In the next chapter, the methodology that will be adopted in order to collect the relevant data will be explained and justified.

6 CHAPTER SIX:

Research Methodology

6.1 Introduction

Since construction management, which draws from both natural and social sciences, is a relatively new field compared to other domains, the competition for methodological primacy between various knowledge theories or research paradigms is expected (Dainty, 2008). In the field of construction management, particularly in research concerning labour productivity, positivism and quantitative methods, which, as demonstrated in Chapter 4, neither have the potential to provide complementary insights nor enrich understanding of the perspectives of different industry participants (Dainty, 2008), have dominated as research methodologies. This research aims to examine the factors influencing labour productivity from a broader perspective, including political and economic instability. As shown in Chapter 1, the research questions tackled the problem from different perspectives and angles. Answering these questions requires integrating qualitative and quantitative research into a single design, referred to as multi-strategy research or multi-methodology (Dainty, 2008), which combines methodologies from different paradigms. It can provide a deeper understanding of the connections between labour productivity factors and their interdependence within the industry, thereby resolving any open debates regarding specific points that could be raised if a single methodology is used.

The purpose of this methodology, which is broader than methods and encompasses them, is to link the theoretical framework and the research methods used to test its validity. This chapter will describe the methodology adopted for this study, starting with the epistemological and ontological positions of the researcher and the research philosophy. After that, the methods used to collect data and challenges due to Covid restrictions will be discussed.

6.2 Research Philosophy

As shown in Chapter 5, this thesis draws on three main theories - structuration, the socio-technical approach and colonisation - to unpack the factors impacting construction labour productivity. The topic has been strongly rooted in the positivism approach as a research methodology (See, for example, Chapter 4 and Dainty (2008)). However, social constructivism espouses the importance of understanding human behaviour and has the potential to overcome the weaknesses of the positivism approach. The approach adopted for this thesis is explanatory, in which multiple strategies can be used (Neuman, 2014). The multi-methodology, also known as mixed methods (Creswell, 2013), allows for combining different theories, including human capital and structuration theory, for creating a novel understanding (Neuman, 2014) of the term and its factors. Combining these two paradigms allows the researcher to comprehend the meaning of construction labour productivity and to establish the relationships between its influencing factors. Accordingly, in the context of a complex geographical region and political instability, explanatory and empirical evidence will be gathered and analysed to determine the factors influencing productivity and the definition of the term. Thus, the multi-strategy aims to provide a picture of the factors impacting productivity and a definition that goes beyond the traditional one and reflects the actual situation of the sector's labour productivity.

Additionally, adopting this approach enhances the ability of the researcher to grasp the meaning of social action from the perspective of the performers involved (Dainty, 2008). Internal realism views that the truth, which exists, is obscure, whilst, additionally, though it seems that facts are concrete, they cannot be directly assessed. This ontology allows using proxies to represent labour productivity. It helps to assess and link together different agency and structural factors and see their impact on the sector's productivity at the macro level. Furthermore, it shows that unpacking all factors impacting productivity is impossible. Different actors could have different definitions, factors impacting productivity and explanations of these factors. This leads to a conclusion that truths are many, which is the definition of the truth in relativism (Easterby-Smith, et al., 2015) or constructivist ontology, which sees that social interaction produces social phenomena in a constant state of revision (Dainty, 2008). Facts in this ontological type depend on the observer's viewpoint (Easterby-Smith, et al., 2015), i.e. other researchers and participants in the field

could have different factors and explanations of these factors while doing research in a different context.

In the part of the thesis, factors impacting labour productivity were explored and ranked, and in the other part, other factors were extracted from interviews and three case studies. Therefore, The researcher's position is positivist in part of the research and constructivist in that part where the thesis constructs a theory rather than tests it. Accordingly, methods from both traditions, so-called mixed methods, are deliberately integrated to increase the potential for gaining deeper insights into research (Easterby-Smith, et al., 2015). Studying the factors impacting labour productivity using statistical tools, including regression analysis, demonstrated the positivism approach in that the researcher's thoughts and views have not influenced this social phenomenon (Holborough, 2015; Dainty, 2008; Easterby-Smith, et al., 2015). At the same time, discussing the findings and exploring a new definition of the term and other factors impacting it have followed the orthodoxy of constructivism that perceives that reality is socially constructed, i.e. natural science objects and people in social phenomena have differences and thus different subjective meanings for the actors studied exist (Holborough, 2015; Dainty, 2008; Easterby-Smith, et al., 2015).

Debates on defining the term and ways to improve productivity in the sector are presented in Chapter 4. The different perspectives of experts and influencers, i.e. practitioners, given in the report by Green (2016), for example, illustrate the importance of a social constructivist paradigm in building a theory regarding the definition and factors impacting construction labour productivity. Quotes in this report show the importance of constructivism in understanding the term; for instance, Professor Jim Meikle at the University College London (UCL) states, ' at the industry level, construction productivity improvement is an answer looking for a question. Why do we want it? Who wants it? How will we know when we've got it? When we can answer these questions, we may see a way ahead (Green, 2016, p. 28)'. While discussing productivity in the construction sector and how it could be improved, the construction sector should not be viewed in isolation. The context in which the industry operates, which includes political, environmental, economic and social aspects, should be linked with each other and the construction sector. Therefore, positivism alone cannot help in understanding the term's meaning and deducing the factors that affect it. Adopting the constructivism paradigm will affect the collection and analysis

of data and the nature of the knowledge produced (Dainty, 2008). Accordingly, positivism and social constructivism have different views regarding epistemology.

Therefore, pragmatism, as epistemology theory suggested by Creswell (2013), which arises out of actions, situations and consequences, could solve the debate between positivism and social constructivism in this research. In the pragmatic view, the focus will be on the research problem and on all available methods of research to be used to understand the problem (Creswell, 2013). Furthermore, there is freedom for a researcher to choose the methods, techniques and procedures that fit the needs and purposes of the study. The researcher under this type can use many approaches for collecting and analysing the data. Pragmatists are not only agreed that research occurs in different contexts, including social, historical and political ones, but also the rational reasons for why quantitative and qualitative data will be mixed should be stated (Creswell, 2013).

The mixed methods methodology enables this research to integrate its two modes: a) the first that generates knowledge by focusing on theoretical questions and b) the second which concentrates on producing knowledge through direct engagement with social practice and problems (Easterby-Smith, et al., 2015). This thesis will employ qualitative and quantitative methods for theory testing and generation, drawing on a multi-paradigm research design comprising a combination of deductive and inductive reasoning. The following section discusses the research design.

6.3 Research Design

As shown in Chapter 1, the research questions are twofold: confirmatory and explanatory. Thus, the study philosophy validates the use of mixed methods methodology, as the purpose of this thesis cannot be fulfilled without merging positivism and constructivism under the canopy of pragmatism. In the light of this perspective, the research design that involves philosophical interaction, inquiry strategies, and specific methods (Creswell, 2013) is based on the nature of the researched subject, the researcher's personal experience and the audience (Creswell, 2013). Accordingly, the research design defined the type of data collected and how the data were collected and analysed (Dainty, 2008). The research design does not adhere to a reductionist approach to studying construction labour productivity factors. The methodology was not compromised the ecological validity of the study because it did not divorce the inquiry from the social realities of the informant. It was possible to describe the causes of specific factors, such as labour mobility, and how

they influence and are influenced by other factors. In addition, it was feasible to explore new factors and explain why the variables were different or similar in different cities or regions.

The research design is comprised of three stages that overlap in order to accomplish the study's aim and objectives. The primary and ongoing phase reviewed the thematic literature confirming the research objectives and providing a resilient historical background (***Figure 6. 1***).

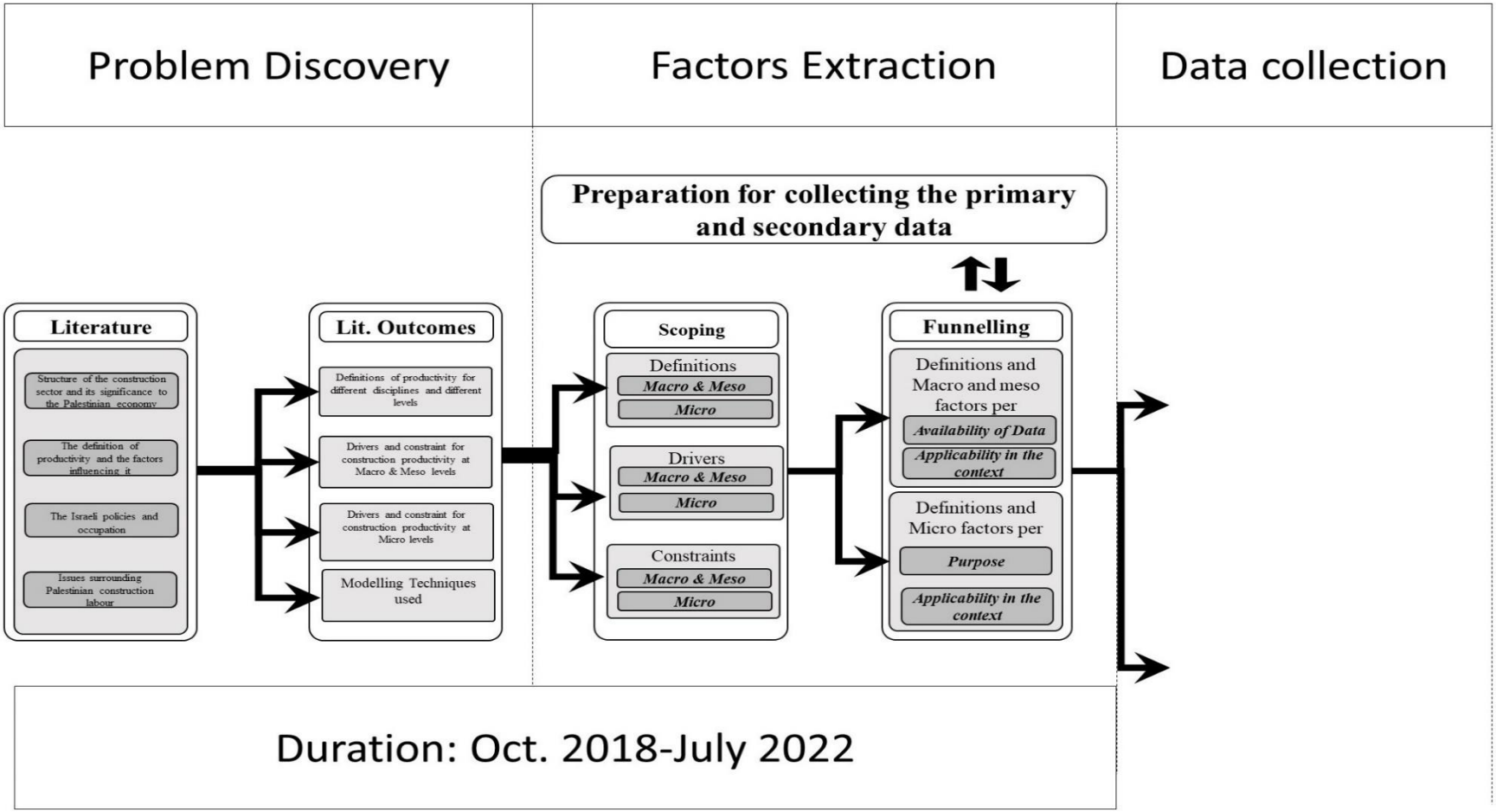


Figure 6. 1: the Primary Stage of the Research Methodology

A desk literature review was undertaken using books, academic research journals, conference proceedings and articles, and reports concerning productivity in developing and developed countries, leading to a comprehensive literature review (Easterby-Smith, et al., 2015). Non-academic sources, known as ‘grey literature ’ (Easterby-Smith, et al., 2015), were not overlooked in this review, though they were restricted by the accessibility of sources and the quality of their abstracts. For instance, several reports and articles written in Arabic have been used in the desk literature review.

As shown in ***Figure 6. 1***, the literature review is structured according to four main themes: the structure of the construction sector and its significance to the Palestinian economy; the definition of construction labour productivity and the factors influencing it; Israeli policies and occupation; and issues surrounding Palestinian construction labour, such as vocational education system and labour mobility. Based on the previous literature and Giddens' Structuration Theory, the structural (internal and external) and agency (labour) factors impacting the productivity of the construction sector are identified at macro, meso and micro levels in the context of the West Bank (***Figure 5. 2***). A theoretical framework has been developed to achieve the research objectives (Chapter 5), around which numerous questions and propositions have been formed.

The secondary stage of the thesis was data collection and exploration. As depicted in ***Figure 6. 2***, there was an overlap between several categories of obtained data. However, secondary data were obtained prior to primary data, which overlapped with the exploration of secondary data. Quantitative and qualitative data were collected, as the pragmatist research philosophy adopted for this thesis. The quantitative data consists primarily of comprehensive survey data from the PCBS, which were of two types: a) repeated cross-sectional labour force survey data and b) abstract data from various reports of the PCBS (***Figure 6. 2***). Nonetheless, all quantitive data have limitations and might end with an open debate or misinterpretation. Consequently, a second research approach called constructivism is adopted to discuss the findings that follow the positivism paradigm and to map, assess and interpret new factors and definitions of labour productivity using purposive semi-structured interviews with decision makers at macro and meso levels and three case studies of cities in the West Bank (***Figure 6. 2***).

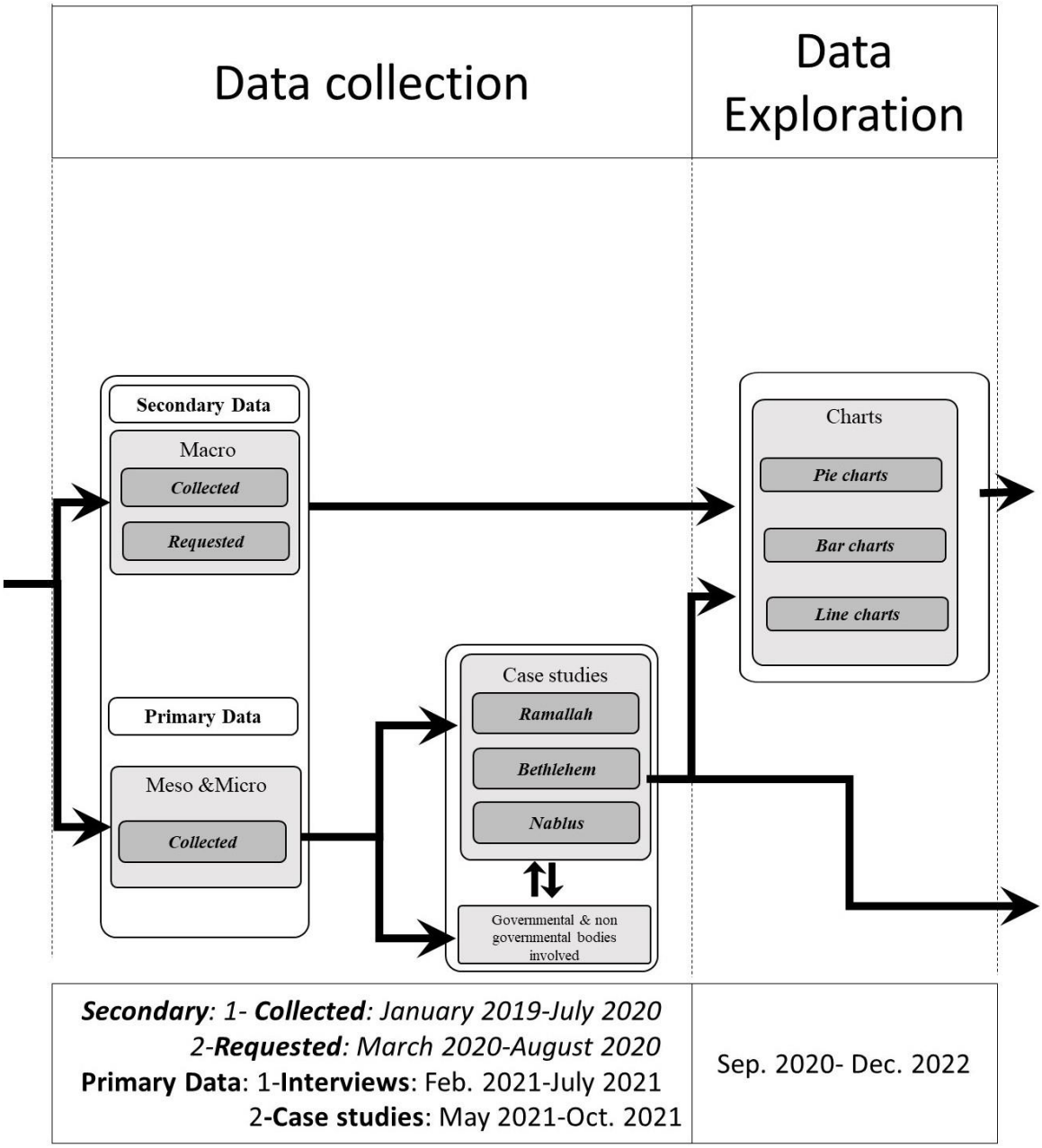


Figure 6. 2: Data collection and Exploration

To examine the effects of the complexity of the West Bank's geography and to determine whether Israeli policies add additional layers of complexity to the construction labour productivity by, for example, relaxing these policies in some locations and restricting them in others having the same Oslo land classifications, data regarding six building projects in three governorates in the West Bank were collected. These key case study projects were selected in three separate West Bank governorates: Nablus (North of the West Bank),

Ramallah (in the middle), and Bethlehem (a southern governorate). The selection of these three governorates was motivated by:

- A comparative analysis across these construction project contexts and highlighting the similarities and differences of factors affecting productivity in the context of different governorates in the West Bank could be conducted due to their locations and the possibility of differing social and working conditions.
- The significance of the governorate of Ramallah for the PA, considered the OPT's political and economic capital, has led to large-scale construction. For instance, in the governorate of Ramallah, enormous joint-funding development projects[25], i.e. not solely funded by Palestinian investors, have been developed. Through semi-structured interviews with responsible individuals, the source of money and challenges encountered during the construction phase of such projects are researched and assessed. In addition, the effects of these projects on construction labour productivity and the problem regarding labour mobility from Ramallah to Israeli construction markets and its mitigation will be explored.
- The proximity to Israel and the illegal settlements of the three cities vary (Chapter 2), and their contributions to the building subsectors follow distinct patterns. Bethlehem has experienced significantly less growth in the residential estate market and the number of new building permits than Ramallah and Nablus. Yet, according to the PCBS census, the size of the construction labour force in these three governorates differs little. Bethlehem looks to contribute significantly less to the construction sector's GDP regarding the number of building permits than the other selected governorates. Therefore, all issues pertaining to Bethlehem's construction labour, including labour mobility and the impact of decreased investment in the construction sector, are investigated.
- The Ramallah and Bethlehem governorates are adjacent to East Jerusalem, surrounded by many illegal settlements, and have many villages adjacent to the Greenline. On the other hand, Nablus is located further from the Green Line and has fewer settlements than the other two governorates. According to the PCBS

[25] One of the major construction projects is Rawabi city, which is considered as the first Palestinian planned city in the OPT. Another joint construction project is the Palestinian Museum, which is considered as the first Palestinian green building following the LEED rating system

database, there are numerous similarities between Nablus and Ramallah in terms of the growth of the construction industry and between Ramallah and Bethlehem in terms of closeness to Israel and Jerusalem (see Chapter 2). Consequently, the governorate of Nablus is chosen to determine if the proximity to Israel and the illegal settlements makes the sector more productive due to labour availability, bearing in mind that enormous construction projects have already been completed in that region. The possibility of having a weaker labour-power in terms of employment and working conditions due to Nablus's location that impacts labour mobility to Israeli building markets was studied.

The tertiary phase of the research methodology, shown in ***Figure 6. 3***, includes the data analysis and results. The three multi-strategy research approaches are 'Triangulation', 'Facilitation' and 'Complementarity' (Dainty, 2008). While Complementarity is employed to dovetail different aspects of an investigation (Dainty, 2008), Triangulation seeks to enhance the credibility of a research study by using multiple approaches to analysing data or multiple data sources (Creswell, 2009; Creswell, 2013; Yin, 2003). In this thesis, complementary triangulation (Erzberger & Prein, 1997; Farquhar & Michels, 2016; Greene, et al., 1989), which provides a strategy involving combining two distinct types of knowledge (the lines and angles of the triangle), is used to generate new knowledge regarding labour productivity in a politically unstable context. The next section discusses data collection in depth.

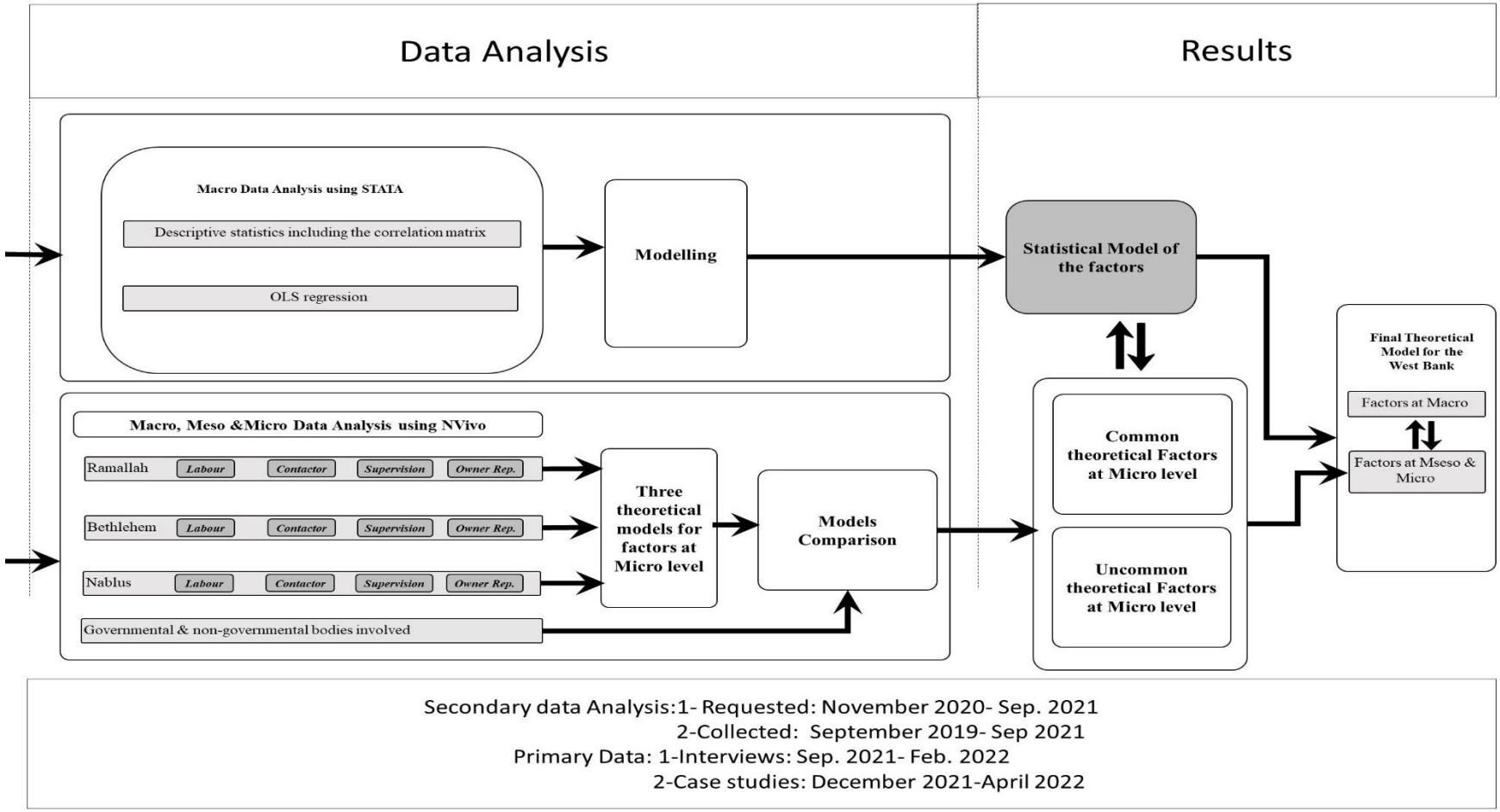


Figure 6. 3: Tertiary phase of the research methodology: Data Analysis and Results

6.4 Data Collection

Due to a lack of data prior to 1993, in which the PA was established, the secondary quantitative data collected extend from 1993 to 2019. Yet, these macro data are abstract and allow for measuring labour productivity for all construction subsectors without distinguishing them based on governorate or subsector (see Chapter 3). The data are only annual; hence, it is impossible to create a regression model to examine agency factors impacting productivity, as some of the factors impacting productivity are at the individual level, and the sector's GDP is computed at the macro level. Accordingly, unpublished and raw secondary quantitative data for the OPT's labour force collected by the Palestinian Central Bureau of Statistics (PCBS) covering the period between 2014 and 2019 were requested.

However, as depicted in ***Figure 6. 2***, the delivery of the requested data was delayed by three months due to the national lockdown in Palestine caused by the pandemic. Accordingly, other data sources were delayed, including semi-structured interviews with construction professionals operating at the macro and micro levels and case studies for chosen building construction projects from three selected governorates. The objective of the primary data is to link structural and agency factors from different levels, resolve the open debate that could be raised while analysing the quantitative data, extract definitions for the term and other structural and agency factors that have an impact, and use three case studies to examine the differences in the ranking of the factors.

6.4.1 Secondary Quantitative Data

Existing PCBS statistics and reports were mined for secondary quantitative data pertaining to the construction labour force, construction firms, and total building construction areas. Other sources, such as the World Bank database, MAS reports, and UNCTAD reports, were utilised to extract macro-level data about the construction sector in the OPT, specifically the West Bank. The findings of this stage, i.e. to determine factors impacting construction productivity at the macro level (see Chapter 3), provide a background context for the micro-level study of factors impinging on the labour productivity of different construction occupations in the West Bank. For this, unpublished and raw data were requested. The data were requested through Westminster University, and a licence agreement was signed for micro-data between the researcher and the PCBS (see a scanned copy of the license agreement in Appendix Ch 6: Secondary). Unpublished and raw

secondary quantitative repeated cross-sectional data for the OPT's labour force collected by the Palestinian Central Bureau of Statistics (PCBS) were extracted, cleaned, and mainly used to calculate the hourly wage (labour productivity) and build a regression model for the factors impacting workers' productivity in the West Bank and three regression models for the three selected governorates using the ordinary least square technique (See Chapter 7). The models estimated are explanatory and confirmatory.

6.4.2 Primary Qualitative Data

6.4.2.1 Interviews at Macro and Meso levels

The thesis's themes and subthemes were outlined in light of the theoretical framework (see ***Figure 5. 2***). The main themes covered are a) Defining productivity, b) Israeli policies and factors of production, c) Health and safety requirements and mechanisms, d) TVET, e) Ageing, f) Innovation and investment in labour, g) Labour disloyalty and absenteeism, h) Buildability and i) Project size and complexity. Thematic guides are used to develop semi-structured interviews using open-ended questions. As Arabic was used for the interviews allowing interviewees to express themselves comfortably, the themes, subthemes, and semi-structured interview questions were translated into Arabic. However, two types of interview questions were developed because the respondents have varying duties, jobs, and construction industry experience, i.e., the list of questions for those operating at a macro level differs from the list of questions for a meso-level interviewer (***Table 6A. 1-Table 6A. 2***). Purposive sampling was employed, with the researcher interviewing individuals who play a vital role in the West Bank building industry. Yet, one of the eleven interviews was conducted on the recommendations of other respondents from the original sample. This research's purposive theoretical sampling strategy has helped draw the links between different factors impacting productivity as each interviewee added something to the researcher's understanding of the context until reaching the theoretical saturation. ***Table 6. 1*** displays the interviewees' position, relevant experience, specialisation, and industry.

The interviewees' experience in the construction industry is over ten years, except for one with just four years of experience. Additionally, the candidates are critical personnel in the industry and have different experiences and roles (***Table 6. 1***). Thus, interviews were expected to tell various stories or factors concerning productivity in the sector under a particular context. Consequently, it is expected to have an insight vision and comprehensive understanding of the interactions between agency and structural factors

from different levels. Moreover, part of Chapter 7 is interpreted based on the findings and results of these interviews.

Int. #	Area of Expertise	Experience (Year)	Organisation	Date	Duration (Min)	Sector Type
1	Structural Engineering	Over 30	Municipality	4/2/2021	80	Public
2	Urban Planning	Over 30	Ministry of Local Government in Palestine	5/2/2021	93	Public
3	Accounting	Over 25	The Palestinian Contractors Union	8/2/2021	58	Private
4	Civil Engineering	Over 30	PECDAR	10/2/2021	89	Public
5	Architecture and Urban Planning	Over 25	Municipality	13/2/2021	89	Public
6	Quality Management	Over 10	The Palestinian Ministry of Labour	16/2/2021	78	Public
7	Civil Engineering**	Over 35	Birzeit University	17/2/2021	94	Public
8	Civil Engineering	Over 20	The Ministry of Local Government	27/2/2021	109	Public
9	Civil Engineering and MBA	Over 10	Rawabi City	28/2/2021	85	Private
10	Civil Engineering	Over 25	The Ministry of Public Works and Housing	6/3/2021	80	Public
11	Civil Engineering**	Less than 5	Contractor	10/6/2021	120	Private
12	Civil Engineering*	Over 20	PECDAR	14/6/2021	65	Public

*: This interview was conducted via WhatsApp.

**: They provided the researcher with productivity rates for several construction occupations, photos of several construction projects during the construction stage, work agreements with workers and subcontractors

Table 6. 1*:* Demographic information for the interviewees at the Macro and Meso Levels

The interview language is Arabic and lasted an hour and a half long for most of the interviews (***Table 6. 1***). The researcher gathered the data personally and thus better understood the context and the multiple definitions of productivity associated with the different factors. Additionally, gathering data directly from the workforce at the workplace

offers higher transparency of interpretability of analysis, as described by Creswell (2009; 2013). However, due to high travel restrictions imposed by the Corona pandemic, all interviews were conducted using Zoom. Even though all of the changes to the research are minimal and neither the objectives nor the questions are altered, the advantages of face-to-face interviews are lost. For instance, interviewees could not exhibit diagrams depicting the effects and interaction between various agency and structural factors, which in turn became part of the analysis (see next section). Verbal communication is the only means of describing the influences and relationships between the various agency and structure factors; thus, creating diagrams was a part of the analysis stage. Yet, some interviewees have emailed crucial information, such as labour productivity rates for some occupations, photographs of West Bank construction sites during the construction stage, and work agreements with workers and subcontractors (see Chapter 4 and Chapter 8). This information was used during the analysis of the primary data.

6.4.2.2 Case studies at the Micro level

The third data source is a case study of construction projects in the West Bank's three central governorates. The primary data collection included interviews with Palestinian construction participants working on construction projects in the designated governorates and other contracting documents. Firstly, semi-structured interviews were conducted, which were drawn from a checklist/thematic guide identical to those used for the interviews collected at the macro and meso levels. These interviews allowed construction participants to express their perspectives via open-ended questions. The researcher gathered the data personally and thus better understood the context and the multiple definitions of productivity associated with the different factors. Due to travel restrictions, it was impossible to conduct in-person interviews with the workforce; thus, all interviews were conducted via Zoom.

The number of construction projects selected in Ramallah was four, and one in each of the remaining governorates, enabling the social and working conditions of construction workers in terms of health and safety, supervision, skills shortages, and other agency and structure factors to be distinguished. In two projects in Ramallah and the projects in other governorates, in-depth interviews were conducted with skilled and unskilled mature-age workers. In addition, superintendents, site engineers, project or construction managers, construction contractors and subcontractors were interviewed (***Table 6. 2***).

Location & Project Type	Int. Code	Area of Expertise	Experience (Year)	Organisation	Date	Duration (Min)	Sector Type	Position
Ramallah								
3-School	R3S-A	Civil Engineering	Almost 10	Consultant Office	25/7/2021	70 (WhatsApp)	Private	Project Engineer
4-School	R4S-A	Civil Engineering	Over 30	PECDAR	14/7/2021	40 (WhatsApp)	Public	Owner's representative
	R4S-B	Architectural engineering	Over 30	Consultant Office	11/7/2021	81 (Zoom)	Private	Project Manager
	R4S-C	Civil Engineering	8	Consultant office	11/7/2021	81 (Zoom)	Private	Project Engineer
	R4S-D	Building Engineering	9	Contracting firm	12/7/2021	65 (WhatsApp)	Private	Site Engineer
Bethlehem								
5-Medical Facility	B5M-A	Civil Engineering	Over 30	PECDAR	14/7/2021	25 (WhatsApp)	Public	Owner's representative
	B5M-B	Civil Engineering	10	Contracting firm	12/6/2021	110 (Zoom)	Private	Construction manager
	B5M-C	Civil Engineering	2	Contracting firm	12/6/2021	110 (Zoom)	Private	Site engineer and workers superintendent
	B5M-D	Electrician	2	Contracting firm	12/6/2021	110 (Zoom)	Private	Semi-skilled
	B5M-E		2	Contracting firm	12/6/2021	110 (Zoom)	Private	Unskilled
Nablus								
6-Medical Facility	N6M-A	Civil Engineering	Over 35	Contracting firm	5/7/2021	80 (WhatsApp)	Private	Project Manager
	N6M-B	Civil Engineering	3	Contracting firm	16/7/2021	80 (WhatsApp)	Private	Site engineer and workers superintendent
	N6M-C	Rebar works	20	Contracting firm	2/7/2021	92 (WhatsApp)	Private	Skilled
	N6M-D		6	Contracting firm	1/7/2021	50 (WhatsApp)	Private	Unskilled

Table 6. 2: Demographic information of those interviewed in the case studies

Each interview lasted for around 70 minutes. These interviews were conducted exclusively in Arabic. Prior to conducting these interviews, bid and contract documents, schedules, daily and monthly progress reports, and photographs of construction sites and workers were requested and collected by email. ***Table 6. 3*** depicts the documents collected in each case study building project.

Location & Project Type	Documents													
Ramallah	BOQ		Progress Reports		Schedule	Work specifications	Drawings		Photos	Claims Report	Forms of time extension	Work Agreement	Contract Agreement	Excel sheet for Work executed
	Unpriced	Priced	Daily	Monthly			Design	Asbuilt						
1-Medical Facility		√			√	√				√	19		√	
2-Medical Facility						√	√		√	√	10			
3-School				28		√	√		√					
4-School	√			1	√	√								√
Bethlehem														
5- Medical Facility		√		1	√	√		√	√				√	√
Nablus														
6-Medical Facility			220	12					√			√	√	

Table 6. 3: Documents collected in each case study project

6.5 Data Analysis

6.5.1 Secondary Quantitative Data

Secondary analysis (Neuman, 2014) was applied to the unique data collected from the existing statistics after 1993 using Excel. After reviewing, extracting and cleaning the repeated cross-sectional data requested from the PCBS, STATA software was used to analyse these secondary labour force data and build a linear regression model to explore the effect of several explanatory factors on building labour productivity in the West Bank. The dependent variable used is hourly labour wage, which was calculated. The estimation used in this regression is semi-elastic or semi-log since the equation is estimated by converting the productivity values to logarithms and using OLS estimation techniques to estimate the coefficient of the independent variables (β_i). The independent variables on the right-hand side were entered one by one. A regression analysis was run after adding a new independent variable to the right-hand side of the equation; thus, the result was a triangle table (see Chapter 7).

Subsample regression analysis was also conducted for each of the three governorates. The step-by-step methodology is discussed in Chapter 7. STATA and Excel software were used to calculate labour productivity in building subsectors for the cities and the West Bank at the Macro level and relevant descriptive statistics (see Chapters 8 and 9).

6.5.2 Primary Qualitative Data

All responses were recorded on Zoom cloud and the personal researcher's computer, with the interviewee's permission, after considering all ethical considerations pertaining to the interviews. The audiotaped interviews were afterwards transcripted and translated into English. During translation for the interviews, the researcher made every effort to obtain a verbatim translation where possible. All transcripted interviews were reviewed for accuracy and entered into NVivo 12, as were photos and other documents and memos collected by or sent to the researcher. Using NVIVO 12, the primary qualitative data were analysed. Firstly, the codes and sub-codes were chosen based on the data. After that, the codes and subcodes covering similar themes or subthemes were grouped together under a broad theme or code. The relationships between these codes and sub-codes were built during the final phase of the qualitative data analysis. The researcher created free-hand sketches and basic diagrams while analysing the data to link the structural and agency factors impacting labour productivity identified from the interviews.

The data collected for each case study are shown in ***Table 6. 2*** and ***Table 6. 3***. In light of the quantity of data gathered for the case study projects, which totalled about 1000 pages, including the transcripts of interviews, Nvivo 12 was adopted to assist in data management as recommended by St John & Johnson (2000). The audiotaped interviews were transcripted. The researchers wrote the remaining interviews that took place on WhatsApp during the interview. Then both types were translated into English. During translation for the interviews, the researcher made every effort to obtain a verbatim translation where possible. All transcripted interviews were reviewed for accuracy. Documents from each case study project were stored collectively to facilitate individual case study analysis. The Nvivo 12, which allowed for the systematic deconstruction of the data into meaningful units, was used to create coding categories for each case study city and initial coding. However, the risk of losing contextualised meaning (St John & Johnson, 2000) and the availability of quantitative data (***Table 6. 3***) led to the move from Nvivo 12 to a manual analysis by creating diagrams and free-hand sketches on other software, such as diagram.io and Visio. The remaining quantitative data collected were analysed using Excel. During the analysis, memos were written. The agency and structure factors that interact and are related were determined using simple diagrams. Examining and contrasting the memos and diagrams allowed for further grouping of similar factors impacting labour productivity.

Firstly each case was analysed separately. Then they were compared to explore the factors impacting labour productivity in different contexts. Then, the common and dissimilar agency and structure factors were extracted. Common agency and structure factors addressed differently across the three governorates were also explored. After the analysis, the results of secondary and primary data will be combined using complementary triangulation that generates an adequate image of reality (Erzberger & Prein, 1997) as the findings generate a measurement of overlapping but distinct facets of a phenomenon (Greene, et al., 1989); thus, an enriched comprehension for the labour productivity is gained. Triangulation reduces the bias of adopting a single approach or data set to explore the definition and factors influencing labour productivity in the Palestinian context and enhances the validity and reliability of existing observations (Creswell, 2009; Yin, 2003).

6.6 Ethical Considerations and Data Challenges

6.6.1 Ethical Considerations

In compliance with Westminster University's ethical permission forms, the informants' rights, needs, values, and confidentiality was preserved and respected. In addition, the author applied the following precautions to protect both the secondary and unpublished PCBS data (raw) and the interviewees:

- The objectives of the thesis were expressed orally to the informants, and a brief explanation of the research objectives was written to ensure that informants fully comprehended the study's objectives.
- A verbal and written summary of how data will be utilised was provided to the interviewees and the PCBS.
- The interviewees were asked for permission to use their own words, names and other related information in the research. If they agreed, the author requested their written consent (changed to recorded video consent). In addition, participant identities were safeguarded, and all acquired data were treated as confidential.
- The author filled out the Westminster University consent form, if any, i.e. the ethics permission form.
- Interviewees were informed about the devices used to collect the data
- The transcripts of all interviews were made available to the informants (the recorded zoom video for the interviews certifies that no one inquired about the transcript of his/her interview by informing the researcher that it is not necessary).
- Informants were informed that their names would be anonymised.
- Quantitative and qualitative data were stored on the researcher's own computer and password-protected External Hard Drive.
- Once the transcription was complete, all recorded interviews were removed from the Zoom cloud and the researcher's data storage devices.
- The researcher complied with the requirements of the PCBS for the quantitative data requested following the completion of the study.

6.6.2 Limitations

Several challenges have been faced in collecting the macro, meso and micro levels data. The greatest obstacle at the macro level was the lack of all essential data from 1993; for instance, the Palestinian Central Bureau of Statistics (PCBS) did not begin collecting the quantity of cement imported into the Palestinian territory until 2006. Sector-specific data are unavailable. The author must download the reports in PDF format to obtain the data for a particular variable, such as labour wage. The majority of construction industry data are only available in abstract form. In addition, the PCBS offers a variety of publications, including Performance of Palestinian Economic reports, Construction statistics: Building licences reports, Labour Force Survey reports, and National Account reports. The PCBS provides inconsistent information: some variables are reported quarterly, while others are reported annually. Additionally, not all the data required for this research, such as labour skills and labour wages per subsector, were available on its website. Accordingly, several emails were sent to the PCBS requesting specific data, but the data was delayed because of the coronavirus pandemic. Thus, collecting the primary data was also delayed.

The principals of UNRWA's Vocational Education and Training Institutes and the Ministry of Labor in the West Bank provide several justifications and impractical conditions for accepting an interview. For instance, the UNRWA Vocational Education and Training Institutes in Qalandia director requested a written approval letter from the UNRWA headquarters in Jerusalem. Furthermore, he asked for a personal interview, not via zoom. In addition, it was challenging to collect data for the case study project and conduct interviews because 3G technology in the West Bank is prohibitively expensive and not utilised by the majority of blue-collar workers. The workers refused to be interviewed on their construction sites because it would reduce their output. Therefore, interviews with them took place on Friday or after 6 p.m. on weekdays other than Friday. In some case study projects, the supervision office refused to provide the researcher with the priced BOQ for the project. The progress reports in other case studies were inconsistent. There were reports for some months and days, but they were unavailable for other periods since they were not issued.

Most of the available reports and papers in grey literature about the Palestinian economy, labour issues and construction industry in the Palestinian territories are available in Arabic. There is no recognised definition of labour productivity in the industry at any level. None

of the publications provided by the PCBS or other governmental and non-governmental organisations contains a proxy representing construction labour productivity. Since 1996, the PCBS reports outline the annual built-up areas of residential and non-residential buildings in the West Bank. However, the number of construction workers employed in building subsectors is lacking and cannot be determined from the data provided. Thus, it is impossible to calculate labour productivity as m^2/labour hour. The data provided in the official reports issued by the PCBS can lead only to calculate labour productivity for the whole sector in US dollars per labour hour. Nonetheless, this proxy cannot be determined at the governorate or subsector level. Consequently, the regression models for 2014 to 2019 were derived using unpublished and raw PCBS data. Due to the pandemic's impact on travel, all data were acquired using zoom. Twelve additional interviews with macro and meso-level construction sector practitioners in the West Bank were undertaken to offset the effect of data collection via zoom. In the following chapter, agency and structure factors influencing labour productivity will be unpacked by constructing an explanatory econometric regression model employing secondary raw and unpublished PCBS data.

CHAPTER 7

The Determinants of Building Labour productivity in the West Bank using survey data

7.1 Introduction

Most local and international reports have concentrated not on the sector's productivity but on the OPT's economic situation. Neither a definition for the term productivity nor the impacts of different factors on the sector's productivity are available in such reports. Moreover, there is a lack of journal articles or conference papers considering the factors impacting productivity in the OPT. Chapter 4 shows only three journal articles and one conference paper concerning productivity in the OPT. Only one of these concerns the factors impacting construction labour productivity in the West Bank. In that article, published in 2013, the sector's factors were ranked based only on construction contractors' perceptions. None of the previous research in the OPT concerning the construction sector discusses the definition of labour productivity or its possible proxies (See Chapter 4). Nevertheless, investigating the structure and agency determinants of building labour productivity using secondary raw data for the Palestinian labour in the West Bank and Gaza obtained from the PCBS requires measuring the dependent variable or selecting a proxy representing it. Measuring construction labour productivity, which may be an entire thesis in itself, is beyond the scope of this thesis. Instead, a striking feature of this chapter is its discussion of the debate surrounding the use of hourly wage as an indicator for construction labour productivity.

Most international reports and datasets do not differentiate the West Bank from the Gaza strip, which is recognised as a single territorial unit, in accordance with the Oslo agreement, in most international reports and datasets. Nevertheless, the segmented territories are considered two separate areas due to Israeli policies and the occupation (see Chapter 3). A new thesis is required to investigate the factors in the Gaza Strip. Studying the two parts as one unit will lead to overlooking crucial factors that could impact labour productivity, such as shortages in construction materials in Gaza and labour mobility to Israeli markets in the West Bank. As a result, all analyses spanning 2014 to 2019 will solely concentrate on the West Bank. The chapter aims to tackle the research questions

raised in Chapter 1 using raw secondary survey data requested from the PCBS. The chapter will examine the effect of mobility on Israeli construction markets and Israeli policies on the sector's productivity in the West Bank. The effect of working conditions, such as legal status and human capital factors, such as skills and education, on construction labour productivity will be identified in this chapter.

Additionally, at the end of this chapter, the determinants affecting labour productivity in the three selected governorates used to identify the common and uncommon factors impacting productivity in different West Bank locations are also examined. Such findings could be considered preliminary findings for Chapter 9, which concerns the construction labour productivity determinants using case study data. Accordingly, this chapter is organised as follows: The relevant literature will be highlighted in the next section. Section 7.3 is data collection and extraction to build a regression model using the ordinary least squares estimator (OLS). Moreover, the empirical methodology used to create the regression model is shown in section 7.4, followed by section 7.5, which shows data analysis and discussion for the explanatory regression model created using the ordinary least squares estimation and covering the factors impacting labour productivity in the West Bank. Finally, the local chapter conclusions are shown in section 7.6.

7.2 Summary of the relevant literature regarding the regression model

7.2.1 Hourly Labour wage as an indicator of labour productivity

This section addresses the theories used to study the relationship between wages and labour productivity and the findings of certain empirical research in developing and developed countries. The diversity of construction projects and activities within a single project makes measuring labour productivity difficult. Even though this thesis aims not to measure construction productivity, productivity measures at the micro-level tend to be averaged out and do not distinguish between workers based on experience, age, skills, and locality (Chapter 4). However, all of these variables and other factors will be considered independent variables in the regression model in this chapter, in which the hourly labour wage will be used as an indicator of productivity. The debate is whether the hourly labour wage is an indicator or a proxy for construction labour productivity. Unfortunately, the answer to this question is not yet cut-clear. Even though none of the researchers has denied the relationship between labour productivity and wage, the relationship between the two

terms is considered direct, as in marginal and human capital theories, or indirect, as in wage efficiency theory.

On the one hand, the **Marginal Productivity Theory**, known as conventional theory, proposes that firms respond with wage rewards if workers become more productive. On the other hand, **Wage Efficiency Theory** indicates that paying workers high wages incentivises them to increase their productivity. In other words, the distinction between the two theories is whether higher wages result from increasing productivity or a cause of it. However, in either case, wages can be used as a strong indicator of productivity. Freeman (2008) states that the input measure used is the most significant factor influencing labour productivity. Productivity input (denominator) is always measured in terms of labour hours, which reflect the effort, time and skills of the workforce and thus, it can be stated that this input measure is the most appropriate compared to other input measures, such as the number of labour (Freeman, 2008). Construction workers' pay in the West Bank is usually dependent on output (see Chapter 4), and thus hourly labour wage, which is equal to the daily wage divided by the number of hours worked each day, might represent labour productivity. According to Freeman (2008) and tables in chapter 4 for labour productivity rates for specific occupations in the building subsectors, a) labour quality and b) the relationship between output and wages should be considered when determining whether hourly labour wage is a proxy for labour productivity.

7.2.2 Labour quality

Using the hourly labour wage makes it simple to differentiate between different types of workers in the field, such as full-time and part-time. Communication skills, information processing speed, strength and endurance, health, self-discipline, flexibility, administrative and strategic capacities, math proficiency, vocabulary size, education, motivation, energy, and job experience are among the main characteristics of individual productivity, which could be described as complex and multidimensional (Van Ours & Stoeldraijer, 2011). Nonetheless, few authors, notably those from affluent countries, such as Fabricant (1962) and Freeman (2008), emphasise the disparities in the quality of one hour of labour against another that result from differences in skills, education, and length of experience (see Chapter 4). In this chapter, the quality of labour hours will be distinguished while unpacking the factors influencing construction labour productivity in the West Bank as

diverse human capital factors, such as experience, education and skills, are included in the model as independent variables.

7.2.3 Wage and Output

Even though construction productivity is much more than a metric, investigating the influence of many factors on productivity necessitates some form of metric. Nevertheless, measuring construction labour productivity is very difficult and differs from one project to another, even within the same project. For instance, measuring labour productivity rate at the micro level as m^2 per labour hour fits some activities but not all occupations, such as steel fixing. Different economic models have used different indicators for construction labour productivity. The proxy used in one of the models of neoclassical economic theory, known as marginal productivity theory, which has been used to explain the rewards received by the various resources cooperating in production (Dorfman, 2008) and has been extensively used by authors such as Ozturk et al. (2019), is daily wage. In this economic theory, that is, marginal productivity, wages are linked to productivity and can accordingly be used as an indicator for the term under perfectly competitive market conditions (Meager & Speckesser, 2011; Ozturk, et al., 2019; Romer, 1995; Van Biesebroeck, 2014). Ozturk et al. (2019) claims that:

> If the growth models are considered correct, [the] real wage should be equal to the marginal product; therefore, the long-run increase in [the] real wage should be parallel to the increase in labour productivity (p. 901).

In contrast, for other authors, such as Hannan et al. (2018), this theory is based on unrealistic assumptions. Hanan et al. (2018) indicate that marginal productivity theory's assumptions, such as the existence of homogeneous and interchangeable workers and employers who can accurately measure productivity and compete freely in the labour market, are the main reason for criticising the theory. This theory, at best, can only contribute to understanding wage trends in the long run (Hannan, et al., 2018). Nevertheless, to generate full employment, this theory, whose assumptions are not always satisfied, has been used to justify wage-setting rules and ensure that wage growth does not exceed productivity growth (Meager & Speckesser, 2011). Other theories, such as efficiency wages, have been used to study the relationship between productivity and wages (Serneels, 2005; Van Biesebroeck, 2014). Ozturk et al. (2019) state that there are many

relationships between wage rates and productivity; thus, marginal productivity theory should be tested empirically.

Serneels (2005) analyses the relationship between labour productivity and the labour wage at an individual level using a large sample of Ghanaian firms. He reports that if a wide range of human capital variables, such as cognitive skills, are controlled for, wage profiles reflect productivity in small and un-unionised firms but less in large and unionised firms, in which the wages are higher than in small and un-unionised firms. In another study, which covered the 19 countries of the Organisation for Economic Co-operation and Development (OECD) between 1960 and 2004, Vergeer and Kleinknecht (2007) not only indicated that labour productivity growth is a critical determinate for a wage but also reported a causal relationship between the two variables. The long-run relationship between real wages, employment and productivity in the Malaysian manufacturing sector was carried out by Yusof (2008). His findings, which are consistent with the performance-based pay scheme theory rather than the efficiency-wage one, indicate that the negative impact of real wages on employment is not validated, yet the wage is tied to productivity, i.e. higher productivity leads to higher wages. Furthermore, another study, which is about the wages of construction labour in New Zealand and its relationship with productivity, indicates similar findings to Vergeer and Kleinknecht (2007) and Yusof (2008), that labour wage increases based on productivity growth lead labour to be more productive (Ozturk, et al., 2019).

However, Van Biesebroeck (2014) states that the gap between marginal productivity and remuneration linked to human capital characteristics is more significant in developing countries than in developed countries. This issue could be related to the worker's weak or bad bargaining position in developing countries due to the low labour supply elasticity caused by bad external choices (Van Biesebroeck, 2014). Van Biesebroeck (2014) states, ‘both experimental and real-world evidence suggests that employers do have monopsony power that they can use in principle to pay workers below their marginal productivity. The low recruiting elasticity, on the other hand, limits the extent to which firms can depress wages (p. 31).’ Van Biesebroeck's statement indirectly illustrates the importance of discussing the factors impacting productivity within its context. For example, even though the West Bank is considered one of the developing countries yet, the presence of the two

attractive Israeli construction markets in the OPT might limit the extent to which Palestinian employers can depress the sector's wages.

Choi et al. (2013) state that different levels of labour productivity can explain more than 86% of the variance in gross margin. Yet, they did not deny the reverse causality between the two variables. According to Choi et al. (2013), if an economic supply-demand curve determines labour wages, a higher demand may result in a wage increase over time. At the same time, higher labour payments have contributed to higher productivity for labour in generating gross margins. Considering the relationship between the two variables into a bi-directional component has been pointed out by many researchers, such as Millea (2002), as a solution to the identification problem, which is very difficult to be avoided in econometrics literature and research (Cappelli & Chauvin, 1991; Meager & Speckesser, 2011), that is whether greater worker productivity is a cause or result from higher wages. Millea (2002) studied the entangling of the wage-productivity relationship for six industrialised OECD countries. The results of her research show that productivity gains and wage changes are interrelated. Thus, researchers studying the relationship between the two variables must consider their bidirectional relationships. Such findings indicate that hourly labour wage is a proxy for labour productivity.

The findings of many researchers, such as Cappelli and Chauvin (1991), Fuess & Millea (2006) and Millea (2002), imply a kind of reverse causality, and thus their findings can be interpreted in the light of efficiency wages models. These models began in development economics, where the link was physiological; higher wages provided a better diet, which permitted more effort and production (Bliss & Stern, 1978; Meager & Speckesser, 2011). Contemporary models of this theory rely on the notation of a relationship between relative wage levels and worker productivity, which in turn justifies a variety of otherwise confusing behaviour such as the existence of involuntary unemployment and underemployment (Meager & Speckesser, 2011). This theory argues that wages are set at a particular level to achieve specific productivity in a world with labour market institutions. Thus one rational choice for firms to increase their employees' work effort could be achieved by paying higher-than-market wages, mainly if alternative income sources are accessible (Ichino & Riphahn, 2005; Shapiro & Stiglitz, 1984), such as benefits for the unemployed workers or mobility to the Israeli market as the case in the West Bank. The models argue that the utility of individual workers will be maximised by them taking into

account efforts, alternative incomes and wages. The empirical researches of Cappelli and Chauvin (1991) and Ichino and Riphahn (2005), who used microdata from different U.S. plants to examine the effect of employment protection on worker effort, found that local labour market conditions unfavourable and wage premiums create incentives for workers to reduce unproductive behaviour or "shirking." These findings show the other argument of efficiency wages models.

According to Ilmakunnas and Maliranta (2005), although individuals' wages are reasonably well measured, their productivity is not observed, and thus it is difficult to carry out an empirical analysis of the relationship between productivity and wages. The data sets on wages for individuals working in the construction sector in the West Bank are available, but the productivity of individuals is not observed; thus, checking the efficiency wage models arguments is problematic. Nevertheless, factors affecting labour productivity in the West Bank, such as labour mobility as other income source alternatives, Israeli policies as unfavourable labour market condition indicators and firm size, are included in the model as control variables. Therefore, explanations of some independent variables might also depend on the efficiency wage theory, which never denied the relationship between wages and productivity. Yet, the causes attributed to the gap between wages and productivity should be discussed to justify using hourly wage as a proxy for labour productivity.

7.2.4 Wags, productivity and Human capital theory

Feldstein (2008) and Meager & Speckesser (2011) point out that the two reasons for the gap between productivity and wages: a) using the Consumer Price Index (CPI) to link between productivity and wages instead of output price levels and b) the dependence on wage rather than labour compensation, which its growth similar to the growth of productivity. Feldstein (2008) states that the U.S. nonfarm business sector productivity between 2000 and 2007 rose 2.9% a year, and compensation per hour rose nearly 2.5% a year. Accordingly, productivity growth should be compared with the increase in total compensation rather than the narrower measure of wages and salaries (Feldstein, 2008). Additionally, the observed growth in productivity does not control for changes in the workforce composition or increases in capital costs, and thus it is likely to overstate the change in marginal productivity (Meager & Speckesser, 2011). Meager & Speckesser's (2011) statement indicates that productivity is more than a technical issue; thus, other

human and social capital factors must be included while linking the term with an hourly wage.

The findings of the research by Hellerstein et al. (1999) comparing wages and productivity for various categories of workers, which demonstrate that prime-age workers are as productive as younger ones, are consistent with the general human capital model in which wages increase with productivity. Crépon et al. (2002), Hacgeland & Klette (1999), Hellerstein & Neumark (2004), and Ilmakunnas & Maliranta (2005) researches show that skills and education levels have a positive premium on both wage and productivity. Nevertheless, the results obtained by Hellerstein & Neumark (2004) and Ilmakunnas & Maliranta (2005) indicate that the effect of education on wage and productivity is not monotonous when education increases; that is, the wage premium for education is somewhat inferior to the productivity premium. Aubert & Crépon (2003) point out that skilled workers' productivity increases at all ages. Such findings reflect that accumulating the amount of general human capital, defined by Greve et al. (2010) as the competence held by people, has a similar effect on wages and productivity. Furthermore, they can be used to justify differences between the productivity or wages of individuals.

Marginson (2019) states that human capital theory sees education, productivity, work and earnings in a linear continuum. Becker (1993) argues that more education and experience for an individual provides a satisfactory position in the job market and shields one's position against environmental turbulence. Furthermore, the increase in education and experience of the individuals tends to be reflected in the workers' wages as indicated by human capital theory, which argues that more human capital leads to an increase in personal rewards and compensation. Blakemore & Hoffman (1989), whose findings are consistent with a general human capital model of rising earnings profiles over the life cycle, state that if other productive and firm characteristics are controlled, the earnings and productivity profiles for unskilled or less-skilled workers, which are statistically indistinguishable and closely resemble each other, are upward sloping.

One distinct feature of the labour market is that workers are not homogenous and do not earn the same marginal wage (Van Biesebroeck, 2014). The Mincer human capital model in 1974, which combines several worker characteristics simultaneously, viewed the worker's total remuneration as a base wage, which equals the marginal productivity of a benchmark worker, and a premium associated with each worker characteristic that

increases human capital (Mincer, 1974). According to Van Biesebroeck (2014), human capital formation goes beyond the formal education required to enter the job market. It includes several factors, such as experience and on-the-job training, which comprise at least half of the average human capital for a worker (Mincer, 1962). When worker productivity is unobservable, employers can use other features as proxies for the productivity of worker types (Van Biesebroeck, 2014). One of the proxies could be the hourly wage. The human capital of workers, such as formal education, which might not be a productive characteristic in its own right, still help link wages to productivity rather than paying all workers the same wage. The correlation between wage and productivity under uncertain conditions may not be ideal, but it is not zero-sum (Van Biesebroeck, 2014). Firms are willing to pay higher wages to different workers due to underlying productivity differences (Van Biesebroeck, 2014).

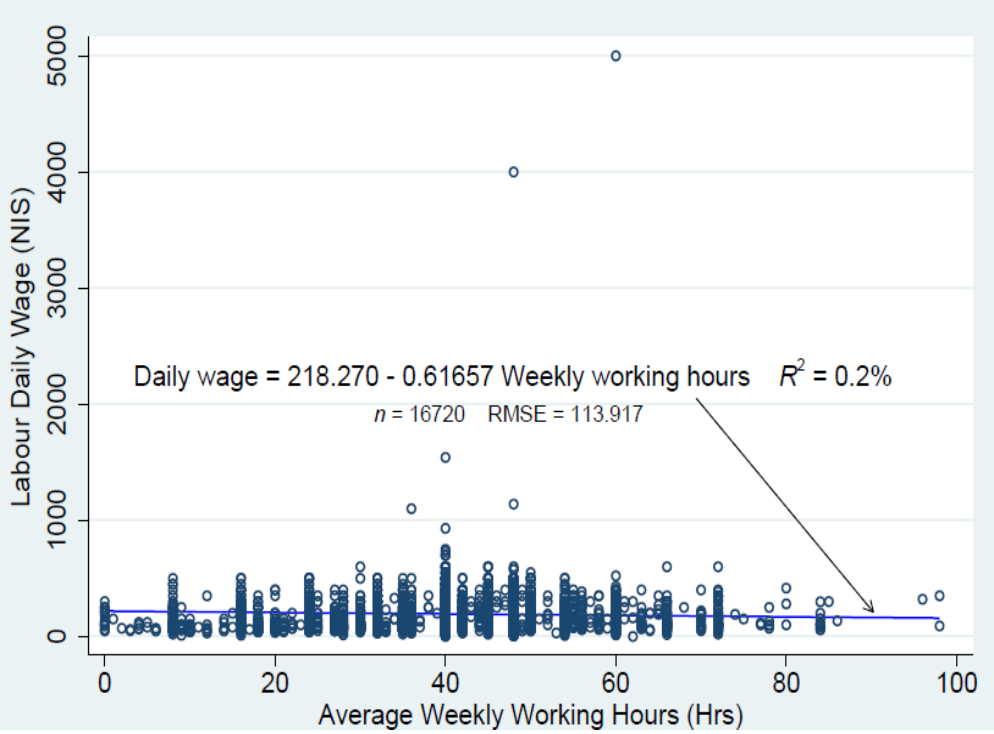
7.2.5 Hourly wages and Labour productivity in the West Bank

The quantitative data collected, which cover all governorates in the Occupied Palestinian territory, neither measure labour productivity nor allow for a calculation of it. Thus, the hourly labour wage will be used as an indicator of labour productivity. To what extent can hourly wages represent the productivity of construction workers in the West Bank? Answering the question might require understanding the factors on which the labour process rests. Clarke (2006) points out that the labour working in the UK construction sector is paid according to output rather than potential, as reflected in qualification and training. The labour process relies on strict occupation divisions, a sharp divide between professional and technical skills, informal self-employment, and low training levels (Clarke, 2006). As demonstrated later in this chapter, the West Bank's labour process is nearly dependent on the same characteristics outlined by Clarke (2006) for the British labour force. According to most interviewees (Chapters 8 & 9), the West Bank construction sector utilises piece rates, price work, and differential piece rates introduced by Taylor, which reflect the present emphasis on rewarding output and performance rather than time and quality, as described by Clarke (2006). The interviewees perceive that wages rates in the sector are more closely associated with task assignments than with workers' ability, which is also supported by Waldman (1996), who states:

> Consider an environment in which a worker's ability level is not directly observed by other firms, but the worker's task assignment is. In such an environment, the

wage offers of other firms will be more closely associated with the worker's task assignment than with the worker's ability level, which in many cases will translate into actual wage rates being more closely associated with task assignments than ability (p. 420).

The interviewees' perceptions imply that wage rates reflect the productivity of construction workers in the West Bank, as they tend to link output and the daily wage during the interviews (***Table 2. 2*** &***Table 2. 3***). **Figure 7. 1** shows a scatter plot with linear fit superimposed for the two variables: a) daily wage in New Israeli Shekel (NIS) and b) the average weekly working hours for construction labour from the West Bank, which are used to measure productivity. As depicted in **Figure 7. 1**, the linear fit line has a slight and negative slope of almost 0.62; that is, for every ten hours of work, the worker will lose almost 6.2 NIS (£1.3) of his daily wage. The distribution of wages with respect to working hours does not have a specific pattern (**Figure 7. 1**). Hence, a worker's daily wage is not controlled by the number of hours spent at the workplace. Consequently, the hourly wage is the variable reflecting the construction labour productivity.



** One Pound Sterling equals almost 4.52 New Israeli Shekel

Figure 7. 1: The relationship between daily wage and Average weekly working hours for construction labour from the West Bank

Figure 7. 1 indicates that real wage changes in construction work could occur since the individuals' pay is performance-based. Clarke (2006) and Waldman (1996) argue that wage rates tend to be more closely associated with task assignments than with ability in actual labour market settings. Van Biesebroeck (2014) argues that when the worker's effort is not perfectly observable, an employer will have no ability to write a contract, making the wage conditional on productivity. Thus, a possible optimal solution to this problem is to make the wage conditional on output. Paying a piece rate, which is common in the construction sector in the West Bank (Chapter 4), rather than a time rate is a practical implementation of this principle. However, this principle entails some inefficiency since the worker's compensation has an element outside the worker's control (Van Biesebroeck, 2014).

Furthermore, this chapter's quantitative analysis can help alleviate the criticisms of using wages as an indicator of productivity raised by Van Biesebroeck (2014). As shown in the next section, human capital characteristics of construction labour, such as skills, training, education and experience, are used as control variables in the model. Thus, by controlling for these factors using regression analysis, confounding effects can be removed and accordingly, the gap between marginal productivity and an hourly labour wage linked to human capital characteristics can be narrowed. Ilmakunnas and Maliranta (2005) argue:

> In competitive markets, workers would receive a real wage that equals their marginal product. If productivity varies by worker characteristics like age, education, and gender and labour markets are segmented so that these characteristics are priced differently, equality of real wage and marginal productivity can hold for each worker type (p. 625).

Bishop (1987) finds that average wage profiles reflect productivity profiles if a wide range of human capital variables, including cognitive skills, are controlled. Additionally, Hellerstein et al. (1999) estimated a production function incorporating a heterogeneous labour aggregate and a wage equation at the plant level, verifying whether a particular worker characteristic is well remunerated and comparing the absolute magnitude of the wage premium productivity premium associated with the same worker characteristic. They conclude:

> With one major exception, our basic results indicate that for most groups of workers, wage differentials do, in fact, match productivity differentials (Hellerstein, et al., 1999, p. 443).

Van Biesebroeck (2014) states that if human capital returns are not in line with their effect on productivity, workers will get either insufficient or excessive investment. Serneels' (2005) point of view supports the use of wage as a proxy for construction labour productivity. He concludes that human capital theory still has the explanatory power to the relationship between wage and productivity in a more competitive environment, such as small and non-unionised firms in developing countries, with all criticism for that theory. He argues that alternative explanations, such as efficiency wage and contract theories, might be better in more institutionalised environments. Based on all arguments mentioned earlier, the hourly labour wage can be used as an indicator of productivity in the West Bank construction sector after controlling a wide range of human capital variables. In the next section, the regression model factors that concern human capital characteristics, migrations or mobility of workers and working conditions impacting productivity will be summarised.

7.2.6 Factors impacting construction productivity used to build the model

The factors influencing West Bank construction labour productivity used to construct the regression model in this chapter are predetermined based on prior research. The relevant structure and agency factors affecting labour productivity are summarised in ***Table 7. 1***, which shows the impact of these factors on construction labour productivity. To comprehend the effect of these factors on productivity, it is necessary to consider the sectoral backdrop, including political instability, economic conditions, Israeli policies, and the presence of the Israeli construction market. Unemployment in the OPT has increased due to the deteriorating situation and continuing population growth (Frech, et al., 2019). AIDA (2017) and Rosenhek (2003) state that the OPT situation in terms of high unemployment and wage discrepancies between the two economies has made Palestinian workers ideal candidates for the Israeli secondary market. In this chapter, and based on the available data, the effect of Israeli policies and labour mobility from the West Bank to the Israeli construction market on construction labour productivity in the West Bank will be numerically examined. The data used to build the regression model will be discussed in the next section.

Factor	Some References	Impact of the factors
1. Skill & Labour quality and training (Agency factor)	Alaghbari et al.,2017; Barbosa et al., 2017; Bernstein, 2003; Chan and Kaka,2003; Clarke et al., 2013; Dudayev and Ismail, 2019; Durdyev and Mbachu,2011; Durdyev and Mbachu,2017; Finke, 1997; Forbes and Ahmed, 2010; Ghoddousi and Hosseini,2012; Goodrum and Haas,2004; Gruenberg, 2019; Hamouda and Abu-Shaaban 2014; Hamza et al., 2019; Hiyassat et al.2016; ILO,2001; ILO,2008; Jarkas et al.,2012; Jarkas,2015; Javed et al., 2018; Levit, 1973; Mahamid, 2013; McGeorge 1988; Nasirzadeh and Nojedehi,2013; National Research Council,2009; Shashank et al.,2014; Teicholz et al. 2001; Teicholz,2013; Zhi et al. 2003	• Skill shortages have a negative impact • The higher the labour quality achieved by training and experience, the higher is the productivity
2. Construction firms' size (Structure factor)	Dainty et al., 2017; Myers, 2013; Teicholz, 2013	The small and medium-sized construction firms might be unable to train and improve labour and thus negatively impact productivity
3. Labour experience (Agency)	Alaghbari et al., 2017; Enshassi et al., 2007; Hamouda & Abu-Shaaban, 2014; Hamza et al., 2019, Hiyassat et al., 2016;Mahamid 2013	The higher the experience is, the higher the productivity
4. Fewer younger labours are entering the workforce, and the Ageing workforce (Agency)	Dacy, 1965; Forbes and Ahmed, 2010; Javed et al.,2018; Shashank et al.,2014; Teicholz et al., 2001	Ageing negatively affects productivity
5. Migration of workers (Agency)	Clarke, 2006; Goodrum & Haas,2004; Smith, 2006	The effects of this factor differ for the home country (sending one) and the host country.
6. Job satisfaction and security (structure)	Clarke, 2006; Fabricant, 1981; Hamouda & Abu-Shaaban, 2014; Javed et al.,2018; Maloney,1983; National Research Council, 2009	It has a positive impact on productivity

Factor	Some References	Impact of the factors
7. External factors, such as transportation, political and economic conditions, Informal economy, (Structure)	Alaghbari et al., 2017; Alesina and Perotti, 1996; Asteriou & Price, 2001; Enshassi et al., 2006; Fielding, 2003; Harriet et al., 2013; Jarkas et al., 2012	Such factors could improve or negatively impact productivity. Thus the context of the sector should be studied while investigating the factors impacting productivity
8. Career prospects & causal employment (Legal or contractual Status)-Structure factor	Clarke, 2006; ILO, 2008; Javed et al.,2018	Having clear career prospects and signing a contract positively impact productivity.
9. Education (Agency factor)	Becker,1993; Gruenberg, 2019; Javed et al.,2018; Kim et al., 2016; National Research Council,2009; Ruddock and Ruddock, 2009; Zhi et al., 2003	It has a positive impact on productivity. Nevertheless, this factor's impacts depend on a particular country's educational system.
10. Palestinian Labour Mobility	AIDA (2017) and Rosenhek (2003)	Discuss the reason for the mobility, not its impact on the construction sector

Table 7. 1: Literature-Based Factors Influencing Labor Productivity Used to Develop the Regression Model

7.3 Data collection and extraction

7.3.1 Data collection and cleaning

Given the availability of data, not all factors impacting labour productivity can be evaluated numerically; therefore, the first step is to assess, extract, and clean the data to determine which factors can be examined numerically. For instance, the ability to explore the effect of the skills/ labour qualification factor on construction labour productivity solely depends on the original data set's availability. The quantitative data acquired using the survey questionnaire, developed following the recommendations of the International Labour Organisation (ILO), cover all sectors of the OPT labour force. The survey

questionnaire, which consists of four major sections: a) identity data, b) quality control, c) household roster and d) employment section, is not tailored to meet sector-specific criteria for measuring or investigating construction labour productivity factors. All interviewees ten years and older must answer questions on their employment status, economic activity, occupation, place of employment, and other employment indicators.

The 2014-2017 **sampling frame** is the 2011 master sample. Each enumeration area has around 124 households. The 2014-2017 master samples include 596 enumeration locations; the 2014 and 2017 labour force survey samples used 494 enumeration areas. These are primary sampling units (PSUs). For 2018 and 2019, the sampling frame is the 2017 master sample: each enumeration area has roughly 150 homes. The master sample includes 512 enumeration locations for the 2018 and 2019 labour force survey samples. In each 2014 quarter except the second[26], the anticipated **sample size** is 7,616 households. Each 2015 quarter sampled 7,616 households. In the first and second quarters of 2016, sample size was 7,616 households. Each subsequent quarter had 7,603 sample households. Each 2017 quarter had 7,616, 7,587, 7,525 and 7,502 sample households. In 2018, the first quarter sample size was 7,452 households, the second 7,597, the third 7,750, and the fourth 7,703 homes. The 2019 anticipated sample size was 7,664 households in the first quarter, 7838 in the second, and 8,040 in the subsequent quarters.

The **sample designed** as a systematic random cluster stratified consists of two stages: a) in the first stage, a systematic random sample of 494 enumeration areas for the whole round is selected; b) if the number of households in the enumeration areas is 80 or more, a systematic random sample of 16 households from each enumeration area is selected. In locations with fewer than 80 households, eight are randomly picked. For 2018 and 2019, the sample was created with 512 enumeration areas. In the second step, 15 homes from each first-phase enumeration region are randomly picked in each round. The survey is repeated every 13 weeks, i.e. quarterly. In each round of the labour force survey, all master sample enumeration areas are covered. While the regions remain fixed over time, 50% of households in the enumeration areas are replaced each round. As shown in the data, the same families stay in the sample for two successive rounds, left for the next two rounds and then selected for the sample for another two consecutive rounds. After that, they will be dropped from the sample.

[26] The sample size was 7,541 households

Accordingly, an overlap of 50% is achieved between successive rounds and between consecutive years. The preceding description of the data set clarifies that the data utilised in this chapter are **repeated cross-sectional data**, as the survey is administered to a new sample at each subsequent time point.

These surveys conducted in the West Bank and Gaza divide the population by a) governorate and b) type of locality (urban, rural, refugee camps). Since the governorate of each individual was not included in the quarterly data, the researcher entered it based on the annual data file for each year, which is the merged quarterly data file for the same year. The questionnaire was modified three times in terms of the number of variables and the codes of the existing variables; for example, the 2014 survey contained 76 variables; however, the following three years' questionnaires contained 120 variables. Six additional new variables have been included in the 2018 study. The number of questionnaire variations reached 136 in 2019. In addition, most of the 2014 codes have been replaced with new ones for similar survey questions in subsequent years.

Due to some mistakes in the merged annual data in 2017, the decision regarding extracting construction labour data was to use the quarterly files' data. Accordingly, 24 files were used to extract the data, which were converted into excel. A new excel file was created, in which numbers and codes of variables of the 2019 survey were used to merge data on construction labour in the OPT. Three variables, a) year, b) governorate, and c) quarter number - were added to the excel file. Values for variables that did not exist in a given year were left blank. The West Bank's labour data were extracted in a separate excel file before entering into STATA. Another Excel file containing the unique code for each variable in a particular year, its new code based on the 2019 survey codes and variable values, was created. Furthermore, the questions (variables) were highlighted in that file whenever a change occurred due to the order of the variable values or to entering new variables values.

Accordingly, after reviewing and cleaning the data, the factors that could be explored using ordinary least square linear regression are: 1) skills or qualifications, 2) age, 3) experience, 4) Israeli policies, which include strikes in the West Bank due to Israeli occupation force actions in the West Bank and the closure of the checkpoints between Israel and the West Bank by Israeli occupation force, 5) labour mobility to the Israeli construction market, 6) years of education, 7) firm size, 8) work satisfaction, 9) working conditions (job security), and 10) legal status. The model built is explanatory. Before defining the model's dependent

and independent variables, the data set's potential limitations are discussed in the next section.

7.3.2 Limitation of data

Although the raw data are informative, changes made to the surveys over the years by adding new variables or deleting others have limited the regression to testing only ten factors. Variables, such as hearing, vision, communication, and mobility difficulties, available from 2018 onwards, cannot be added as independent variables in the regression. The surveys used are not sector-specific. As mentioned earlier, the data do not have any variable that measures construction labour productivity, and thus, the hourly wage is used as an indicator for the term. Accordingly, employers and self-employed labour (***Table 7. 2***) are excluded from regression since their daily or monthly wages are unavailable. However, this chapter's findings make sense since self-employed individuals are not the same kind of workers as employees. Furthermore, It is not easy to apply the previous theories, i.e. marginal productivity, wages efficiency and human capital theories, to either self-employment or employer individuals.

Status in employment	Total number	Percentage
Employer	2,578	11.43
Self-employed	1,911	8.47
Wage-employee	18,069	80.1

Table 7. 2:The status of employment in the construction sector in the West Bank

The second limitation is that the data do not distinguish between construction workers working in Israel and illegal settlements. The workers at Israeli markets are categorised as one group. Consequently, the effect of labour mobility associated with the illicit Israeli settlement construction sector on the sector's productivity in the West Bank could not be separately explored. The construction workers are not classified by occupation but rather into three groups: Building and Related Trades Workers (excluding electricians), Electrical and Electronics Trades Workers, and Construction Laborers (unskilled). The data also include a second occupational classification, placing construction employees into either the Elementary Occupation or Craft groups. The regression analysis is therefore restricted to these classifications within each sub-sector.

7.4 Defining and measuring the productivity indicator (The Dependent Variable)

Linear regression has been created to investigate the impact of various explanatory factors on construction labour productivity. The dependent variable employed is hourly labour wage, computed using equation 1.

$$Labour\ Productivity = \frac{dwage * 365}{52 * PW05} \qquad Eq(7.1)$$

Where:

- Dwage is the daily wage in New Israeli Shekel (NIS), defined by the PCBS as the employer's net cash wage to the employee.
- PW05 is the usual number of working hours an employed person spends weekly in his/ her main occupation. Leaves, such as sick, lunch breaks and travel time, which is spent while worker goes from home to work and vice versa, are excluded from the working hours.

7.4.1 Kernal Distribution for the Palestinian construction workers' daily wage

The summary of the daily wage reveals a mean of approximately 193 NIS (£42.5) and a standard deviation of around 114 NIS (£25.2). The daily wage has a minimum value of zero, which is not accepted for a wage, while the maximum daily wage is 5000 NIS (£1,104). Inspection of the variable daily wage, denoted by dwage in the equation, shows more than 99 unique values, indicating that this is a continuous variable, as each observation has a unique and distinct value. Additionally, it reveals that all values (16,818) in the variable daily wage are positive except for one with zero value. Consequently, this singular value is dropped from the analysis. ***Figure 7. 2*** depicts the Kernel density estimation to visualise the distribution of the numerator (dwage).

Figure 7. 2 shows that the daily wage is not normally distributed. It has a very long right tail, which means that some workers are paid very high daily wages, which are over 5,000 NIS (£1,120). The graph shows that much data is bunched up on the left. The graph depicts the asymmetries in the daily wage distribution; thus, neither coefficient of skewness will equal zero, nor coefficient of kurtosis will equal three. The detailed summary of the variable shows that the skewness coefficient is positive at 7.3. That is, the distribution is to be skewed to the right. Furthermore, the coefficient of kurtosis, which equals 266.9, is above three suggesting thinner tails than a normal distribution.

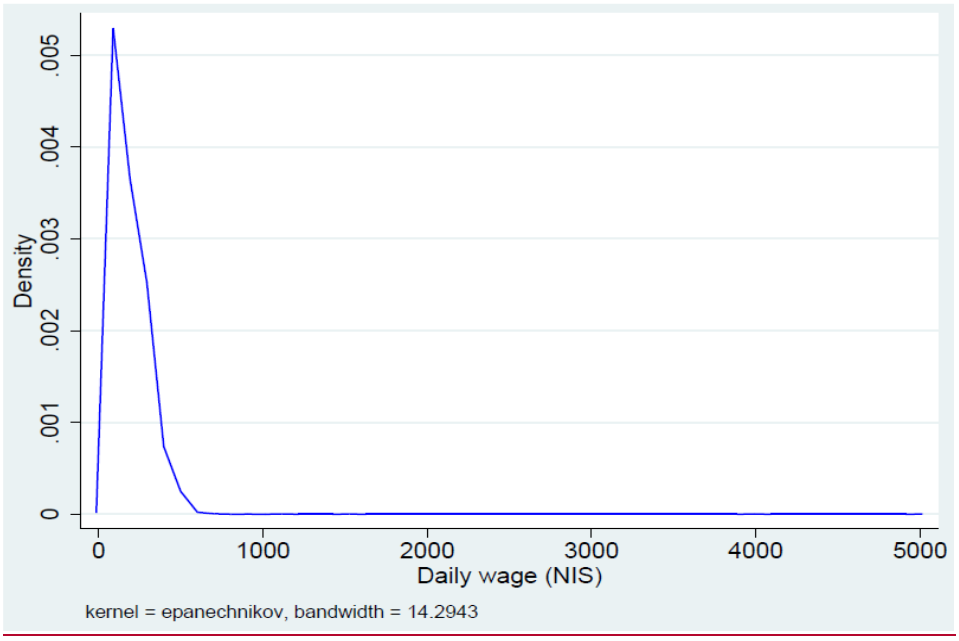


Figure 7. 2: Kernel Density Estimation for the Daily Wage for all construction workers working locally or in the Israeli construction markets

Figure 7. 3 shows the two-way kernel density for the wage variable over the place of work. The wage distribution for the Palestinian construction workers working in the West Bank is left-shifted compared to those working in Israeli markets. The left shift seems relatively uniform, implying that construction workers working in the West Bank are paid less than those working in Israeli markets.

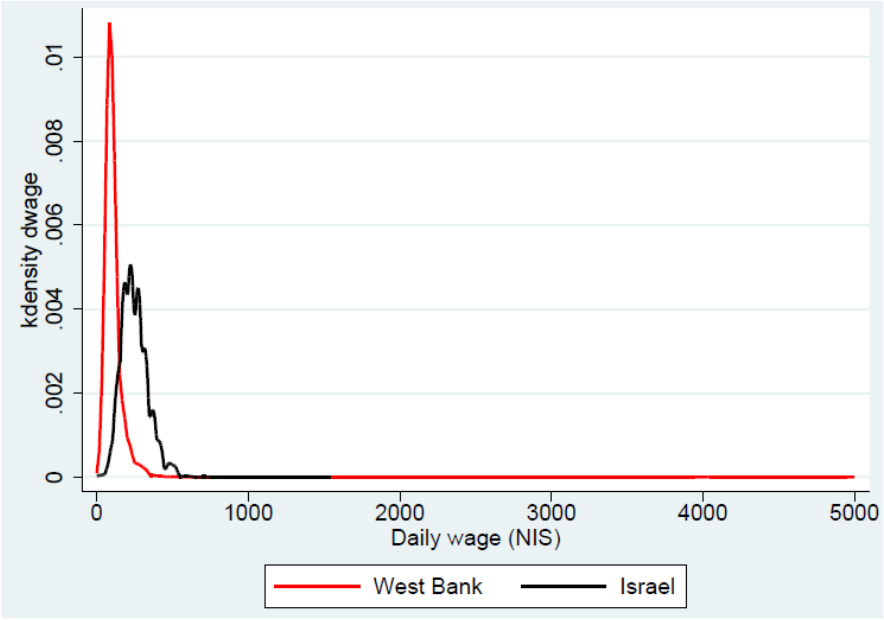


Figure 7. 3: Distribution of Daily wage variable by place of work

7.4.2 Kernal Distribution for the Palestinian construction workers working hours

Summary statistics of the weekly working hours variable reveal a mean of around 42.4 hours and a standard deviation of around 11.3 hours. The variable has a minimum value of zero, which is expected since the survey covers unemployed workers and people outside the labour force, and a maximum value of 126 hours, which corresponds to 18 hours per day, seven days per week, for a single worker. Inspection of the variable shows more than 77 unique values, which indicates that this is a continuous variable, as each observation has a unique and distinct value. Additionally, it reveals that 21,530 observations have positive values, and the number of observations with zero values is 384. ***Figure 7. 4*** shows the Kernel density estimation to visualise the distribution of the dominator. As shown in ***Figure 7. 4***, the variable is not normally distributed. It has a longer right tail, which means that the maximum value on the right, 126, is further from the average than the lowest extreme value on the left, zero. The graph shows the asymmetrical distribution of the working hours variable, and thus, neither coefficient of skewness will equal zero, nor coefficient of kurtosis will equal three. The detailed summary of the variable shows that the skewness coefficient is negative 1.2. That is, the distribution is to be skewed to the left. Additionally, the coefficient of kurtosis, which equals 8.3, is above three suggesting thinner tails than a normal distribution.

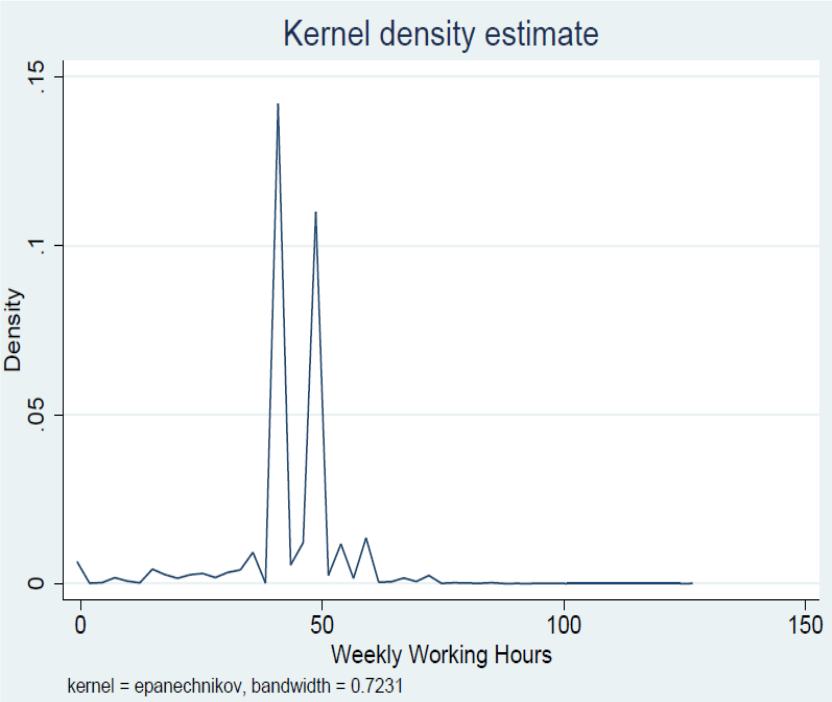


Figure 7. 4: Kernel Density Estimation for the Average Weekly Working Hours

The graph reveals the existence of two peaks. The leftmost peak is slightly higher than the rightmost peak. Typically, two peaks in hours worked statistics are associated with part-time versus full-time employment, but in this instance, the double-peak structure results from distinct labour market dynamics in the Palestinian and Israeli markets. To explore this in more detail, ***Figure 7. 5*** shows the two-way kernel density for the variable over the place of work. The weekly working hours variable distribution for the Palestinian construction workers working in the West Bank is right-shifted compared to those working in Israeli markets.

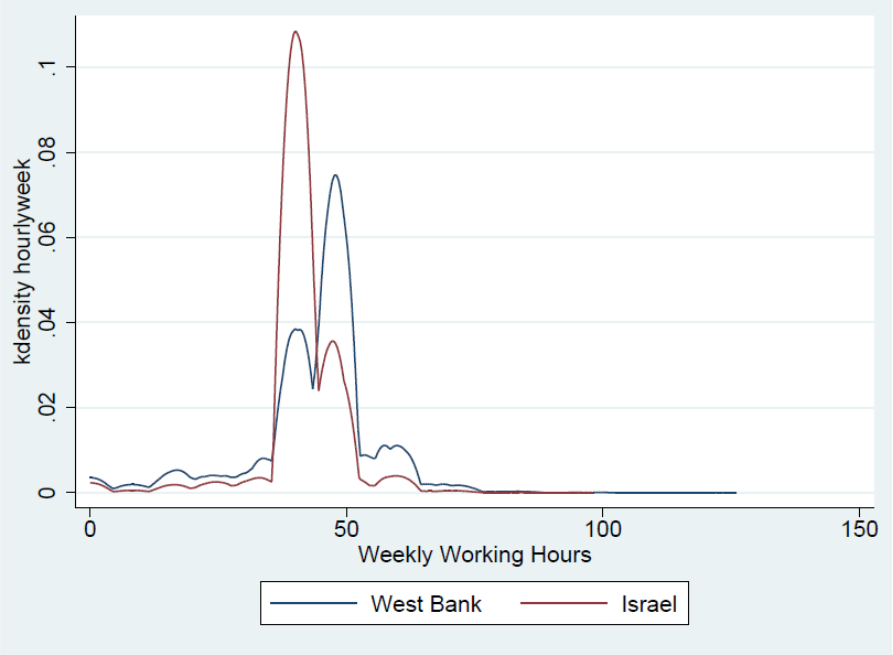


Figure 7. 5: *Kernel Density Estimation for the Average Weekly Working Hours by place of work*

However, the right shift seems relatively uniform, implying that construction workers working in the West Bank work longer than those working in Israeli markets. Furthermore, looking at the percentiles of the variable by place of work could explain the existence of the two peaks (***Table 7. 3***). ***Figure 7. 5*** shows that the peak of weekly working hours for workers working in the West Bank is to the left of the peak of those working in Israeli construction markets. Furthermore, there are another two high values of weekly working hours. The second highest value that belongs to the workers working in the West Bank is almost at the same position as the peak of those working in the Israeli construction market and vice versa. Consequently, the two peaks in ***Figure 7. 4*** are the sum of the two peaks and the two second-highest values of the two construction markets.

Percentile	Value	
	West Bank	Israel
5	16	32
10	30	40
25	40	40
50	48	40
75	48	45
90	54	48
95	60	50

Table 7. 3: The percentiles of weekly working Hours by Place of work

7.4.3 Kernal Distribution for the Palestinian construction workers' productivity (The Dependent Variable)

The dependent variable has a mean of around 33.43 NIS per hour, equivalent to £7.5 per hour, and a standard deviation of approximately 23.72 NIS/hour (£5.32/hour). The minimum hourly productivity is 0.033 NIS (approximately £0.01 per hour), which is too low for an hourly wage. This may have occurred due to a data entry error or if the interviewee did not provide the correct answer for his daily wage, given that the minimum hourly wage in Palestine is 8 NIS/hour (£1.76). The highest value of hourly labour productivity is around 1,048.85 NIS (£231.33). The variable contains more than 99 distinct values, indicating that it is a continuous variable since each observation has a unique and distinct value. Moreover, it demonstrates that all values (16,704) are positive. ***Figure 7. 6*** depicts the Kernel density estimation to visualise the distribution of the dependent variable, i.e. construction labour productivity after trimming the daily wage equals zero.

The hourly labour productivity is not normally distributed. It has a very long right tail, which means that some workers are paid very high daily wages, which look up to over £231 (***Figure 7. 6***). Furthermore, the graph shows that much data is bunched up on the left. The graph shows the asymmetrical distribution of the variable, and thus, neither coefficient of skewness will equal zero, nor coefficient of kurtosis will equal three. The detailed summary of the variable shows that the skewness coefficient is positive at 8.45. That is, the distribution is to be skewed to the right. Furthermore, the coefficient of kurtosis, which equals 258.17, is above three suggesting thinner tails than a normal distribution.

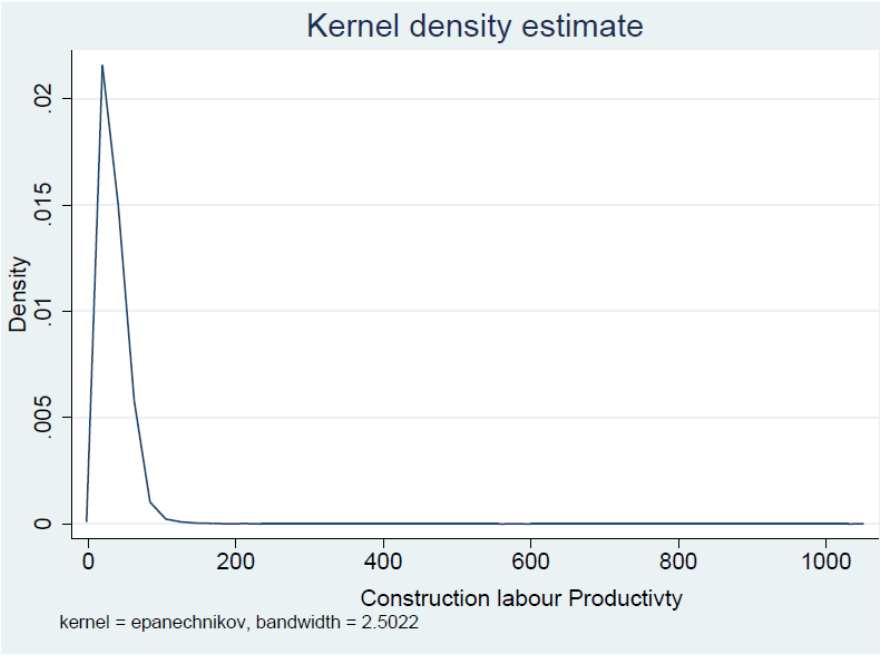


Figure 7. 6: Kernel Density Estimation for the Construction Labour Productivity

Figure 7. 7 compares the distribution of dependent variables by the markets where the construction workers from the West Bank are working, i.e. Israeli and Palestinian construction markets in the West Bank. As shown in ***Figure 7. 7***, both graphs are not normally distributed. Instead, they have a very long right tail, which means that some workers are paid very high hourly wages, over 580 NIS (£129) in the West Bank and almost 1050 NIS (£233) in the Israeli construction market.

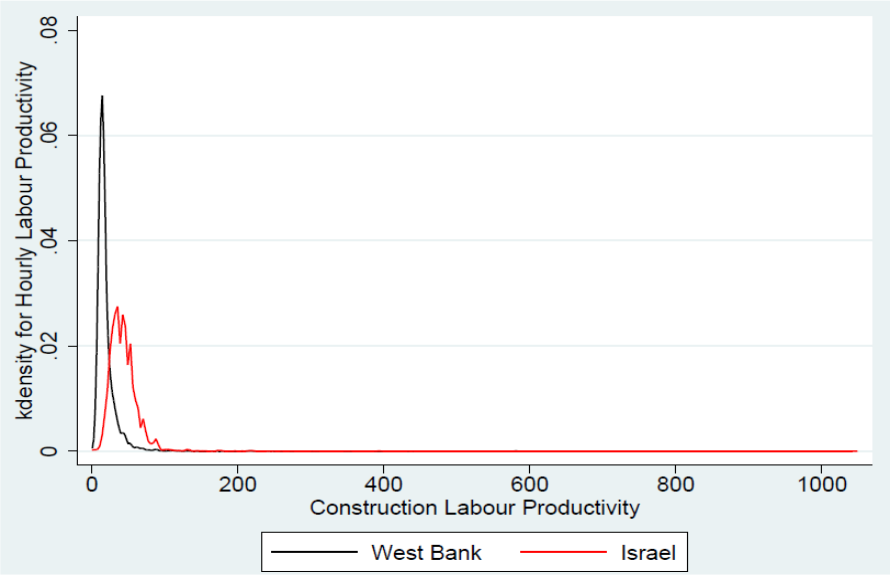


Figure 7. 7: Kernel Density Estimation for the construction labour productivity by place of work

The graph shows that much data is bunched up on the left. The graph shows the asymmetrical distribution of the daily wage, and thus, neither coefficient of skewness will equal zero, nor coefficient of kurtosis will equal three (***Figure 7. 7***). ***Figure 7. 7*** also shows that the wage distribution for the Palestinian construction workers working in the West Bank is left-shifted compared to the workers working in Israeli markets. The left shift seems relatively uniform, implying that construction workers working in the West Bank are paid less than those working in Israeli markets, working longer hours, or both.

7.4.4 Researcher's argument and T-test results

The main argument of this thesis is that labour mobility from the West Bank to Israeli construction markets is a significant challenge affecting West Bank building subsectors' labour productivity. Consequently, the baseline model encompasses all West Bank-based Palestinian construction workers employed by wage in building subsectors. In addition, another regression model is built for building workers working locally, i.e. in the West Bank. ***Figure 7. 7*** shows a difference in productivity between workers working locally and in the Israeli construction markets. The T-test results, presented in **Table 7. 4** and ***Table 7. 5***, show that the hourly labour productivity for workers working in the West Bank is statistically different from those working in the Israeli construction markets. Yet, the hourly labour productivity in the West Bank for workers working in the same governorates is not statistically different from those working outside their governorates. These findings could be considered a motivation for splitting the data.

Group	Observation	Mean	Std.Err.	Std. Dev.	[95% Conf.	Interval]
Inside	5,837	18.82205	0.220955	16.88102	18.3889	19.25521
Outside	880	18.00132	0.3300838	9.791867	17.35348	18.64917
Combined	6,717	18.71453	0.1968393	16.13242	18.32866	19.1004
Diff.		0.8207322	0.5833368		-0.3227931	1.964257

diff = mean(inside) - mean(outside) t = 1.4070

Ho: diff = 0 Degrees of freedom = 6715

Ha: diff < 0	**Ha: diff != 0**	**Ha: diff > 0**
Pr(T < t) = 0.9203	**Pr(T > t) = 0.1595**	**Pr(T > t) = 0.0797**

Table 7. 4: T-test results for construction workers' productivity working inside and outside their governorate of residence

Testing whether the hourly labour productivity in the West Bank for workers working in the same governorates is statistically different from those working outside their

governorates can be carried out using a T-test. The t statistic is 1.4, with 6,715 degrees of freedom, and the null hypothesis is that the difference is 0 (**Table 7. 4**). In this case, the T-test rejects the assumption. The alpha for the alternative hypotheses, which are lower productivity, productivity that is not equal, and greater productivity, is over 0.05. Therefore, The test shows that the hourly labour productivity for workers working outside their place of residence of 18.00 is not statistically different from workers working in their place of residence (18.82 NIS/hour). Consequently, all the alternative hypotheses are rejected, as shown in **Table 7. 4**.

Group	Observation	Mean	Std.Err.	Std. Dev.	[95% Conf.	Interval]
West Bank	6,728	18.75957	0.1971505	16.17115	18.37309	19.14605
Israel	9,908	43.34197	0.2296142	22.85556	42.89188	43.79206
Combined	16,636	33.40026	0.183867	23.71528	33.03986	33.76065
Diff.		-24.58241	.3225467		-25.21463	-23.95018

diff = mean(WB) - mean(Israel) t = -76.2135
Ho: diff = 0 Degrees of freedom = 16634

Ha: diff < 0	**Ha: diff != 0**	**Ha: diff > 0**
Pr(T < t) = 0.0000	**Pr(T > t) = 0.0000**	**Pr(T > t) = 1.0000**

Table 7. 5: T-test results for workers' productivity working in the West Bank and Israeli construction markets

Applying a T-test to check whether the workers' productivity working in the West Bank is statistically different from those working in the Israeli markets rejects the null hypothesis, which assumes that the difference is 0 (***Table 7. 5***). The t statistic is -76.21, with 16,634 degrees of freedom. The test also rejects the third alternative hypothesis that labour working in the West Bank is more productive than those working in Israeli construction markets since the alpha for this hypothesis is over 0.05. However, the other two alternatives, which are the difference between the productivity of the two groups neither equal nor equals to zero, are accepted since the alpha for these alternative assumptions is less than 0.05. Accordingly, the test results (***Table 7. 5***) show that the hourly labour productivity for workers working in the West Bank of 18.76 NIS/hr is statistically different from workers working in Israeli construction markets (43.34 NIS/hour).

7.5 Defining the Independent variables

7.5.1 Dummy and Categorical Variables

The labour skills factor, a dummy variable, is measured by checking whether the employee has completed a formal training course with a certificate. The training course should be managed either by the Ministry of Labour or the Qalandia Institute for Vocational Training, managed by the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA). Having a training course could be considered a qualification factor rather than a skill. Nevertheless, McGowan and Andrews (2015) indicate that qualifications have been widely used as proxies for skills. Since the variable values in the 2014 survey differ from those in subsequent years, a value of one has been assigned to the year 2014 skills dummy variable for employees who are enrolled in or have completed the course. The skills dummy variable equals zero when the labourer does not complete or never attended a certified training course. However, the skill dummy variable is equal to one for those who have answered "yes", and the dummy variable is equal to zero for those who have answered "no" to the same question over successive years.

Legal status concerns whether the employee has signed a written contract in his/ her primary job. If the employee has a permanent employment contract, fixed-term contract, or is included in a collective labour agreement, the variable's value equals one. However, if the contract has been verbally agreed upon, or there is no contract between the parties, the variable's value is zero.

The working conditions (Job security) factor is derived from three data-derived factors: a) the employer contribution to the pension fund/end of services benefits, b) annual leave paid by the employer, and c) sick leave payment in case of illness or injury. Accordingly, the value of job security equals one if the answers to these three variables are affirmative; otherwise, it equals zero, which includes employees who responded "No" or "I do not know."

Job satisfaction is derived from the questionnaire variable asking whether the worker desires a job change. Consequently, the factor value is equal to one if the response to the question is "No"; alternatively, the factor value is equal to zero if the response is "Yes."

Israeli policies,which are confined to the closure of the checkpoints between the West Bank and Israeli markets and strikes in the West Bank because of Israeli occupation force actions, use the variable that looks at why interviewees worked less than 35 hours last week (normal working hours). Thus, the only direct answers, i.e. "closure or strikes", were assigned a value equal to one. Other indirect answers, such as "Could not find additional work," "nature of work", "unwillingness to work more", "personal reasons", and "nature of work", have given a value equal to zero.

Labour Mobility to the Israeli market (Mobility IS only): The value of the factor is one if the answer to the workplace question is "Israel and the illegal Israeli settlements"; otherwise, the value of the factor is zero, which covers the other possible workplace answers, i.e. "working in the same district in the West Bank" and "working in other districts in the West Bank", "working in Gaza," and "working abroad."

The company size factor is a categorical variable that modifies the category values derived from the survey question "Number of Employees in the Current Main Work." The respondent could only select one of the five category values. The first category means that only one employee works for the company. The second category is selected when workers are between two and four. These two variables are joined in Stata using the re-code command and are classified as category one. The third category indicates that the company employees range between five and nine. The fourth category means that the number of employees in the company is between ten and nineteen, and finally, the fifth category indicates that the company has twenty or more employees. Categories from three to five have also been re-coded. The original data's third category became the second category, the fourth category became the third, and the fifth category became the fourth.

7.5.2 Continuous Variables

The **age variable** answers a question about the employee's age at the last birthday. Additionally, the **experience variable** is the length of tenure of an employee at his/her primary job in months, and **education** is the years of schooling a labourer has completed. ***Table 7. 6*** summarises the variables used as independent factors in the regression model. In the next section, the methodology adopted to explore the factors impacting on productivity will be explained.

Variable	Type	Definition	Value
Skills	Binary	Whether the employee has completed a formal training course with a certificate	a) If year =2014, 1= Employees who are either currently attending or have graduated from the course. b) For year>2014, 1= if workers have answered "yes."
			c) If year=2014. 0= if the labourer does not complete or never attended a certified training course d) If year>2014, 0= if workers have answered "No."
Legal status	Binary	Whether the employee has signed a written contract in his/ her primary job	a) 1= The employee has a permanent employment contract, fixed-term contract, or included in a collective labour agreement
			b) 0= The contract has been verbally agreed upon, or there is no contract between the parties
The working conditions (Job security) factor	Binary	The variables used to build job security factors are a) the employer contribution to the pension fund/end of services benefits; b) annual leave paid by the employer; c) sick leave payment in case of illness or injury	a) 1= If the answers for the three questions a), b) and c) are yes
			b) 0= If the answer in any of the three questions a), b) and c), either "No" or "I do not know."
Job satisfaction	Binary	Whether the labourer wants to change his/her job	a) 1= If the answer to the question is "No."
			b) 0= If the answer is "Yes."
Israeli policies	Binary	The reasons that interviewees worked less than 35 hours last week (normal working hours). It only concerns the closure of the checkpoints between the West Bank and	a) 1= closure or strikes
			b) 0= Other reasons

Variable	Type	Definition	Value
		Israeli markets and strikes in the West Bank because of Israeli occupation force actions	
Mobility IS	Binary	Working in Israel and the illegal Israeli settlements construction markets	a) 1= place of work is in Israel and the illegal Israeli settlements
			b) 0= other places of work
Firm size	Categorical	Number of Employees in the current main work.	a) 1= the number of workers is between one and four
			b) 2= the number of employees in the company ranges between five and nine
			c) 3= the number of employees in the company is between ten and nineteen
			d) 4= the number of employees equals twenty or more
Year fixed effect	Binary	The year fixed effects (i.e. year dummy variables) control for factors changing each year	
Age	Continuous	The employee's age at the last birthday	Year
Education	Continuous	The years of schooling a labourer has completed	Year
Experience	Continuous	The length of tenure of an employee at his/her main job in months	Month

Table 7. 6: The Regression model control variables, their definitions and value

7.6 Methodology

To assess the effect of varying the preset independent variables on the dependent variable, i.e. construction labour productivity, a regression model is estimated using the ordinary least square technique. As mentioned earlier, the Kernel distribution estimation for the dependent term is not normally distributed. Accordingly, a logarithmic transformation for the dependent variable is a convenient means of transforming it from a highly skewed to a more normalised variable. A logarithmic transformation for the dependent variable is common practice with such variables and improves the model's fit. The estimation used in this regression is semi-elastic or semi-log since the equation is estimated by converting the productivity values to logarithms and using OLS estimation techniques to estimate the coefficient of the independent variables (βi).

All the variables on the right-hand side of the model equation are entered one by one to explore their impacts on the log of construction labour productivity. As the regression analysis will be run after adding every new independent variable to the right-hand side of the equation, the result will be a triangle table. All explanatory variables (independent) utilised to construct the model will be displayed in the final regression analysis. The proposed model equation, which contains the dependent variable, i.e. the productivity of construction labour in the West Bank working in building subsectors only, the eleven independent and predetermined factors and error terms, is illustrated in Equation 7.2.

$$\begin{aligned} &Log\ Construction\ Labour\ Productivity \\ &= \alpha + \beta 1 * (Skills) + \beta 2 * (Age) + \beta 3 * (Experience) + \beta 4 \\ &* (Education) + \beta 5 * (Legal\ status) + \beta 6 \\ &* (Work\ conditions) + \beta 7 * (Job\ satisfaction) + \beta 8 \\ &* (Israeli\ Policies) + \beta 9 * (Mobility\ IS) + \beta 10 * (Firm\ size) \\ &+ \beta 11 * (year) + \varepsilon \end{aligned} \quad \textbf{(Eq 7.2)}$$

Where:

- β_i is the coefficient of the independent variable
- **ε** is the random error term

7.6.1 The semi-elastic model specifications

The main assumption of the regression analysis is that the variance in the residuals is constant or homoskedastic (Torres-Reyna, 2007), yet when this is not the case, the errors are said to be heteroscedastic (White, 1980). This behaviour is reflected in the residual values estimated from a fitted model (White, 1980). Heteroskedasticity can be detected

graphically and non -graphically. In this chapter, the **Breusch-Pagan / Cook-Weisberg test**, a non-graphical way to detect heteroscedasticity, will be run. The null hypothesis is that residuals are homogeneous. According to Williams (2015), although the ordinary least square estimator delivers unbiased and consistent coefficient estimates under heteroscedasticity, the estimator will be biased for standard errors, leading to biased inference. In order to allow the fitting of a model that does not contain heteroscedastic residuals, heteroscedasticity-consistent standard errors are used (White, 1980). Torres-Reyna (2007) states that dealing with the problem of heteroskedasticity could be either by using heteroskedasticity-robust standard errors or using weighted least squares. This chapter will use the former solution if the null hypothesis is rejected, concluding that residuals are not homoskedastic.

Another basic assumption in the regression analysis is that one independent variable should not be a linear function of another (Torres-Reyna, 2007); independent variables are not perfectly multi-colinear. For example, variables such as age and experience are not entirely independent of each other and are impossible to conclusively separate from each other. As age increases, the experience will often also increase. This problem is known as multicollinearity, which may lead to inflation in the standard error (Torres-Reyna, 2007). Variance Inflation Factor (VIF) will be used to test for multicollinearity, bearing in mind that VIF >10 is trouble (see Torres-Reyna (2007)).

Another assumption is that the outlined OLS model, based on a sample size of the Palestinian construction workers in the West Bank, is conditional on exogenous independent factors. The exogeneity condition supposes that the error term, which accounts for other unobserved independent factors impacting productivity, can not be predicted from the variables used to build the model. However, all variables used to build the model or considered in the error term are logically connected since they are combined under the same economic system: construction labour productivity. Thus, the exogeneity condition might be violated. The exogeneity condition for the OLS regression model might not exist because of omitted variables, simultaneous causality, or error in measurements in the model.

The statistical analysis depends on the common validity of assumptions and is valid only when the variables used are entirely independent of each other, a test that many multivariate analyses fail to meet (Carabelli & Cedrini, 2014; Lawson, 2012). For

example, age is potentially endogenous. Building the cause-effect relationship between age and productivity is challenging since important control variables such as physical strength, technology, and other firm-level factors are not included in this regression. Accordingly, the coefficient associated with age does not reflect the effect of age only but the effect of other factors such as physical strength and technology. Therefore, omitted variable bias could occur since the coefficient shows the effect of change of the regressor and the value of the confounding variable.

Whilst it is possible to address endogeneity via more complex estimation techniques (such as instrumental variable regression or panel data regression), the data used in this analysis is limited in its ability to convincingly estimate such complex models. Consequently, some of the results, which will be interpreted with some caution, will be positively and negatively biased. Thus, while interpreting potential endogenous variables in the results, the other unobserved effects and measurement errors are considered. Furthermore, coefficients of the independent variables are held to constitute a suggestive association between productivity and these independent variables instead of demonstrating that they are causally related. Nevertheless, the analysis presented will offer new and essential insight into the factors impacting on productivity in the construction sector in the West Bank. Furthermore, even with a potentially weaker causal interpretation, it can be argued that the novelty of the data, model and context contribute to the related literature.

7.6.2 Baseline model and non-linear relationships

As the thesis aims to unpack the factors influencing building construction workers, the baseline regression will exclude employees from the West Bank working in the civil engineering subsector. The baseline model, which investigates the impact of the predetermined factors on construction labour productivity working in building subsectors in the West Bank, is built based on equation 7.2. Age, experience and education are often squared and added as polynomial order 2. Accordingly, different non-linear relationships, particularly for age, experience and education factors, are carried out on the data set used to build the baseline model. Equation 7.3 is used to test the following two hypotheses:

i. Up to a certain point, the productivity of construction workers grows with age and subsequently drops.

ii. Regardless of the education type, construction labour productivity increases with years of schooling until a certain point; then, it decreases.

iii. Construction labour productivity rises with experience up to a certain point, after which it declines.

$$Log\ Construction\ Labour\ Productivity = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta12 * (Age)^2 + \beta3 * (Experience) + \beta14 * (Experience)^2 + \beta4 * (Education) + \beta13 * (Education)^2 + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.3)}$$

7.6.3 Subsamples

The Kernal distribution graph for the dependent variable, depicted in **Figure 7. 7**, and the results of the T-test, depicted in **Table 7. 5**, support the idea of splitting the data by workplace. Another linear regression analysis is performed for the working group in the West Bank to explore the factors affecting their productivity. Furthermore, Chapter 6 reveals that three main governorates are used as case studies to investigate and compare construction labour productivity factors in these selected cities. Thus, a regression analysis is run for the north West Bank governorates, followed by two more for the central and southern West Bank governorates. Finally, three regression analyses are run concerning the three selected governorates (See the set of equations below).

$$Log\ Construction\ Labour\ Productivity_{WB} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.4)}$$

$$Log\ Construction\ Labour\ Productivity_{NWBG} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.5)}$$

$$Log\ Construction\ Labour\ Productivity_{MWBG} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.6)}$$

$$Log\ Construction\ Labour\ Productivity_{SWBG} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.7)}$$

$$Log\ Construction\ Labour\ Productivity_{Nablus\ NG} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.8)}$$

$$Log\ Construction\ Labour\ Productivity_{Ramallah\ MG} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.9)}$$

$$Log\ Construction\ Labour\ Productivity_{Bethlehem\ SG} = \alpha + \beta1 * (Skills) + \beta2 * (Age) + \beta3 * (Experience) + \beta4 * (Education) + \beta5 * (Legal\ status) + \beta6 * (Work\ conditions) + \beta7 * (Job\ satisfaction) + \beta8 * (Israeli\ Policies) + \beta9 * (Mobility\ IS) + \beta10 * (Firm\ size) + \beta11 * (year) + \varepsilon \quad \text{Eq (7.10)}$$

Where:

- WB = the West Bank
- NWBG = the North West Bank Governorates
- MWBG = the Middle West Bank Governorates
- SWBG = the South West Bank Governorates

The following section interprets the findings of these regression analyses, covering the descriptive statistics for the dependent and independent variables.

7.7 Data analysis and discussion

7.7.1 Descriptive Statistics

The sample size is 29,600, including unemployed people and those outside the labour force. Dropping these two categories from the analysis has reduced the sample size to 21,693. Moreover, 23% of the sample size, which comprises self-employed and employers, is eliminated and excluded from the analysis, resulting in a sample size of approximately 16,700. The analysis only covers waged West Bank construction workers working in the building subsectors. Nevertheless, within the category of full employment and underemployment in these two subsectors, one of the waged employees has erroneously

answered that his/her daily wage is zero and thus is excluded from the analysis. Therefore, the sample size for all variables, such as age, education and dummy variables, approaches 16,352 (**Table 7. 7** & **Table 7. 8**, which show the descriptive statistics of the dependent and independent variables of the model. While **Table 7. 7** shows the descriptive statistics of the three continuous variables and variables used to calculate hourly labour productivity, **Table 7. 8** shows the descriptive statistics of the dummy and categorical variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
Log Productivity	16352	3.321	0.637	-3.393	6.955
Hourly Productivity	16352	33.53	23.807	0.034	1048.851
Weekly Hours (Hours)	16352	42.532	8.418	1	98
Daily Wage (NIS)	16352	192.394	114.344	0.192	5000
Age (Years)	16352	34.116	11.643	12	72
Experience (Months)	16352	100.678	108.302	0	584
Education (Years)	16352	10.05	2.871	0	22

Table 7. 7: Descriptive Statistics of the Productivity, daily wage, weekly hours and the three continuous independent variables used in the analysis

The descriptive statistics for the transformed dependent variable and ***Figure 7. 8*** show that the distribution of the features of the variable transformed to a more normally-shaped bell curve. Consequently, the fit of the model is improved. A summary of the experience variable reveals a mean of around 100 months (8 years) and a standard deviation of around 108 months (9 years). The detailed summary shows that 25 % of the workers have less than 1.5 years of experience and 50% have less than five years of experience. Accordingly, it is expected that the conditions to enter the construction market in the West Bank are not difficult and does not require high experience. The experience variable has a maximum value of 584 months (almost 48 years). **Table 7. 7** shows that the average education variable is about ten years and is expected in this sector, of which construction workers are one of the most important assets.

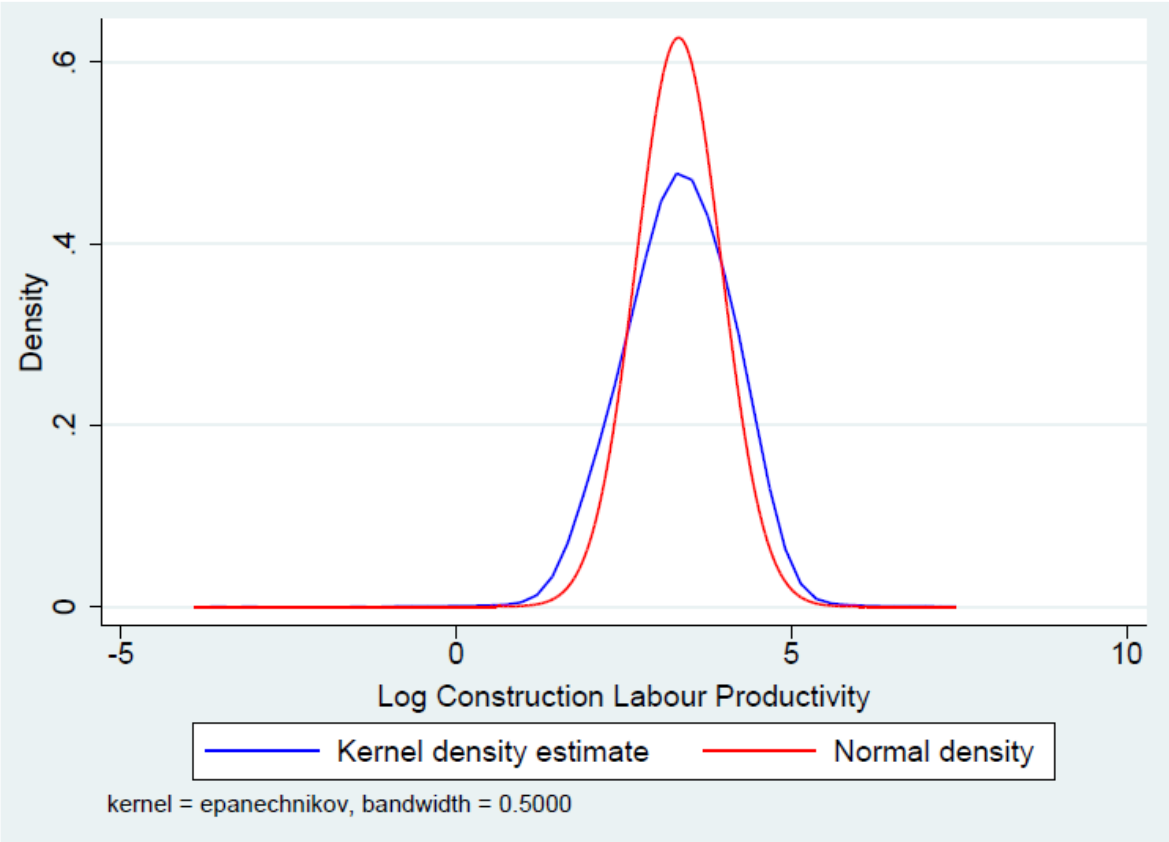


Figure 7. 8: Kernel Density Estimation for the Dependent Variable

Variable	Obs	Mean	Std. Dev.	Min	Max
Skills	16352	0.073	0.261	0	1
Legal Status	16352	0.245	0.430	0	1
Work condition	16352	0.094	0.292	0	1
Israeli policies	16352	0.032	0.176	0	1
Job satisfaction	16352	0.903	0.296	0	1
Mobility IS	16352	0.597	0.490	0	1

Table 7. 8: Descriptive Statistics of the Dummy independent variables used in the regression analysis

Table 7. 8 demonstrates that most West Bank construction working in building subsectors (92.7%) did not attend any formal training course. Data shows that only 24.54% of workers have signed contracts, less than 8% of them have health insurance and get paid even when they are on sick leave and vacation, and only 4 % of the workers have both contract and job security. Although the statistics show that most construction workers are unsecured, more than 90.28% of the workers indicate that they are satisfied with their jobs and do not want to change them. The data indicate that Israeli policies affect less than 4%

of the West Bank workforce. Nevertheless, the data shows that almost 60% of the Palestinian construction workers in the West Bank commute to Israel to work in its construction markets. ***Figure 7. 9*** depicts that more than 55% of the construction firms working in the construction of buildings and Specialised construction activities subsectors are micro-enterprises. Yet, less than 28% of the construction firm working in the Israeli construction market is micro-companies. Such vast numbers of micro-firms in the West Bank could hinder the companies' ability to train and develop their workers and demonstrate the West bank construction market's high and rigid trade divisions.

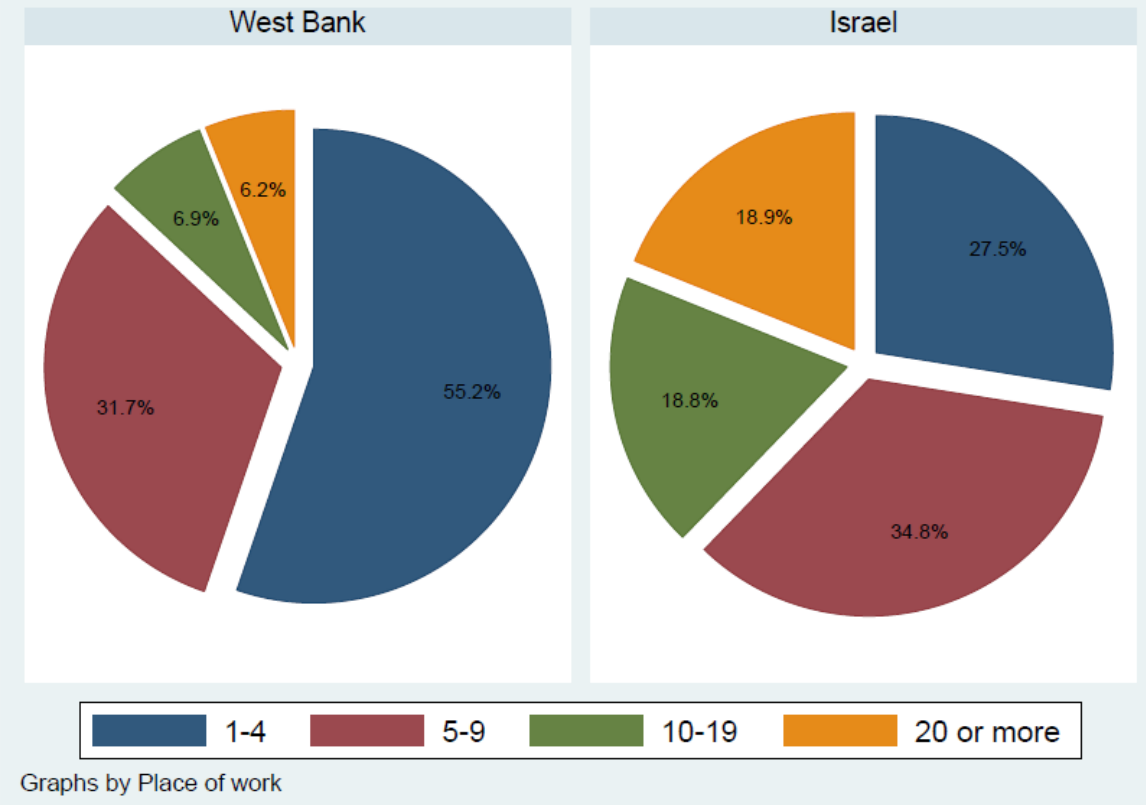


Figure 7. 9: Construction Firm Size by Place of Work

Correlation Matrix and VIF

Table 7. 9 displays the Pairwise correlations matrix for the variables. As demonstrated in **Table 7. 9**, age and experience variables are correlated with one another (0.667). Furthermore, labour mobility from the West Bank to the Israeli market is the highest correlated value of 0.688 with the dependent variable in the model. Such values are not too high to have a multicollinearity problem in a regression model. Nonetheless, the

Variable inflation factor (VIF), which determines the strength of correlation between the independent variables, is calculated to check for multicollinearity post running the regression. Two regression models were run, one containing two independent variables, i.e. age and experience, and the other without the experience variable. There was no statistically significant difference between the two regressions; thus, both were retained in the explanatory model. The subsequent section presents the baseline results and different scenarios results.

Heteroscedasticity problems

Regression analysis was run without controlling for heteroskedasticity, i.e. assuming that variance in the residuals is homoskedastic. Then the Breusch-Pagan/Cook-Weisberg test was carried out to detect heteroskedasticity. The test result shows that the null hypothesis of constant variance in the regression model is rejected, and thus there is evidence of heteroscedasticity in the model. Accordingly, in all regression models that run, heteroskedasticity-robust standard errors deal with heteroscedasticity problems.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) log Con. Productivity	1.000										
(2) Skills	0.041	1.000									
	(0.000)										
(3) Age	0.351	0.006	1.000								
	(0.000)	(0.292)									
(4) Experience	0.274	-0.015	0.667	1.000							
	(0.000)	(0.044)	(0.000)								
(5) Education	-0.019	0.050	-0.183	-0.187	1.000						
	(0.015)	(0.000)	(0.000)	(0.000)							
(6) Legal status	0.011	0.005	-0.029	-0.004	0.043	1.000					
	(0.169)	(0.362)	(0.000)	(0.635)	(0.000)						
(7) Work condition	0.160	-0.009	0.074	0.082	0.062	0.284	1.000				
	(0.000)	(0.108)	(0.000)	(0.000)	(0.000)	(0.000)					
(8) Job satisfaction	0.058	-0.003	0.079	0.056	-0.008	0.183	0.158	1.000			
	(0.000)	(0.603)	(0.000)	(0.000)	(0.149)	(0.000)	(0.000)				
(9) Israeli policies	0.156	0.005	0.042	0.038	-0.002	0.027	0.043	0.097	1.000		
	(0.000)	(0.418)	(0.000)	(0.000)	(0.718)	(0.000)	(0.000)	(0.000)			
(10) Mobility to IS	0.688	0.002	0.149	0.143	-0.027	0.036	0.141	0.095	0.145	1.000	
	(0.000)	(0.695)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
(11) Firm size	0.242	0.000	0.062	0.075	0.043	0.277	0.282	0.042	0.085	0.342	1.000
	(0.000)	(0.971)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Table 7. 9: Matrix of Pairwise correlations for the dependent and independent variables

7.7.2 Baseline Regression Results

To verify how adding the independent variables to a regression might improve the model's fit, the independent variables are introduced into the model in four stages. At each stage, independent factors with common characteristics, such as experience and skills, are added to the model as one group (***Table 7. 10***). ***Table 7. 10*** shows that R-squared, a measure of fit that ranges between zero and one, is increased, and Root MSE decreases as a new independent variable is introduced to the model. R-squared is increased from 0.065 to 0.539, which is quite good. Accordingly, the fourth column in the trigonometric table is the baseline regression results that include all independent factors (***Table 7. 10***). The explanatory analysis, which follows the ordinary least square (OLS) estimation method, is run to investigate the impact of the predetermined factors on construction labour productivity in the West Bank, excluding workers in the civil engineering subsector.

The trigonometric table shows the effect of using the short and long models on the coefficients associated with each variable. The first variable entered into the model was the firm size. The coefficients associated decrease from first towards fourth regressions, implying that using this variable only could not justify the causal effect between productivity and firm size. By entering the worker characteristics variables in the second regression, the coefficients of firm size, which remain significant, decreased. The decrease in the firm size coefficients by entering more independent variables implies that the coefficients in the first regression show the effect of change in the firm size and other confounding variables, such as skills, education and age. The effect of experience was tiny in the second regression. The small value of the experience coefficient might reflect that one of the variables in the model, possibly age, has shifted the regression into its direction, which is to scale down the experience's causal effect. As shown in ***Table 7. 10***, as the age coefficient decreased, the coefficient associated with experience increased while moving from the short to extended model.

In the third regression, the working conditions for construction workers were added to the model. The new variables entered are job satisfaction, legal status and job security. Entering these factors has not impacted the coefficients of experience and age factors. Yet, it has slightly decreased education coefficients and firm size factors. The coefficient of job satisfaction was positive and insignificant in this model.

	(1)	(2)	(3)	(4)
	Log y^A	Log y^A	Log y^A	Log y^A
2. Firm size	0.219***	0.176***	0.168***	0.032***
	(0.012)	(0.011)	(0.011)	(0.008)
3. Firm size	0.412***	0.354***	0.350***	0.059***
	(0.014)	(0.013)	(0.013)	(0.011)
4. Firm size	0.409***	0.321***	0.300***	0.028*
	(0.014)	(0.013)	(0.014)	(0.012)
1. Skills		0.095***	0.101***	0.050***
		(0.018)	(0.018)	(0.014)
Age		0.015***	0.015***	0.007***
		(0.001)	(0.001)	(0.000)
Experience		0.000***	0.000***	0.001***
		(0.000)	(0.000)	(0.000)
Education		0.010***	0.009***	0.006***
		(0.002)	(0.002)	(0.001)
1.Legal Status			-0.076***	-0.024**
			(0.010)	(0.008)
1.Working conditions			0.186***	0.084***
			(0.013)	(0.012)
1.Job satisfaction			0.027	-0.130***
			(0.016)	(0.014)
1.Israeli policies				0.157***
				(0.017)
1. Mobility IS				0.820***
				(0.008)
2015.year				-0.028*
				(0.013)
2016.year				0.057***
				(0.013)
2017.year				0.078***
				(0.013)
2018.year				0.156***
				(0.013)
2019.year				0.199***
				(0.013)
_cons	3.135***	2.490***	2.502***	2.479***
	(0.008)	(0.025)	(0.030)	(0.025)
R^2	0.068	0.178	0.186	0.543
N	16352.000	16352.000	16352.000	16352.000

Standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001"

Y^A stands for construction labour productivity

Table 7. 10: Results of iterations of regression analysis for predetermined factors on the productivity of construction workers except for the civil engineering sub-sector

However, the legal status coefficient was significant and negative, implying that having a signed contract decreases the construction worker's productivity. The negative sign of the legal status coefficient will be interpreted later in this section. The fourth regression shows the entire independent variables used in this model. Israeli policies, mobility to the Israeli construction markets, and year fixed effect variables were added to the model, reflecting the context and the inflation effect of wages. As these factors entered into the regression, the coefficients of firm size dramatically decreased. Additionally, the coefficients of age and skills factor were halved.

In contrast, the coefficient of the experience factor was increased in magnitude. While the coefficient of education was slightly decreased, legal status and working conditions coefficients have dramatically decreased. Only one variable's coefficient, the coefficient of job satisfaction, has changed in magnitude and sign. In the fourth regression, the effect of attenuation bias between different variables, such as age and experience, might be decreased. Furthermore, the fourth regression shows the impact of Israeli policies and worker mobility from the West Bank to the Israeli construction markets on the coefficients of other independent variables utilised in this explanatory model. The baseline regression results, the nearest ones to the long model, are interpreted in the following paragraphs.

7.7.3 Checking for Multicollinearity

As demonstrated in **Table 7. 9**, the correlation between age and experience variables might indicate a multicollinearity problem. Thus, multicollinearity was detected with the help of the variance inflation factor (VIF) before running the interactions between these two variables and before interpreting the results of the baseline model and its modifications and sub-samples. Since the Value of VIF is less than 4, and simultaneously the value of tolerance is more than 0.2, multicollinearity is not problematic (***Table 7. 11***). Furthermore, another regression is run without the experience variable. The results do not significantly differ from the baseline ones (***Table A7. 1***).

	VIF	1/VIF
1. Skills	1.072	.933
Age	1.924	.52
Experience	1.835	.545
Education	1.063	.941
1. Legal status	1.28	.781
1. Work condition	1.139	.878
1. Job satisfaction	1.056	.947
1. Israeli policies	1.031	.97
1. Mobility IS	1.227	.815
2. Firm size	1.302	.768
3. Firm size	1.305	.766
4. Firm size	1.422	.703
2015. year	1.702	.587
2016. year	1.735	.576
2017. year	1.77	.565
2018. year	1.737	.576
2019. year	1.774	.564
Mean VIF	1.434	.

Table 7. 11: Variance inflation factor for the Model

7.7.4 Interpretation of the results for the Baseline

The F-stat p-value of 0.000 indicates that the baseline model predicts meaningful results. The R-squared of this model, .as shown in ***Table 7. 10***, is 0.543. ***Table 7. 10*** demonstrates that the p-value for each of the preset factors is less than 0.01, with the exception of the year dummy 2015 and firm size category four variables, for which the p-value is less than 0.05. Accordingly, all of the factors are statistically significant. The negative sign associated with some factors, such as legal status and job satisfaction, represents the negative impact on construction labour productivity.

- **Skills or qualification factor**

The regression result is in line with previous literature concerning the impact of skills on construction labour productivity. The regression results show that the more skills a worker have, the higher his/her productivity. The change in skills results in a 5% gain in construction labour productivity; that is, the transition from unskilled to skilled labour has a positive effect on construction labour productivity in the West Bank. This research suggests that the amount of general human capital possessed by West Bank construction workers is mirrored in their ability to perform a skilled task. Moreover, it shows that a worker with a qualification degree is at least 5% more productive than a worker who does not have the qualification required to carry out the task. The result is

in line with Brookes et al. (2018), who found that labour productivity strongly correlates with employee cost. According to them, workers with higher skill levels, either through qualifications or experience, earn higher wages due to their greater productivity.

- **Age factor**

Results from ***Table 7. 10*** show that the effect of age on productivity is statistically significant and positive. A 1-unit change in age leads to a 0.7% increase in productivity, as measured by hourly wages. Therefore, a construction worker aged forty would be 14 per cent more productive than a worker aged twenty. This result is in line with related literature and findings by Altonji & Williams (2005), Brown (1989) and Topel (1991), and suggests that older workers have superior skills to those of younger workers, leading to an accumulation of human capital that boosts the innate productivity of individuals. The coefficient estimated is higher compared to other studies, such as Serneels (2005), who finds that the effect of age on productivity is positive and concave. Furthermore, he finds that one additional year increases relative productivity with 0.0002 standard deviations for women and 0.0006 standard deviations for men and that the peak levels of productivity are attained at age 41 for women and 49 for men before declining thereafter. Overall, our results suggest that individuals of higher age are more likely to be more productive.

Nevertheless, The hypotheses and previous literature, such as Dostie (2011), Johnson & Andorka (1993), Serneels (2005) and Skirbekk (2004), state that workers' productivity will eventually decline with age. Consequently, the location of the turning point of the age-productivity profile, which is currently unknown, also requires the addition of a second-degree polynomial to test for non-linear effects of age. The nonlinearity of age effects on construction labour productivity will be examined in the next section.

- **Experience**

Results from ***Table 7. 10*** show that the effect of experience on productivity is statistically significant and positive. A 1-unit change in experience in months leads to a 0.06% increase in productivity, as measured by hourly wages. Therefore, a construction worker with 15 years of experience would be 7 % more productive than a

worker with five years of experience. The results indicate that workers' experience is crucial for boosting West Bank construction labour productivity. This conclusion is consistent with previous research and findings by McDaniel et al. (1988), McEnrue (1988), Quinones et al. (1995), Serneels (2005) and Tesluk & Jacobs (1998) and suggests that with more experience, parts of human skills are created that in turn increases innate productivity of individuals. For instance, Blakemore and Hoffman (1989) conducted a time-series analysis to examine the correlation between productivity and tenure in the U.S. manufacturing industry. The results of their research show a strong, positive association between changes in job tenure and changes in productivity. Moreover, Serneels (2005) concludes that tenure positively influences employee productivity.

Even though the results shown in ***Table 7. 10*** suggest that individuals with higher experience are more likely to be more productive, other studies carried out by Altonji & Williams (2005), Brown (1989) and Topel (1991) find that experience of workers has a positive, sometimes concave effect. Moreover, the potential experience, calculated as age minus education years, and the hypotheses in section 6.4.2 suggest a curvilinear relationship between experience and productivity. Thus adding a second-degree polynomial to test for non-linear effects of experience on labour productivity is required. The following section will examine the nonlinearity of experience's effects on construction labour productivity.

- **Education**

The results, which align with previous literature, show that the more educated a worker, the higher his/her productivity. Such a finding indicates the importance of education in enhancing construction labour productivity in the West Bank. Results from ***Table 7. 10*** show that the effect of education on productivity is statistically significant and positive. A 1-unit change in education leads to a 0.6% increase in productivity, as measured by hourly wages. Therefore somebody with 15 years of education would have 6% increased productivity than somebody with five years. This result is in line with related literature and findings by Becker (1993), Gruenberg (2019), Haegeland & Klette (1999), Javed et al. (2018), Kampelmann & Rycx (2012), Kim et al. (2016), Mahy et al. (2015), National Research Council (2009), Ruddock and

Ruddock (2009), Serneels (2005) and Van Biesebroeck (2011). It suggests that education leads to an accumulation of human capital that, in turn, increases individuals' innate productivity. For instance, Haegeland & Klette (1999), who use Norwegian data to study whether the wage premiums for both gender and education are in line with productivity premiums, find that education increases productivity and wage. Furthermore, they find that highly educated workers are roughly paid based on their productivity. Van Biesebroeck (2003), who used data from developing countries, finds similar results for the effect of education on productivity and wage in Ghana and Zimbabwe. Kampelmann and Rycx (2012), who used detailed Belgian that linked employer-employee panel data for 1999– 2010, found that over- (under) education has a significantly positive (negative) impact on firm productivity.

Furthermore, the coefficient estimated is higher compared to other studies by Mahy et al. (2015) and Serneels (2005). For example, Serneels (2005) finds that, on the one hand, one additional year of education, representing general human capital, increases female wages by 7% and 2% for males. On the other hand, the quality and subject of education have no effect. Moreover, Mahy et al. (2015) find that economic uncertainty increases the detrimental effect of undereducation on productivity. According to their research, an additional year of education required significantly positively influences productivity, which is estimated to increase by 1.3% on average when one lagged year of education required in a firm rises by one year. It has been found that a one-year increase in average years of education required leads to a 3.1% increase in the productivity of a firm operating in uncertain economic conditions, compared to a 2.4% increase in productivity if the firm operates in less uncertain economic conditions. Furthermore, if the over-education increases by one year, then the following year, firm productivity increases by 4% for firms operating under uncertain economic conditions and by 2.2% for those working under less uncertainty (Mahy, et al., 2015). Finally, Mahy et al. (2015) find that an additional year of under-education reduces productivity by 1.2% if the firm operates in an uncertain economic environment, compared to a decrease of 0.9% if the firm operates in a lesser uncertain economic environment, confirming that under-education only harms firm productivity in an uncertain economic environment.

Overall then, the results of this research are consistent with human capital theory, which argues that under-(over-)education decreases (increases) workers' productivity and with other researchers' results (see, for example, Dolton & Silles (2008), Duncan & Hoffman (1981), McGuinness and Sloane (2011), Sicherman (1991), Sloane et al. (1999) and Van der Meer (2006)). Similarly to Mahy et al. (2015), our findings suggest that individuals in higher education are more flexible and adaptive and thus more likely to be more productive in uncertain economic and political conditions. Nevertheless, The hypotheses claim that the relationship between years of schooling and labour productivity is non-linear, and thus, there is a need to add a second-degree polynomial to test for non-linear effects of age. The nonlinearity of education effects on construction labour productivity will be tested in the next section.

- **Legal status**

Results for legal status suggest that workers with a written contract are more likely to be less productive. The results show that construction workers who have signed a written contract, either a permanent or a fixed-term contract, or are included in a collective labour agreement are less productive by about 2.4% compared to others who have not signed a contract or have a verbal labour agreement. These results are similar to findings by Bjuggren (2018), Hopenhayn & Rogerson (1993), Lazear (1990), Mortensen & Pissarides (1994), OECD (2007), Okudaira et al. (2013) and Saint-Paul (1997). However, the mechanism behind these results may be bi-directional. For example, legal status's negative impact could be attributed to the deductions for tax, pension and insurance payments (Nathanson, 2017); Palestinian workers who have a contract or work permit receive their gross and net wages after deducting taxes and contributions. Another explanation could relate to the Taylorist differential piece-rate system. The payment will be based on output, but the employee may pay liquidated damages, which is the amount of money agreed upon by the parties upon signing the contract that the owner will deduct from the contractor if he fails to complete his obligation, that is if there is a time overrun. A third possible interpretation might be that the workers have to work long hours to finish on time. On the other hand, it might be related to the idea that employment protection decisions increase dismissal costs, influencing hiring decisions and preventing companies from freely adjusting hiring according to demand, thus harming productivity (Bjuggren, 2018; Hopenhayn &

Rogerson, 1993; Lazear, 1990; Mortensen & Pissarides, 1994; Saint-Paul, 1997). Therefore, the mechanism of these results is open to debate.

- **Mobility to Israeli Construction Markets**

Results for mobility to the Israeli construction markets, as shown in ***Table 7. 10***, suggest that workers who work for Israeli construction firms are more likely to be productive. The results show that construction workers working in the Israeli construction markets are approximately 127% more productive than those employed in the Palestinian construction market in the West Bank. These results are similar to the findings by Jayachandran (2006) and Van Biesebroeck (2014). The results represent that workers in Israeli markets earn more than those working in the West Bank. However, other factors, such as the technological factor, domestic demand (Downes, et al., 1990) and political instability (see Chapter 3), besides the real wage, could also explain the positive influence of labour mobility from the West Bank to Israel on productivity performance. Accordingly, the mechanism of these results is open to debate.

- **Job satisfaction**

Results from ***Table 7. 10*** show that the effect of job satisfaction on productivity is statistically significant and negative. The results indicate that Palestinian construction workers who do not want to change their jobs are 12% less productive than others who are dissatisfied with their jobs. These results are dissimilar to findings by Clarke (2006), Fabricant (1981), Hamouda & Abu-Shaaban (2014), Javed et al. (2018), Maloney (1983) and the National Research Council (2009). Therefore the job satisfaction factor is inconsistent with previous literature. Nevertheless, The waged employees, who are satisfied, might not find a job in other sectors because of the high unemployment rate in the West Bank or might earn less in other sectors if they leave the construction market. Moreover, the dissatisfied workers might have higher education levels but work in the construction industry that can absorb these workers in the West Bank (see, for instance, (ILO, 2018b; ILO, 2018a)). Consequently, the mechanism underlying these outcomes is debatable.

- **Work conditions (Job Security)**

Results from ***Table 7. 10*** show that the effect of job security on productivity is statistically significant and positive. Additionally, results suggest that workers with job security rights, particularly a) pension fund/end of services benefits, b) annual leave paid by the employer and c) sick leave payment in case of illness or injury, are approximately 9% more productive compared to other unsecured construction workers. These results are similar to findings by Clarke (2006), Fabricant (1981), Hamouda & Abu-Shaaban (2014), Javed et al. (2018), Maloney (1983) and the National Research Council (2009). The coefficient estimated can not be compared to other studies, such as Clarke (2006), Fabricant (1981), Hamouda & Abu-Shaaban (2014), Javed et al. (2018), Maloney (1983) and the National Research Council (2009), since most of these studies are either based on cross-sectional survey or qualitative data. However, the coefficient associated with this factor is consistent with the findings of the previous studies. Overall, our results show that individuals working under secured conditions, such as sick leaves and pension funds, are more likely to have higher productivity, as measured by hourly wages.

- **Israeli Policies**

Results for ***Table 7. 10*** show that the effect of Israeli policies on productivity is statistically significant and positive. Additionally, results suggest that the closure of checkpoints between Israel and the West Bank and strikes due to Israeli occupation actions in the OPT, particularly in the West Bank, known as Israeli policies in this chapter, increase worker productivity, as measured by hourly wages, approximately 17%. One possible interpretation of these results is that during the closure, Palestinian construction workers working in the Israeli market will work locally and improve productivity by applying and transferring the experience gained from Israeli construction markets, which are more advanced. Furthermore, the strikes in the West Bank are always commercial ones and affect people working in the formal sector, such as the teaching and service sectors. As some of the workers in formal sectors work in the construction sector on a part-time basis, their productivity increases if there is a strike. Another possible explanation is that Palestinian construction workers may work hard without breaks to leave early during strikes and close checkpoints, and thus their productivity will increase because they earn the same money in a shorter time.

However, the existence of different scenarios to interpret the results concludes that the mechanism of these results is open to debate.

- **Construction Firm size**

Results for firm size suggest that workers who work for larger firms are more likely to be productive. Compared to the reference category Firm size 1, workers in category 2 are 3.3% more productive, whilst workers in category 3 are 6% more productive. More productive workers in category four have a productivity increase of 2.8% compared to workers in category 1. These results suggest that working for larger firms is associated with increased productivity. These results are similar to the findings by Dainty et al. (2017), Myers (2013) and Teicholz (2013), who argue that small and medium-sized construction firms might be unable to train and improve labour and thus negatively impact productivity. Various researchers, such as Masters (1969), Serneels (2005), Strobl & Thornton (2004) and Söderbom & Teal (2001), indicate that large firms pay workers more. However, the mechanism behind these results may be bi-directional. For example, workers in larger firms may receive better and more specialised training that increases their stock of human capital, which in turn increases their productivity. Conversely, there may be an element of selection whereby larger firms are engaged in more complex construction projects requiring specialised workers hired on the open market without additional training. Therefore, the mechanism of these results is open to debate.

- **Year dummy variable**

Results for year dummies suggest that productivity increases over time. For example, compared to the base year of 2014, workers in 2019 have 19% more productivity. However, this result may not necessarily reflect innate productivity as year dummies represent general macro-economic conditions that affect all individuals in the sample. Thus, the results are likely driven by general wage and inflationary pressures and not a general learning/skill increase element. However, introducing these variables as controls serves the important purpose of removing such macroeconomics conditions from our other results, thereby better-interpreting productivity for other variables.

7.7.5 Special modelling changes

This section considers and interprets the non-linear effects of continuous independent variables on construction labour productivity. Non-linear regression checks if there is a non-linear relationship between the square of age and age, the square of experience and experience, the square of education and education on the one hand, and productivity on the other. Accordingly, a non-linear regression was run between these model parameters. The outcomes of this model are displayed in Appendicies of Chapter 7. Eq. 6.11 illustrates the quadratic relationship between productivity and all continuous independent variables to the model introduced with full factorial interaction. The coefficients of the variable education are omitted from the equation since they are insignificant (Results from ***Table A7. 2***), implying that the relationship between log productivity and education is linear. Results from ***Table A7. 2*** show that R-squared jumped to 0.551, and the age and experience terms are statistically significant, indicating that the model has improved.

$$\text{Log Construction Labour Productivity} = c + 0.0319 * (\text{Age}) + -0.000342 * (\text{Age})^2 + 0.000945 * (\text{Experience}) + -8.92e-07 * (\text{Experience})^2 + \text{other variables} \quad \text{Eq. 7.11}$$

- **The nonlinearity of the age variable**

  Results from ***Table A7. 2*** show that the effects of the workforce age structure on productivity are statistically significant, positive and concave since, at some point, the squared effect will overtake the linear effect. The results support the hypothesis that the relationship between age and productivity is non-linear. The maximum age (inflexion point) linked to the highest productivity could be calculated using Eq 7.11. Furthermore, the margins command in Stata helps to visualise this relationship, as shown in ***Figure 7. 10***, indicating a concave relationship between log productivity and age. Eq (7.11) and ***Figure 7. 10*** show that the productivity of construction workers increases over time until it reaches the highest productivity at 49 years and then diminishes. The results are in line with related literature and findings by Dostie (2011), Johnson & Andorka (1993), Serneels (2005) and Skirbekk (2004). For example, Johnson & Andorka (1993) state that average labour productivity declines after some age between 40 and 50. According to Skirbekk (2004), job performance decreases after age 50, particularly for jobs where problem-solving, learning, and speed are essential. Dostie (2011), who investigates the effects of the workforce age structure on the productivity and wages of the workers, finds that the age group between 35 and 55

years has the highest productivity and wage. Overall, the results Results from ***Table A7. 2***, similar to the previous literature, conclude that middle-aged workers earn more than young adults and older and are more productive. Nevertheless, the turning point of the age-productivity profile might be shifted up or down depending on the physical efforts and equipment used.

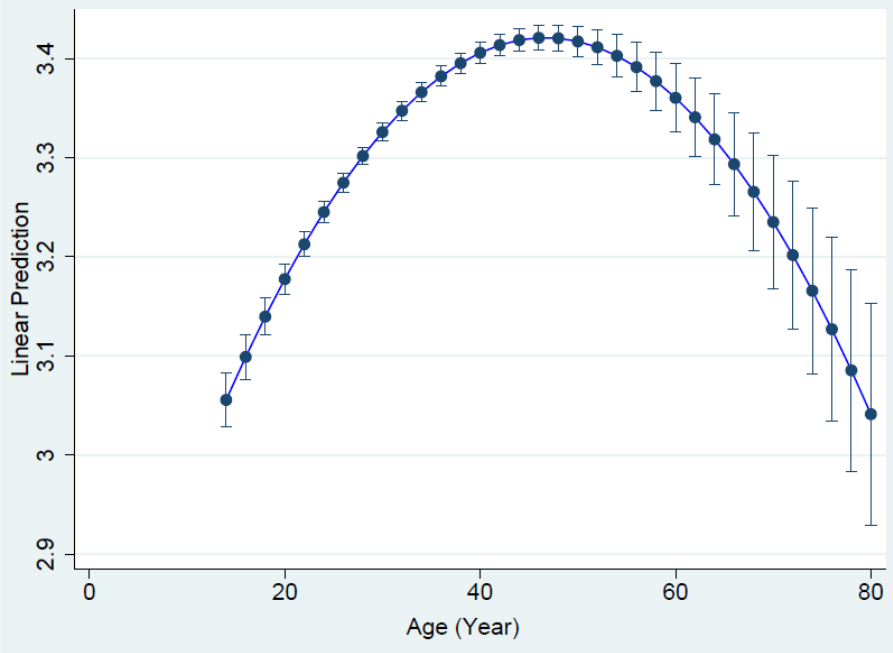


Figure 7. 10: The Change of log Construction Labour productivity with labour force age with 95% CIs

- **The nonlinearity of the experience variable**

Results from ***Table A7. 2*** show that the effects of the workforce experience on productivity are statistically significant, positive and concave since, at some point, the squared effect will overtake the linear effect. Thus, the results support the hypothesis that the relationship between tenure period and productivity is non-linear. Furthermore, the margins command in Stata helps to visualise this relationship, as shown in **Figure 7. 11**, which indicates that the relationship between experience and log productivity, as measured by hourly wages, is curvilinear, reaching a peak after some years and then declining. Eq (7.11) and **Figure 7. 11** demonstrate that the productivity of construction workers increases as the experience period increases. It reaches the highest productivity at an experience period of almost 500 months (41 years) and then diminishes. The findings are consistent with the relevant literature and the findings of Hofmann et al.

(1992), Hunter & Hunter (1984) and Ilmakunnas & Maliranta (2005). Overall, the results in Results from ***Table A7. 2*** suggest that individuals with higher work experience are more likely to be more productive until reaching the turning point of the experience-productivity profile, which may be shifted up or down based on the physical effort required and other firm-level factors, such as technology.

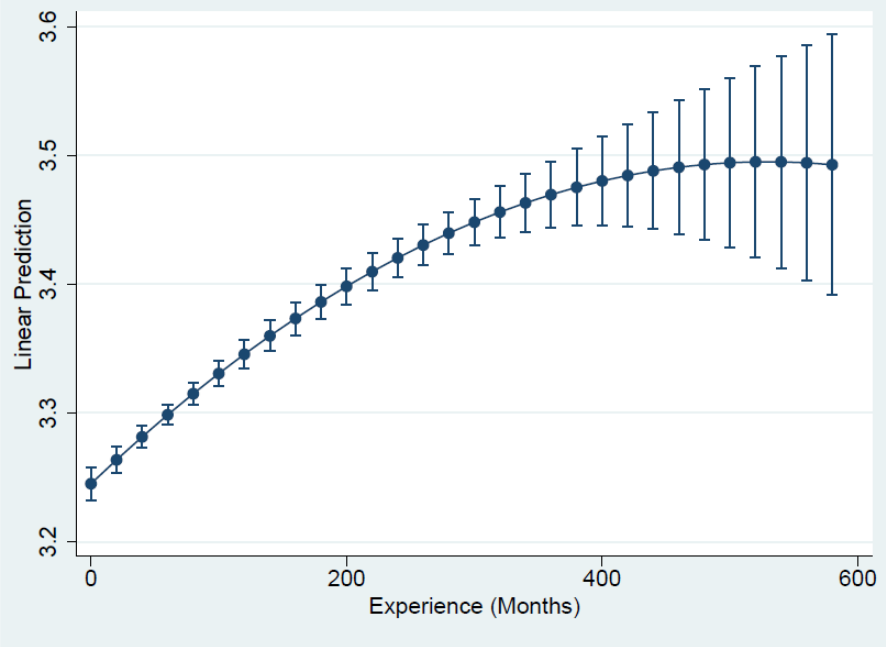


Figure 7. 11: The Change of log Construction Labour productivity with labour force experience with 95% CIs

- **Education**

A quadratic relationship between productivity and education was introduced to the model with full factorial interaction to check a non-linear relationship between the square of education, education, and log productivity (Results from ***Table A7. 2***). Contrary to the hypothesis, which presumes a non-linear relationship between years of schooling and productivity, the results from Results from ***Table A7. 2*** and ***Figure 7. 12*** display that both variables are statistically insignificant, and the relationship between years of schooling and productivity is linear.

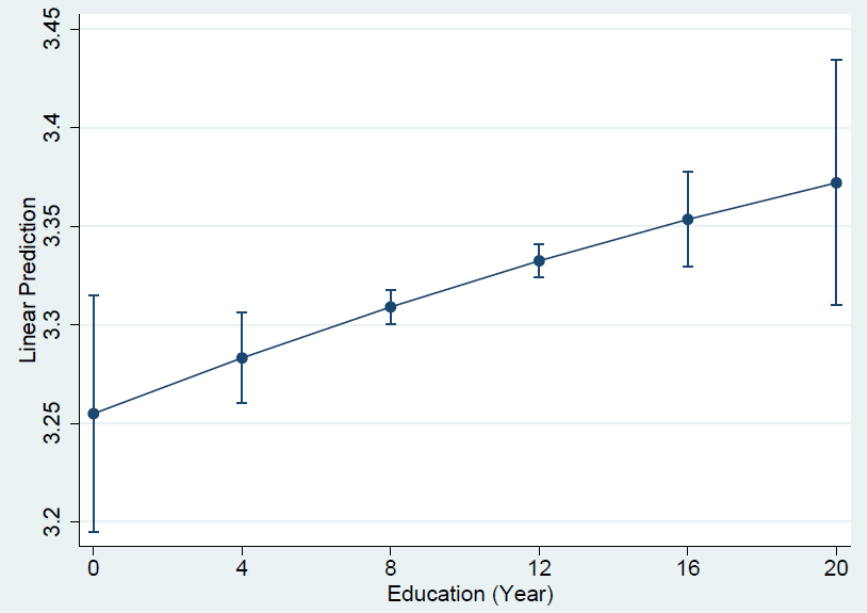


Figure 7. 12*:* The Change of log Construction Labour productivity with the year of schooling of the workforce with 95% CIs

7.8 Subsamples and different scenarios

7.8.1 Factors impacting Productivity of building workers working in the West Bank

The T-test results, presented in ***Table 7. 5***, indicate that the hourly labour productivity of workers working in the West Bank is statistically different from those working in Israeli construction markets. Thus, the results of the first subsample regression to examine the effects of the independent variables on the productivity of workers working in the West Bank estimated using OLS estimation techniques are shown in ***Table 7. 12***. Results from ***Table 7. 12*** show that **the effect of skills** on productivity is statistically insignificant and positive. This statistic may indicate that most skilled Palestinian workers work in the Israeli construction markets, which may be attractive in terms of money. Moreover, the Israeli construction markets are more advanced than the Palestinian construction market; consequently, Palestinian construction workers require more advanced skills to work in the Israeli construction markets. The effects of age, experience and education on labour productivity are statistically significant and positive. A 1-unit change in age leads to a 0.73% increase in productivity, as measured by hourly wages. Consequently, a forty-year-old construction worker would be approximately 15 % more productive than a twenty-year-old worker. A construction worker with fifteen years of experience would be approximately eight per cent more productive than one with five years. Additionally, the

results show that a 1-unit change in education leads to a 0.5% increase in productivity, as measured by hourly wages. Therefore somebody with 15 years of education would have a 5% increased productivity compared to somebody with five years.

Variables	Baseline model	Building workers in the West Bank
1. Skills	0.0500***	0.00508
	(0.0141)	(0.0250)
Age	0.00689***	0.00729***
	(0.000434)	(0.000817)
Experience	0.000612***	0.000644***
	(4.35e-05)	(8.99e-05)
Education	0.00645***	0.00547***
	(0.00127)	(0.00211)
1. Legal Status	-0.0239***	0.0979***
	(0.00837)	(0.0143)
1. Working Conditions	0.0842***	0.216***
	(0.0118)	(0.0374)
1. Job Satisfaction	-0.130***	-0.181***
	(0.0143)	(0.0194)
1. Israeli Policies	0.157***	0.532***
	(0.0171)	(0.122)
0 . Mobility to IS	0.820***	-
	(0.00805)	
2. Firm size	0.0318***	0.0538***
	(0.00815)	(0.0124)
3. Firm size	0.0594***	0.143***
	(0.0108)	(0.0250)
4. Firm size	0.0277**	0.177***
	(0.0121)	(0.0311)
2015. year	-0.0284**	-0.0943***
	(0.0128)	(0.0210)
2016. year	0.0566***	-0.0519**
	(0.0130)	(0.0220)
2017. year	0.0777***	-0.0264
	(0.0128)	(0.0212)
2018. year	0.156***	0.0631***
	(0.0126)	(0.0211)
2019. year	0.199***	0.125***
	(0.0130)	(0.0215)
Constant	2.479***	2.529***
	(0.0255)	(0.0393)
Observations	16,352	6,525
R-squared	0.543	0.167
Robust	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. 12: Results of Regression Analysis for the Baseline model and the model concerning Building workers working in the West Bank

In contrast to the baseline results, legal status results for workers working in the West Bank indicate that those with signed contracts are more likely to be more productive by about 10.3% compared to others who have not signed a contract or have a verbal labour agreement. Nonetheless, the mechanism behind these results may be bi-directional. For example, legal status's positive impact could be attributed to the Taylorist differential piece-rate system. The payment is based on output, but the employee may pay liquidated damages, which is the amount of money agreed upon by the parties upon signing the contract that the owner will deduct from the contractor if he fails to complete his obligation if there is a time overrun. Thus, the worker increases his/her productivity to avoid paying the liquidated damages.

Another explanation could be that since the payment is based on output, the workers try to increase their revenues by working longer hours. Moreover, these results might be related to the idea that the employment contract does not include a clause related to the deduction for pension and insurance costs in the West Bank. Therefore, the mechanism of these results is open to debate. Nevertheless, the effect of working conditions, job satisfaction and Israeli policies on the productivity of building labour working in the West Bank is similar to the baseline in terms of its direction and statistical significance. However, the magnitude of the coefficient associated with each of these variables is higher.

7.8.2 Labour productivity factors based on their region of residence

The results of the impact of the predetermined variables on the construction labour productivity based on the region of residence, i.e. North, South and Center, are deposited in ***Table 7. 13***. Results demonstrate that different parts of the West Bank have coefficients with varying magnitudes and, in some cases, opposite signs. Some independent variables are statistically significant for some regions and not for others. For example, ***Table 7. 13*** shows that, in the south of the West Bank, a worker with a qualification degree is over 9 per cent more productive than a worker who lacks the appropriate qualification. This result is higher than that found in the baseline results, but it cannot be compared to other locations because the coefficients associated with the skill component in the West Bank's central and northern regions are statistically insignificant. Additionally, the results show that a 1-unit change in age leads to a 0.7% increase in northern worker productivity, as measured by hourly wages. While this finding is comparable to that obtained in the

baseline, a 1-unit change in age leads to a 0.5% and 0.9% increase in productivity of building workers from the central and southern regions of the West Bank, respectively.

Variables	Baseline	North	Middle	South
1. Skills	0.0500***	0.00294	0.0131	0.0821***
	(0.0141)	(0.0192)	(0.0488)	(0.0211)
Age	0.00689***	0.00681***	0.00478***	0.00909***
	(0.000434)	(0.000604)	(0.000915)	(0.000791)
Experience	0.000612***	0.000539***	0.000538***	0.000478***
	(4.35e-05)	(6.29e-05)	(9.55e-05)	(7.40e-05)
Education	0.00645***	0.00248	0.00865***	0.0120***
	(0.00127)	(0.00189)	(0.00301)	(0.00194)
1. Legal Status	-0.0239***	0.176***	0.122***	-0.164***
	(0.00837)	(0.0413)	(0.0207)	(0.0141)
1. Working Conditions	0.0842***	0.121***	0.0894***	0.138***
	(0.0118)	(0.0157)	(0.0233)	(0.0274)
1. Job Satisfaction	-0.130***	-0.00468	-0.171**	-0.166***
	(0.0143)	(0.0223)	(0.0757)	(0.0181)
1. Israeli Policies	0.157***	0.164***	-0.0745	0.0687***
	(0.0171)	(0.0232)	(0.198)	(0.0250)
1. Mobility IS	0.820***	0.934***	0.490***	0.754***
	(0.00805)	(0.0118)	(0.0170)	(0.0154)
2. Firm Size	0.0318***	0.0236**	0.0607***	0.0171
	(0.00815)	(0.0112)	(0.0183)	(0.0162)
3. Firm Size	0.0594***	-0.0289	0.121***	0.0790***
	(0.0108)	(0.0183)	(0.0270)	(0.0181)
4. Firm Size	0.0277**	-0.0214	0.0443	0.0328*
	(0.0121)	(0.0227)	(0.0272)	(0.0197)
2015. year	-0.0284**	-0.0227	0.0524**	-0.123***
	(0.0128)	(0.0187)	(0.0248)	(0.0222)
2016. year	0.0566***	0.0406**	0.0733***	0.0435*
	(0.0130)	(0.0183)	(0.0282)	(0.0225)
2017. year	0.0777***	0.0639***	0.0735***	0.114***
	(0.0128)	(0.0176)	(0.0282)	(0.0230)
2018. year	0.156***	0.122***	0.206***	0.179***
	(0.0126)	(0.0176)	(0.0262)	(0.0229)
2019. year	0.199***	0.199***	0.259***	0.163***
	(0.0130)	(0.0181)	(0.0279)	(0.0226)
Constant	2.479***	2.349***	2.529***	2.578***
	(0.0255)	(0.0379)	(0.0826)	(0.0388)
Observations	16,352	8,049	2,967	5,336
R-squared	0.543	0.597	0.401	0.555
Robust	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. 13: Results of the regression analysis for the baseline and based on the zoning of the West Bank

Although the effect of experience on productivity is statistically significant and positive, southern workers have the lowest coefficient value compared to workers from other regions. ***Table 7. 13*** shows that education's effect on productivity is statistically significant and positive for the central and southern West Bank regions. For instance, a building worker from central or southern regions with 15 years of education will be 8.7% and 12.1% more productive than a person from the central or southern regions with only five years of school. In addition, legal status results indicate that central and northern workers with formal contracts are more likely to be more productive. The findings indicate that construction workers from the Northern region who have signed a written contract, either a permanent or a fixed-term contract, or who are included in a collective labour agreement are approximately 19 % more productive than those who have not signed a contract or have a verbal labour agreement. However, labourers from the southern district of the West Bank with written contracts are 15 % less productive on average. These findings, which differ in value and sign, need further investigation.

The effects of **working conditions and job satisfaction** on the productivity of building labour working in different regions in the West Bank are comparable to the baseline in terms of its trend and statistical significance. Similarly, the effect of Israeli policies in the northern and southern regions is similar to the baseline results in terms of their trend and statistical significance. Yet, the effect of this factor is statistically insignificant in the middle region of the West Bank. Finally, the effect of labour mobility from the West Bank to the Israeli construction markets on the productivity of building workers is statistically significant and positive, similar to the baseline analysis findings. Nevertheless, the results show that northern construction workers working in the Israeli construction markets are more productive by about 155% than other northern workers working elsewhere. The southern workers are more productive by about 113% than others from the same region. In addition, workers from the central region of the West Bank who work in Israeli construction markets are the least productive compared to workers from other regions who work in Israel. However, they are about 63% more productive than other workers from the central region who work elsewhere. The mechanism behind these results may be bi-directional. For example, workers from the central region who work in the West Bank may get better and higher daily wages than those from other regions and work elsewhere in the West Bank. On the contrary, workers from other regions but not the centre are not

commuting every day and therefore working longer hours. Therefore, the mechanism of these results is open to debate.

7.8.3 Labour productivity factors for the three selected governorates

In the final scenario, three regression models are performed for the three West Bank cities located in the north (Nablus), the middle (Ramallah), and the south (Bethlehem). The regression analysis results are displayed in ***Table 7. 14***. The skill factors are statistically insignificant in Ramallah and Bethlehem. However, the mechanism behind these results may be bi-directional. For example, a possible explanation for this variable being statistically insignificant in these two cities is that entering the labour market does not require any skill. On the other hand, another explanation could be that there is a need for skills, but skilled workers are scarce. Therefore, the mechanism of these results is open to debate.

In contrast, this variable is statistically significant (at $p<0.1$) and negative in Nablus. The results show that a change in skills leads to an 8% decrease in the productivity of construction workers. In other words, the transition from unskilled labour to skilled labour negatively affects the productivity of construction workers in Nablus. The mechanism behind these results may be bi-directional. For instance, the negative effect can be due to the quality of the training courses, i.e., qualified workers are not skilled enough to perform their jobs without close supervision from other workers with higher experience; that is, the outputs of the courses may not be sufficient and not meet the market requirements. On the other hand, another explanation could be that the number of qualified workers is higher than the number required in Nablus, and because of the distance between this city and the Green Line (Israel), these workers compete among themselves in price to get a job in Nablus. Consequently, the mechanism of these results is also open to debate.

The results indicate that the coefficient of the education variable is statistically significant and positive exclusively for Bethlehem workers. Although the mean of years of schooling in Bethlehem is only one year more than in the two case studies cities, a 1-unit change in education leads to a 1.2 % increase in productivity for workers from Bethlehem, as measured by hourly wages. Consequently, someone with 15 years of schooling would be 12 % more productive than someone with five years.

Variable	(1) Nablus	(2) Ramallah	(3) Bethlehem
1. Skills	-0.0869*	-0.0601	0.0609
	(0.0489)	(0.0522)	(0.0383)
Age	0.00915***	0.00489***	0.0126***
	(0.00147)	(0.00141)	(0.00136)
Experience	0.000423**	0.000432***	0.000297**
	(0.000177)	(0.000148)	(0.000117)
Education	0.00417	-0.000344	0.0123***
	(0.00451)	(0.00447)	(0.00360)
1. Legal status	0.163*	0.0249	-0.378***
	(0.0876)	(0.0308)	(0.132)
1. Work condition	-0.0380	0.164**	0.158***
	(0.0796)	(0.0742)	(0.0476)
1. Job satisfaction	0.00992	-0.198	-0.0526**
	(0.0486)	(0.132)	(0.0210)
1. Israeli policies	0.00941	0.219***	0.371***
	(0.0515)	(0.0430)	(0.0837)
1. Mobility IS	1.008***	0.706***	0.496***
	(0.0278)	(0.0242)	(0.0237)
2. Firm size	-0.126***	-0.0200	0.0356
	(0.0278)	(0.0271)	(0.0251)
3. Firm size	-0.136***	-0.00960	0.0389
	(0.0390)	(0.0429)	(0.0304)
4. Firm size	-0.272***	-0.00855	0.181***
	(0.0477)	(0.0416)	(0.0350)
2015. year	-0.0977**	0.0459	-0.337***
	(0.0475)	(0.0373)	(0.0416)
2016. year	-0.0213	0.127***	-0.0111
	(0.0438)	(0.0467)	(0.138)
2017. year	0.00320	0.133***	-0.0325
	(0.0444)	(0.0444)	(0.137)
2018. year	0.0697	0.165***	0.0851
	(0.0432)	(0.0399)	(0.136)
2019. year	0.115**	0.160***	0.169
	(0.0454)	(0.0414)	(0.136)
Constant	2.479***	2.677***	2.713***
	(0.0888)	(0.149)	(0.0673)
Observations	1,898	1,135	1,841
R-squared	0.530	0.512	0.453
Robust	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. 14: Regression Analysis results for the three selected Cities

The mechanism behind these results may be bi-directional. For example, one possible explanation for these results might be the type of education the workers had; that is, workers from Bethlehem are more likely to enrol in technical education than in other cities. Another possible explanation could be related to the type of work carried out in Ramallah, and Nablus does not require highly educated workers compared to Bethlehem. Finally, another explanation may be that educated workers in Bethlehem may be more likely to work in the Israeli construction markets. Accordingly, the mechanism of these findings is also open to debate.

Results for legal status suggest that workers from Bethlehem, who have a formal contract, are more likely to be less productive. The results show that construction workers who have signed a written contract, either a permanent or a fixed-term contract, or are included in a collective labour agreement are less productive by about 31.5% than others who have not signed a contract or have a verbal labour agreement. Nevertheless, the results on the legal status of Nablus workers are statistically significant at $p<0.1$ and positive. The results show that construction workers who have signed a written contract, either a permanent or a fixed-term contract, or are included in a collective labour agreement are most likely to be more productive by about 18% than those who have not signed a contract or have a verbal labour agreement. Additionally, the workers' legal status results are statistically insignificant and positive in Ramallah. Again, the mechanism underlying these findings may be bidirectional. For example, the negative or positive impact could be related to the type of contract and whether it was signed between the workers and the Israeli or Palestinian construction company. On the other hand, the difference in the numbers or proportions of workers who have a contract signed in these cities can lead to these results. Therefore, the mechanism of these findings is also open to debate.

The results in ***Table 7. 14*** show that the effect of working conditions on the productivity of construction workers in Ramallah and Bethlehem is almost similar in direction and value. On the other hand, the effect of this variable is statistically insignificant and negative in Nablus. The differences, which need to be investigated further during the analysis of the case studies in Chapter 9, could be related to the type of construction sector in which the workers are employed, i.e. formal or informal. Another possible explanation for these differences could be whether the workers work in the Palestinian or Israeli construction markets. Therefore, the mechanism of these findings is also open to debate.

The coefficient of job satisfaction is only statistically significant and negative for building workers from Bethlehem. The results show that the coefficient associated with the Israeli policies variable is statistically insignificant for construction workers from Nablus. Yet, it is statistically significant and positive for workers from Bethlehem and Ramallah cities. The results suggest that Israeli policies in Bethlehem and Ramallah increase worker productivity, as measured by hourly wages, approximately 45 and 25%, respectively. However, the mechanism underlying these findings may be bidirectional. For example, the impact of Israeli policies on productivity in these three cities could be related to the number of workers employed in Israeli construction markets. However, the results could be affected by the severity of the Israeli actions in each of these cities and the number of Israeli checkpoints.

Results for mobility to the Israeli construction markets, as shown in ***Table 7. 14***, suggest that workers who work for Israeli construction firms are more likely to be more productive. For example, the results show that construction workers from Nablus working in the Israeli construction markets are productive by about 174 % compared to others working in the Palestinian construction market in Nablus. Furthermore, workers from Ramallah and Bethlehem who work in the Israeli construction markets are 103% and 64% more productive than other workers in Ramallah and Bethlehem, respectively.

Differences in the value of this variable's coefficient may be connected to the real wage of construction workers in each of the three cities. Alternatively, it may be due to the distance and time required to reach these markets. It may be tied to the type of labour force, skilled or unskilled. For example, most of the workers from Bethlehem who work in the Israeli market may work as assistants to skilled workers; therefore, the difference between their real wage and that of workers in Bethlehem is not significant. Finally, the results show that all firm size categories coefficients are statistically significant with a negative sign for workers from Nablus. Nevertheless, the coefficient associated with firm size category 4 is the only statistically significant and positive for the Workers from Bethlehem. These results could be related to whether the workers work with Palestinian or Israeli construction firms. Conversely, it might be linked to the type and size of the building projects in each of these cities. Therefore, the mechanism of these findings is also open to debate.

7.9 Conclusions

In this chapter, three main theories, marginal productivity, human capital and efficiency wage, have been discussed to solve the debate surrounding the use of hourly wage as an indicator for building productivity. Several human capital characteristics of construction labour, such as skills, training, education and experience, were used as control variables in the model. The regression model results show how labour productivity in the building sector changes with different human capital characteristics of workers. These human capital variables considered in the regression model have helped to consider the quality of one hour of work for workers while building the dependent variable, i.e., worker productivity. Although experimental and real-world evidence suggests that firms have monopsony power that they can use in principle to pay employees below their marginal productivity, the presence of the Israeli construction markets might lead to a low recruiting elasticity in the Palestinian construction sector. Thus it limits the extent to which employers can depress wages. Since the regression models in this chapter have also considered worker mobility from the West Bank to the Israeli market and some Israeli policies, the hourly wage is a strong indicator of the productivity of construction workers in the West Bank. In addition, this chapter addressed the research question about the impact of preset factors on West Bank construction labour productivity. In the following paragraphs, the main findings are presented.

7.9.1 Regression model

The estimation used in this regression was semi-elastic or semi-log, using the OLS estimation techniques to estimate the coefficient of the independent variables (β_i). Heteroskedasticity-robust standard errors were used to allow the fitting of a model that does not contain heteroscedastic residuals. Multicollinearity was not an issue in this model because the VIF value for each variable was less than 2. While it is possible to resolve endogeneity using more advanced estimating approaches (such as instrumental variable regression or panel data regression), testing is beyond the scope of this PhD thesis. Moreover, the data employed in this investigation are insufficient for confidently estimating such sophisticated models. Nonetheless, the presented analysis provides unique and vital insight into the factors influencing productivity in the West Bank construction industry. Furthermore, the data, model and context novelty contribute to the related literature. To the researcher's knowledge, this is the first research that tests the factors impacting building labour productivity using the OLS regression model in construction.

All previous research was based on qualitative or cross-sectional data, which precludes the development of a regression model.

7.9.2 The factors and their ranking

B standardised coefficients were utilised to rank the models' independent variables. This manipulation shows that the coefficient associated with labour mobility from the West Bank to the Israeli construction markets has the most significant impact across all regression models evaluated in this chapter. Another command known as Eta squared was also run, indicating that the most influential factor in the regression is labour mobility, which has an eta squared ($\eta 2$) of 0.42, indicating a large effect for this predetermined variable. In the baseline model, the following variable in terms of effect was the year dummy factor with an eta squared ($\eta 2$) of 0.03, indicating a minor effect. Age and experience exhibited negligible effects in the same model, with eta squared ($\eta 2$) of 0.02 and 0.012, respectively. Thus, the presence of the Israeli construction markets, which are structure factors, has increased the building worker productivity. The findings indicate that workers in these markets are 127 per cent more productive than their counterparts in the West Bank. Nevertheless, the impact of labour mobility on labour productivity in the West Bank needs more investigation, especially in terms of skill shortages and learning new experiences from these competitive construction markets.

Except for work satisfaction and Israeli policies, which cannot be examined apart from its political and economic instability setting, the influence of other variables is consistent with past research. ***Table 7. 10*** demonstrates that Israeli policies, as a structure factor, boosted worker productivity by around 17% and that construction employees who are content with their occupations are 12 % less productive than those who are not. However, the prevalence of multiple interpretations of the results suggests that the mechanism underlying these conclusions is debatable. Nonetheless, the prevalence of multiple interpretations of the data suggests that the mechanism underlying these conclusions is debatable. Consequently, more data sources, primarily interviews and case studies (Chapter 6), are required to understand and interpret these results.

Finally, the results of all regressions indicate that the relationship between experience and age on one side and log productivity on the other, as measured by hourly wages, are curvilinear, reaching a peak after some years and then declining. However, the relationship

between the dependent variable and education is always positive and linear. The results of the baseline regression are depicted in ***Figure 7. 13***.

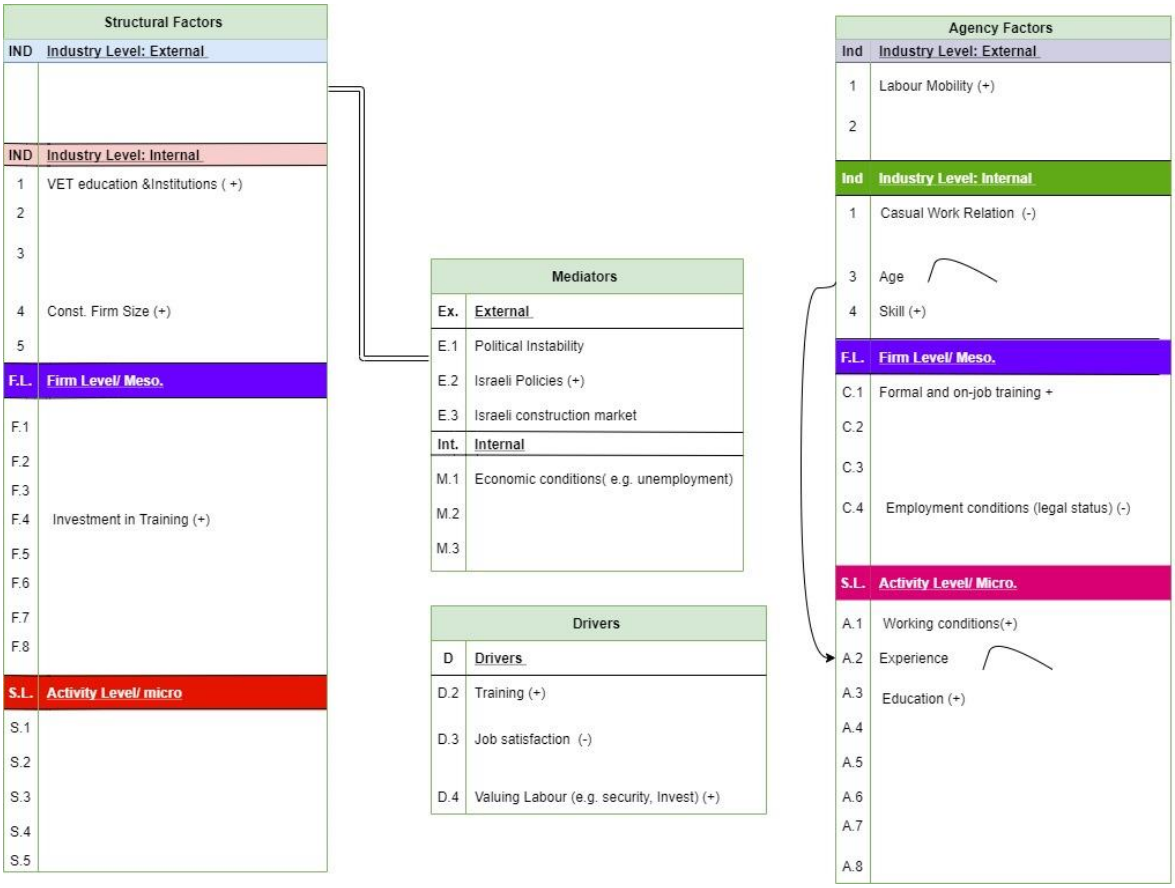


Figure 7. 13: The Agency and Structural Determinants impacting Building Labour productivity based on the results of the baseline regression model

7.9.3 Baseline results vs West Bank regression results

The results indicate that middle-aged workers are more productive and earn more than younger and older workers. However, the results suggest that the West Bank's peak productivity occurred during a 23-year experience period, compared to 41 years in the baseline results. These data may suggest that the building industry in the West Bank is labour-intensive as opposed to machine-based; that is, the productivity of the West Bank's sector primarily depends on the physical exertion of labour. Although the coefficient associated with the education factor is positive and significant in all regression results, the coefficient of skills is statistically insignificant for the workers working in the West Bank. Additionally, the regression analysis shows that Israeli policies positively impact construction labour productivity. This finding could indicate that, during the closure,

Palestinian construction workers employed in the Israeli market will labour locally and increase productivity by applying and transmitting their acquired experience. However, this interpretation must be validated by additional data sources.

The findings indicate that West Bank construction workers who have signed a written contract, either a permanent or a fixed-term contract, or are included in a collective labour agreement are approximately 10 % more productive than those who have not signed a contract or have a verbal labour agreement. Nonetheless, the baseline data indicate that this category of construction workers is around 2.4% less productive than those who have not signed a contract or have a verbal labour agreement. The negative legal status's impact could be attributed to the deductions for tax, pension and insurance payments (Nathanson, 2017); Palestinian workers who have a contract or work permit receive their gross and net wages after deducting taxes and contributions. On the other hand, the positive impact of the legal status of building workers working in the West Bank could be because the workers in the West Bank acquire more firm-specific skills and thus may increase company productivity by increasing human capital. Alternately, if temporary workers believe that good performance will result in contract renewal or a permanent job offer, they may exert more effort than other workers.

Overall, the results for the West Bank suggest that enhancing the legal status by improving the employment relationship leads to increased labour productivity. Yet, the relationship between aggregate productivity and employment regulations can not be examined in isolation from context and firm and industry characteristics (Brookes, et al., 2018). For instance, DeFreitas & Marshall (1998) discovered that nations with comparatively greater labour surpluses tend to have much higher productivity growth rates. However, the effect of labour surplus on productivity is influenced by the strength or weakness of union rights. If the labour surplus is bigger, the disciplinary effect on workers hired and a weaker labour force to oppose technological change and productivity-enhancing innovation will be more pronounced (DeFreitas & Marshall, 1998). Ichino and Riphahn (2005) argue that the impact of labour rights on productivity growth could be either negative or positive, depending on the labour market situation. The mechanisms of the results are open to debate and should be discussed with their context and firm characteristics (structural factor). Consequently, other data types (Chapter 6) were collected to interpret the regression analysis results.

7.9.4 Region-based Regression results

The regression results based on the regions (north, south, and middle) and those pertaining to the three case study cities demonstrate how structural and agency factors are shifting spatially. The coefficients associated with the factors could be interpreted based on the distance between these areas and the Israeli market. Another explanation could be related to the Israeli policies imposed on these three regions and cities. The actions of the Palestinian Authority in these regions may also explain why the factors of these three cities and regions are distinct. Even though the mechanisms underlying the conclusions are debatable, one notable feature shared by all these regions is that the coefficient connected with labour mobility to Israeli markets has the highest value and effect on labour productivity.

However, essential factors, including health and safety regulations and mechanisms, economic conditions (Chapter 4), and the division of the West Bank into areas A, B and C (Chapter 3), must be examined. Additionally, the relative impact of education and the VET institutes on labour productivity and interdependences with technology is, to some extent, unclear. In order to determine the interactions between the independent variables and the effects of these interactions on productivity, it is necessary to collect additional data sources. Overall, the regression analysis and all its conclusions are novel and contribute to the literature. However, interpreting these results necessitates using additional data sources, which may add new structure and agency factors that influence labour productivity. Chapter 8 discusses the analysis and results of the first data source, namely the interviews at the macro and meso levels.

8 CHAPTER 8

Structural and Agency Determinants of Building Labour Productivity in the West Bank

8.1 Introduction

The implications of previous research investigating factors impacting labour productivity in the sector section, presented in Chapter 4, revealed the missing or overlooked components. These studies, e.g. Abdul Kadir et al. (2005), Durdyev & Ismail (2019) and Ghoddousi & Hosseini (2012), demonstrate the term's significance, yet the concept is not fully grasped. Nevertheless, these studies have examined the factors influencing productivity but have never linked them to the causes or structural factors that lead agency factors to act that way. A negligible number of studies, e.g. Chan et al. (2010), Clarke et al. (2017) and Dainty et al. (2017), have dealt with the construction industry's productivity as a socio-technical system. In addition, despite the novelty and significance of Chapter 7, a few of its results, such as the link between labour productivity and firm size, are still debatable. It is necessary to consider the structural and agency factors that influence productivity and explore how they interact with one another and how these interactions affect labour productivity in the sector. Linking these factors with the context in which they interact is also crucial. Accordingly, this chapter tackles several questions raised in the previous chapters' findings. The multiple definitions of productivity are also explored. Additionally, this chapter discusses construction workers' employment and working conditions and links the agency factors with structural factors at various levels to completely comprehend West Bank construction labour productivity's determinants. Multiple data sources, including interviews with various individuals (Chapter 6) and secondary quantitative data from the PCBS, were used to draw out the findings for this study. Accordingly, with the triangulation of the findings and presenting multiple perspectives via interviews in this chapter, the research's credibility, dependability and confirmability were further strengthened.

8.2 Multiple definitions of labour productivity

Figure 8. 1, which summarises the concepts associated with the definition of construction productivity at its three levels based on the standpoints of the decision-makers and

professionals in the construction sector for the West Bank, shows that productivity is neither a straightforward concept nor does it have a clear or official definition at any level. Since the term "labour productivity" has been used to denote several notions, some of which are quantifiable and others are either vague or insufficient (***Figure 8. 1***), contradictory outcomes are inevitable. One striking feature of the interviewees' definitions is that they perceive the phrase as output-driven without acknowledging the labour input, including the worker's skills, experience and qualifications. Even though technical and managerial concepts have been linked to the term, the high uncertainty, political instability and complex geography have added a new layer of complexity to the definition linked to statements such as 'working with our boundaries'[27] and 'having a realistic schedule in light of the context in which we are working '[28]. The importance of the context, that is, the Israeli occupation policies, internal economic conditions, unwillingness to work, or other challenges, is clearly emphasised by other interviewees, for instance

> There is no official and approved definition of productivity by the Palestinian Authority, nor is there a measurement of productivity in the construction sector. The projects depend on the amount of funding allocated from donors and the ability of P.A.'s general budget to finance the implementation of these projects internally (Interviewee #2).

> The project's (Rawabi) challenges were 30% real estate problems, and the rest were political, social and economic challenges. The political challenges we faced were from the Israeli and Palestinian sides (interviewee #9).

The statements quoted show that structural factors impacting labour productivity can be divided into internal and external ones, and neither structural nor agency factors can be detached from their context. Such statements confirm that construction projects, particularly in the formal sector, are not evaluated by labour productivity or its proxies due to the instability of funding by international donors and the volatility of the P.A.'s budget allocated to the construction sector (***Figure 8. 1***).

[27] Interview #1
[28] Interview #4

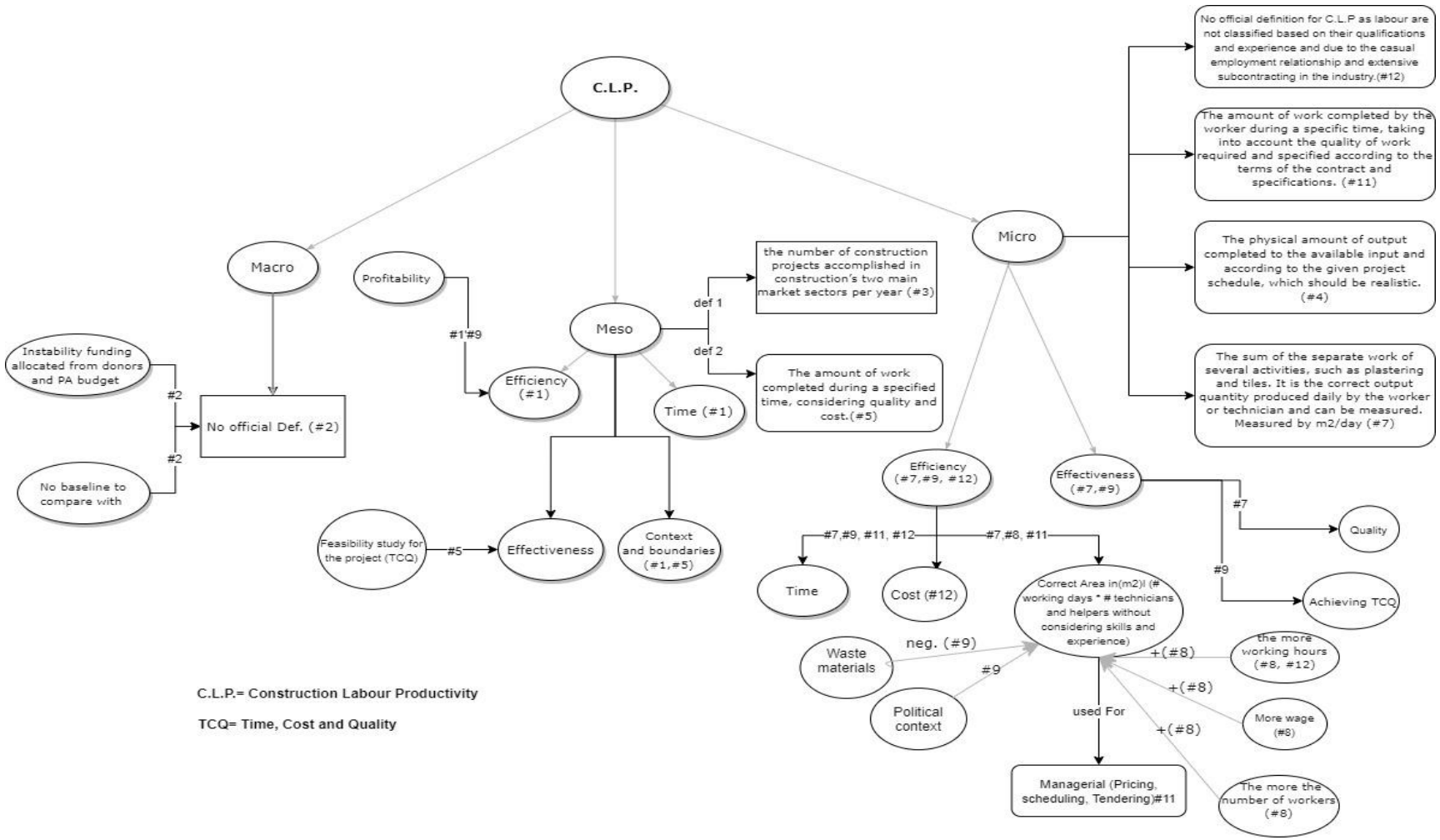


Figure 8. 1: Definitions of Construction Labour Productivity and Concepts linked to the term at all levels in the West Bank extracted from the interviews

Most of the definitions and notions associated with the term at the meso-level are economic. The combination of efficiency[29], profitability[30], cost recovery [31]and labour productivity is an eye-catching aspect of the meso-level definition for the term, as shown in ***Figure 8. 1***. For instance, one of the meso-level definitions is

> the amount of work completed during a specified time, considering quality and cost. It is a feasibility study for the project and is concerned with the speed of production, price, and quality (Interviewee #5).

The construction labour market in the West Bank depends on a casual workforce (agency factor), which includes high levels of self-employment and extensive subcontracting[32] (agency factor). While classifying workers according to their credentials and experience is necessary for defining and measuring labour productivity at the micro level, recording productivity rates are missing as most contracting firms ignore documenting them.[33] Accordingly, the existence of a formal definition and rate of labour productivity for various building trades has been hampered at the micro-level (***Figure 8. 1***). Nevertheless, time as a denominator to measure productivity has been extensively linked with the term, particularly at the micro-level. Higher output can be achieved by working harder rather than smarter (Figure 8. 1). Yet, the capability to yield more by better-combining inputs using new ideas and enhancing labour value and working conditions has been overlooked. Figure 8. 1 shows that the term had been linked with effectiveness and efficiency, and the output-oriented concepts associated with the term were mainly managerial or technical at the meso and micro levels.

Figure 8.1 depicts, on the other hand, a contradiction at the micro level in the concepts included in the term, particularly its efficiency aspect. Concepts such as the number of construction projects accomplished in the construction's two main market sectors[34] (i.e. the public and the private ones), the exact quantity of output produced by the skilled worker that can be measured[35], the amount of work completed during a specified time,[36] and

[29] Interview #1, interview #7 and interview #9
[30] interview #1 and interview #9
[31] Interview #5 and Interview #1
[32] Interview #12
[33] Interview #12
[34] Interview #3
[35] Interview # 7 and Interview #11
[36]Interview #5, Interview # 7 and Interview #8

achieving the Time, Quality and Money objectives for the project[37], show that the focus is on physical output. The time component is not seriously considered as both sectors worked on output and input cost and quality dimensions. The mental work or effort involved in producing that work and the quality of workers are ignored. Thus, the definitions offered are too mechanical and focus on the physical aspect of the work (***Figure 8. 1***). The definitions show that labour productivity is also linked with the daily wages of workers (for example, interviews #5,# 8 and #11). Accordingly, this finding validates the correctness of using daily labour wage as an indicator of worker productivity in Chapter 7. While the concepts linked with the term show the effect of the political and economic situation on productivity, they do not reflect and value the labour process aspect.

8.3 Structure of the Building subsectors in the West Bank

According to the Population, Housing and Establishment Census for 2017, the number of construction contracting companies registered in the West Bank reached 576 (PCBS, 2019). Almost 43% of these companies are registered under the Construction of Buildings subsector, and over 47% are considered under the Specialised Construction Activities subsector. The remaining firms are registered under the Civil Engineering subsector (PCBS, 2019). In the West Bank, small firms dominate the building construction subsectors. Overall, over 65% of construction workers work for firms employing under five workers, 27% work for firms that have up to 9 workers, a tiny percentage (less than 5%) works for firms employing between 10 and 19 workers, and the remainder work for companies with 20 or more employees[38].

The PCU reports in 2019 and 2020 argue that the construction sector, particularly the private sector, is controlled by hundreds of unauthorised construction companies and contractors in the West Bank, which implement 95% of construction building projects in the sector. The total number of construction firms, including those not registered with the PCU in the West Bank, is unknown. However, in 2018, the construction industry's gross value added (GVA) was 6.1%, and the contribution of the formal and informal sectors to the total value added was 72% and 28%, respectively (PCBS, 2018). Yet, these companies are not more than labour agencies or contractors. All interviewees at the meso level and

[37] interview #9
[38] The PCBS raw quantitative data for the period between 2014 and 2019

one at the macro level affirmed the small and medium size of the contracting firms and their family-owned business character. For instance, interviewee #2 states:

> We do not have contracting companies in the sense of a company, but we have contractors or a labour agency, and our most prominent company is Al-Tarifi Construction Company, which only acts as a labour agency. Furthermore, the Palestinian construction market cannot afford this large number of contracting companies, which are already in financial insolvency and bankruptcy and are struggling to cover their monthly expenses. Nevertheless, only a tiny proportion of these companies can be described as having an excellent financial position.

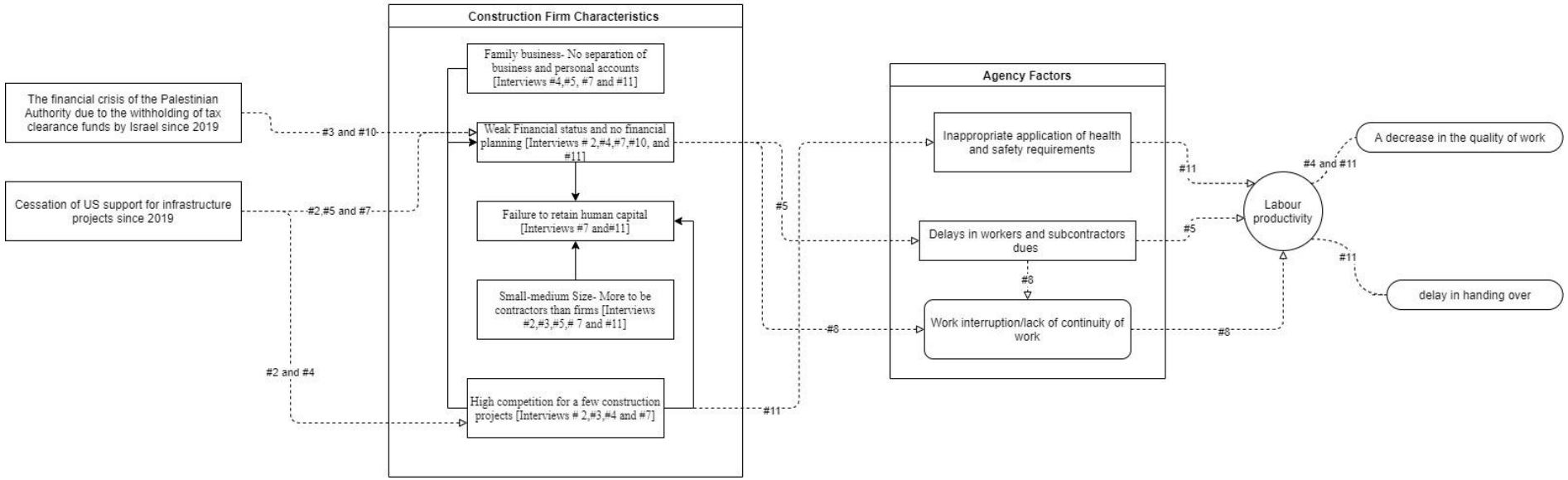
The only three large real estate companies that invest in the construction of buildings are the Palestine Real Estate Investment company (PRICO), Palestine Development and Investment, Ltd. (PADICO HOLDING), and the Palestine Investment Fund. Despite this, all of their significant building projects are carried out by local subcontractors[39]. No public joint-stock firm specialising in the building industry in the West Bank has been registered on the Palestinian stock exchange[40]. Therefore, megaprojects, such as Rawabi city, have not significantly improved labour productivity in the West Bank[41].

> The construction companies here are no more than an office that wins the bid and distributes it to several sub-contractors known as labour-only contractors, such as plasterers, tilers, and steel fixers. The contracting companies do not have permanent engineers, permanent technicians, or permanent workers, and some of them do not even have the equipment. It is impossible in Palestine to see a contracting company with permanent workers and engineers and all equipment required to execute a construction project (Interviewee #7).

Accordingly, on-the-job training does not exist due to the size, weak financial status and employment relationships in these contracting firms.[42] As an internal structural factor, construction contracting firms' characteristics, shown in ***Figure 8. 2***, in the West Bank have affected labour productivity by constraining several agency factors, such as improving workers' skills via on-the-job- training and securing working conditions through

[39] Interviewee #5
[40] Interviewees #5 & #7
[41] Interviewee #5
[42] See for exmaple interviews #2,7 and 11.

timely payment of workers' dues and permanent contracts. The attributes of these companies have imposed restrictions on the proper application of health and safety regulations on the sites (structural factor), which increases the risk of accidents; that is, the working conditions are unsafe (***Figure 8. 2***).



**The numbers indicate the interviews used to build the factors and the relationships between different agency and structural factors*

Figure 8. 2: The Characteristics of Contracting firms in the West Bank and their impacts on agency determinants and labour productivity

Figure 8. 2 depicts that contracting firms in the West Bank can be described as family-owned businesses with no separation of personal and business accounts due to their lack of skills in financial planning. As shown in ***Figure 8. 2***, the financial crisis of the PA, which is related to the Israeli government's seizure of Palestinian clearing funds, the cessation of US support for infrastructure projects, and the cutdown in the financial support of international donors, has impacted the financial situations of most of contracting firms in the West Bank. Since the number of projects submitted by the formal public and private sectors is not commensurate with the number of contracting companies, there is intense competition between companies to win the bid down to offering a lower price than the project's actual estimated cost[43]. As a result, the financial position of the majority of these companies, most of which are small in size, is weak, becoming indebted to the banks and on the verge of collapse. Accordingly, these firms' ability to improve, attract, and retain labour is almost impossible, and their workers' wages, who suffer from insecure working conditions, are delayed. The firms' features have impacted labour productivity and led to a fluctuation in the quality of the work in the projects as well interruption and delay of work in some cases, as shown in ***Figure 8. 2***.

Another direct result is that the firms' financial situation and intense competition between these companies affects the health and safety of construction workers by sacrificing the cost of implementing health and safety requirements on all projects except those funded by USAID (***Figure 8. 2***). Another external structural factor that has halted work on some construction projects in the West Bank is the fluctuation in the price of the dollar against the shekel, which has led to a loss of nearly 30 per cent in the purchasing power of the dollar[44]. This is because the contractor receives the payments due in dollars but pays the workers and local suppliers of construction materials in shekels, which causes a significant loss and increases the financial crisis for some contracting firms. This situation is coupled with the dramatic increase in the price of construction materials due to the pandemic. Therefore, work on some projects halted or slowed down, and the quality of others decreased due to the use of cheap and non-conforming building materials (***Figure 8. 2***).

[43] See for example interviews #2 and #3.
[44] See for example Interviews #1, #2, #4

8.4 Building construction workforce structure

The average construction workforce from the West Bank is 145,660. Overall, 98% work either in the construction buildings subsector (56%) or the specialised construction activities subsector (42%). The percentage of full-time equivalent (FTE) regular labour is 93.37%. This encompasses the following workforce segments::

- Employers: 12,209 (slightly over 26% of them working in the Israeli construction markets)
- Self-employed: 11,476 (almost 28% of them working in the Israeli construction markets)
- Wage Employees: 106,893(over 62% of them working in the Israeli construction markets)
- Unpaid Family Members: 2,706 (7% of them working in the Israeli construction markets)

Figure 8. 3 depicts the distribution of blue-collar building workers by their subsectors and working place. As indicated in ***Figure 8. 3***, the percentage of workers in the construction of buildings and specialised construction activities subsectors working in the same governorate of residence is 38% for each, compared to 57.5% and 58% working in the Israeli construction markets. Moreover, only a tiny percentage of workers (4.5%) in the construction of buildings and in specialised construction activities subsectors (4%) is mobile to other governorates within the West Bank. In addition, it was found that the average hourly labour productivity of workers in the building sub-sectors in the West Bank is 0.028m^2/labour.hr, equivalent to building a turnkey apartment of 150 m^2 in 67 days, assuming ten workers and eight working hours per day. The main characteristics of the labour force from the West Bank, based on secondary quantitative data covering the period from 2014 to 2019, are discussed in the following subsections.

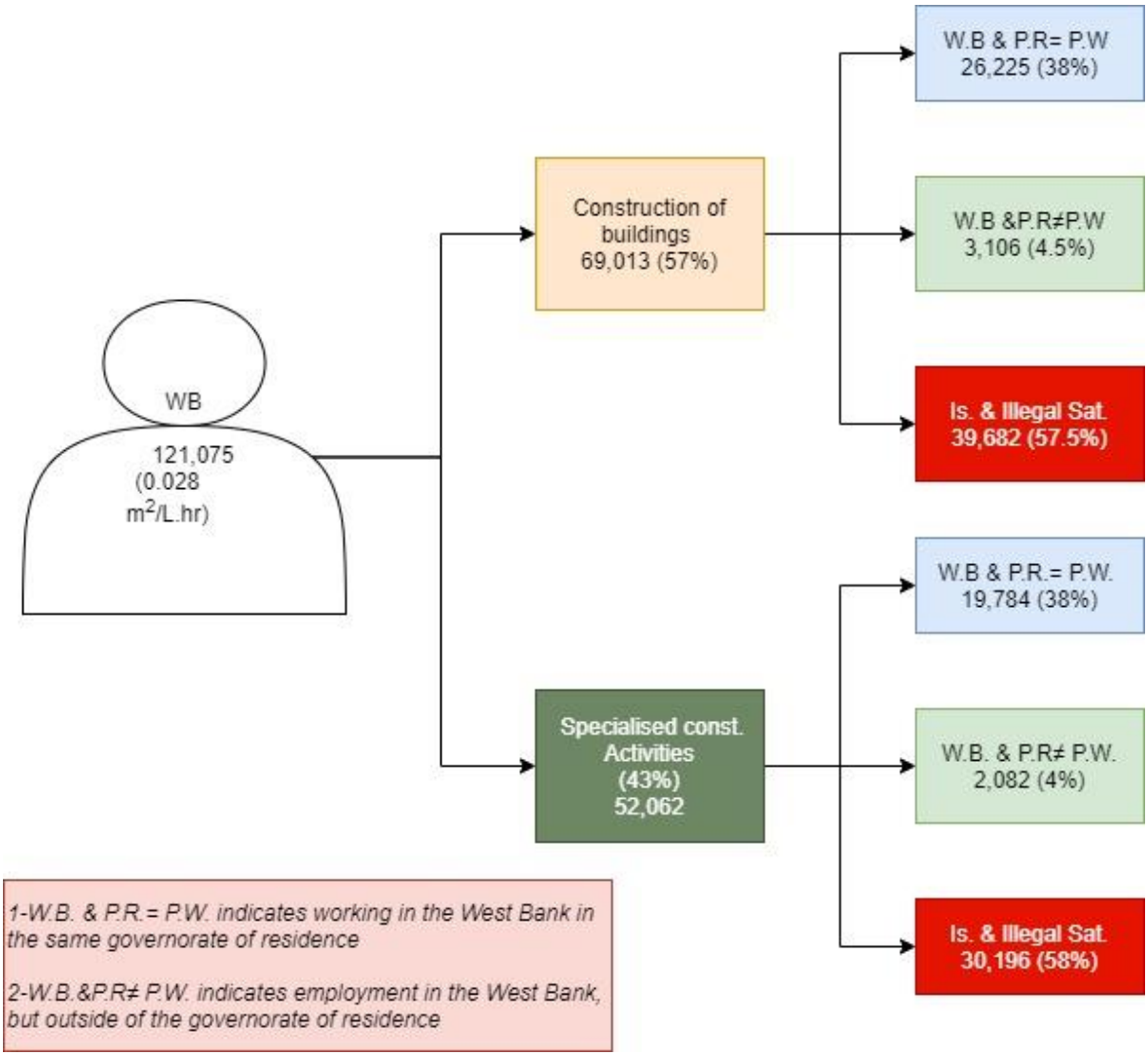


Figure 8. 3: The Breakdown of the West Bank Building Blue-collar Workers by subsectors and working place

8.4.1 Workers Average Age

The average age among blue-collar workers is 34.3 years. However, 25% of the workforce is 24 years old or under. Three-quarters are between the ages of 16 and 43, and less than 10 % are over 51, indicating no ageing workforce problem, as confirmed by the interviewees. Linking this finding with the total number of employers of more than 12,000 and the harsh working conditions at construction sites leads to the understanding of early retirement in blue-collar workers in the West Bank. Building workers can be divided into three main age groups: a) under 30, b) 30 to 50, and c) over 50[45]. Employees between 18-30 years are usually either unskilled workers or technical assistants (semi-skilled) as they do not have

[45] Interviews #2, #3,#11

enough experience to start the project from scratch[46]. The ages of skilled workers range from 30 to 50 years old[47], and it is rare to find a worker, particularly an unskilled one, over sixty working in construction[48], as this market requires great physical effort and abilities that decrease with age[49]. However, this is not necessarily the case with skilled workers.

> Due to his quality and acquired experience, a forty-year-old worker can be more productive than a twenty-year-old worker with the current technological advancements in construction tools (Interviewee #2).

> The productivity of workers aged 30 to 45 is the highest in quantity and quality as most are not vocational or technical institution graduates (interviewee #5).

Other interviewees indicate that most skilled workers become subcontractors, mainly labour-only subcontractors, when they get older[50] or work as labour superintendents for the construction firms in the West Bank[51]. Additionally, the distribution of employers, whose average age is slightly over 41, by higher education qualifications is similar to the blue-collar workers, as shown in ***Table 8. 1***, supporting the findings that some skilled older workers become labour-only subcontractors. Finally, most of the injuries in this sector are in the youngest age group, i.e. less than 30 years old, due to meagre experience in this category of working in construction projects[52].

8.4.2 Workforce Educational Level and Training

Based on the PCBS classification, which never reflects the exact situation of high occupational divisions on the construction site, the workers are divided into three categories: Building and Related Trades Workers (excluding electricians), which are given the code (71), Electrical and Electronics Trades Workers, which are given the code (74), and the unskilled workers, which are given the code (93) and known as Labourers in Mining, Construction, Manufacturing and Transport. Nevertheless, the construction labour process in the West Bank rests on rigid trade divisions, which are neither reflected in the PCBS reports nor its raw data (see Chapters 4,5 &9). ***Table 8. 1*** shows the distribution of

[46] Interviews #2, #3, #11
[47] Interviews #2, #3, #5, #11
[48] Interview #2, #3, #11
[49] Interviews #2, #3, #11
[50] Interviews #7, #8
[51] Interviews #4, #9, #11
[52] See interview # 6

construction workers and employers from the West Bank working in the building subsectors according to their higher educational qualifications. Over three-quarters of them have less than ten years of schooling (completed middle school), and almost 17% have completed their secondary education. Furthermore, a tiny percentage (less than 3%) have an associate diploma and less than 4% hold a bachelor's degree (***Table 8. 1***). Interestingly, the number of workers with a higher diploma or a master's degree is 24 and 97, respectively, which indicates an increase in the unemployment rate in the West Bank (***Table 8. 1***).

Educational attainment Category	**Blue-collar workers***	**Employers***
Illiterate	315	15
Can Read and Write	6,477	577
Elementary	25,135	2,415
Preparatory	60,755	5,756
Secondary	20,207	2,393
Associated Diploma	3,390	534
B.A.\ BSc	4,661	512
Higher Diploma	24	7
Master's Degree	97	0

* The numbers include only employers and full-time workers

Table 8. 1: The average numbers of full-time employees and employers in the West Bank by their educational; attainment between 2014 and 2019[53]

Furthermore, the average number of years of schooling among blue-collar workers is almost ten. Surprisingly, the data show that 7% of the blue-collar workers working in building subsectors have attended training courses, such as those managed by the Ministry of labour or run by the UNRWA, such as the Qalandia Institute. Nevertheless, almost 59% work in the Israeli construction markets. Almost 99% of blue-collar workers started working in the construction sector without receiving any on-the-job training from their employers. This reflects the fact that the construction labour process in the West Bank rests on low levels of vocational education and training. A deep discussion took place with the interviewees at different levels to explore the reasons for and implications of this situation.

8.5 Vocational Education and Training System and Centers

The Arab Standard Occupational Classification (ASOC) includes the following technical and vocational education and training levels for occupational classification: 1) Semi-skilled

[53] Author calcualtions based on the secondary qualitative data provided from the PCBS.

workforce, 2) Skilled workforce, 3) Professional workforce, 4) Technical labour, and 5) Specialists (ETF, 2020). Vocational Training Centers (VTC) target the first two categories, Vocational Secondary Schools (VSS) target the third level, and Technical colleges (T.C.), other colleges and universities handle the fourth and fifth levels (ETF, 2020). The ETF report reveals that TVET providers in Palestine are the Ministry of Education and Higher Education (MOEHE), Ministry of Labour (MOL), Ministry of Social Development (MOSD), other relevant ministries, and non-governmental organisations and the UNRWA. Additionally, private providers are private training centres and other relevant institutions related to private companies, such as the electricity company and other TVET institutions, that do not fall under any of the above categories. Accordingly, the TVET programmes can be categorised as formal and informal education and training (***Table 8. 2***).

Table 8. 2 and the average years of education of blue-collar workers (section 8.4.1) reveal that programmes offered to the workers are either long-term training programmes (one to two years) targeting skilled labour or short-term training programmes (half to one year) targeting semi-skilled workers. These programmes are considered part of informal education and training programmes, which can be described as unintended and sometimes unstructured education and training in terms of goals, time, and technical support that occurs through individual training in the workplace (ETF, 2020). Additionally, short-term training programmes do not have a predetermined curriculum and minimum qualifications for the trainers[54]. Having a different and ununified curriculum has led to a different perspective on the quality of the graduate students/ workers from these schools and centres. For example, on the one hand, two interviewees stated that trained workers in vocational education institutions are better than those that have acquired skills through experience as Institutes and schools provide modern means of learning. Thus, the ability of their graduates to use a computer and read blueprints is better than those learned by experience[55]. On the other hand, others pointed out that the level of graduates is an assistant technician and needs more training on construction worksites to be familiar with the work. For instance, Interviewee #11 states:

> The vocational training centres cover some trades, but their graduates have weaknesses. Most of the graduates of these technical centres we dealt with know

[54] WAFA (2022)
[55] Interviews #7 and #8

> the basics of work or profession. From my experience with more than one technician, especially in tiles, I can say that the graduates of these centres do not have enough skill to do the work from scratch, i.e. the know-how is weak, except for those specialising in air conditioning and refrigeration.

The parties that offer the vocational training programs are the Vocational Training Centres (VTCs) of the Ministry of Labour (MOL), the Ministry of Social Development (MOSD), the UNRWA, the non-governmental organisations, charitable organisations; and the private for-profit training centres, licensed by the Ministry of Labour (ETF, 2020). Moreover, the MOL-VTCs offer various vocational programmes in its 11 centres in the West Bank. The programmes offered and the number of graduates of each programme in the West Bank for the academic year 2020-2021 is as follows: electrical installation (87), electrical installation and solar panel units installation (67), Architectural Drawing and Quantity Surveying (11), Painting and decorating (48), Air conditioning and refrigeration (101), Carpentry (59), aluminium work (133), blacksmith welding and services (20), Sanitary installations and central heating (117), tiling (153) and Interior design and decoration (17) (MOL, 2021). These figures show the marginal number of graduates from government vocational training centres compared to the number of entrants new to the sector's labour market. Training courses offered by the MOL and other institutions are insufficient, and the programmes need to be developed to satisfy the needs of the construction market in the West Bank.[56] Additionally, there is a lack of studies on the needs of the market in the West Bank

> There is simply no single study about the needs of the local market, and thus guiding students towards the specialisations required in the Palestinian market is not scientifically grounded. […] If these studies are found, they are not reflected on the ground to serve the local market (Interviewee #5).

[56] Interview #5

Levels of TVET	Levels According to ASOC	Qualifications covered by the level	Levels according to NQF[57]	ISCED levels	Number of blue-workers[58]	Impact on labour productivity
		Third university degree (PhD) and equivalent qualifications from previous learning	8	8		
		Second University Degree (Masters) and Higher Diploma at Masters level, courses and specialized training programs equivalent to the Master's degrees and equivalent qualifications obtained from previous learning	7	7	97 (<1%)	It reflects the high unemployment rate in other sectors while increasing labour productivity in the sector (see Chapter 7)
Technical Baccalaureate	Specialist	First university degree (baccalaureate), specialised courses and training programs of the level of baccalaureate and the equivalent qualifications obtained from previous learning	6	6	4,661[59](4%)	It reflects the high unemployment rate in other sectors while increasing labour productivity in the sector (see Chapter 7)
Technical Diploma	Technical	Intermediate and technical diploma certificate, and specialised training programs and courses equivalent to the diploma and the equivalent qualifications obtained from previous learning	5	4	3,390[60](3%)	It reflects the high unemployment rate in other sectors while increasing labour productivity in the sector
Secondary Vocational Certificate	Vocational	Academic and vocational high school diplomas and equivalent qualifications from previous learning	4	3	N.A.	
Vocational training (Long-term training programs)	Skilled worker	Certificate of basic education for the tenth grade, vocational training level II (long-term training programs) certificate, and equivalent qualifications obtained from previous education.	3	2	1,415[61](1%)	Little positive impact due to marginal number of graduates, labour mobility and a limited number of programmes
Vocational[62] training (Short Term Training Programs)	Limited-skilled Worker	Certificate of basic education for the sixth grade, certificate of vocational training level I (short-term training programs) and the equivalent qualifications obtained from previous education	2	1	N.A.	Minor impact due to the structure of these programmes and their limited number and marginal number of graduate labour
		Pre-school certificates and unskilled qualifications obtained by experience	1	0		

*NQF stands for National Qualifications Framework

* ISCED stands for International Standard Classification of Education

Table 8. 2: Framework for the distribution of TVET levels based on the National Qualifications Framework (NQF) and ISCED in Palestine and the number of qualified Building workers from the West Bank in each category where possible

Adapted from: *(ETF, 2020)*

[57] There is no official NQF system in effect at this time. There is a draft NQF structure, but it must be revised and updated.

[58] Based on the PCBS quantitative raw data for 2014 to 2019

[59] The number covers the workers who have their first university degree, which is not necessarily a technical Baccalaureate, as the data do not provide this level of subdivision.

[60] The number covers the workers who have Associated Diploma, which is not necessarily a technical Diploma, as the data do not provide this level of subdivision

[61] This number is based on the calculations of the researcher. Nonetheless, the ETF notes that numerous fifth- or sixth-level employees obtain a Skilled or Semi-Skilled Worker certificate through long-term training or short courses. According to the researcher's calculations, about 60 per cent of workers in this category are employed in Israeli construction markets.

[62] Institutions under this category provide informal education and training programmes (see ETF (2020) report).

According to the MOL (2021) report, there are 230 private training centres. Yet they offer a limited number of construction occupation-related programmes (Abdullah, 2018). Abdullah (2018) pointed out that the sector is still fragile in terms of the number of centres and their equipment, the training of cadres, and the budgets allocated to provide them with the materials needed for training. The sector also remains dispersed in terms of legal affiliation and poor coordination between the various authorities. The interviewees also raised all these points and explained the effect of inadequate training levels on labour productivity in the building sector. For instance, interviewee #2 states:

> The P.A development budget is only related to implementing projects, and there is no item covering the issues of training workers in any sector. Moreover, the failure to focus on technical education, which was not among the priorities of successive Palestinian governments, has led to a shortage of skills in the construction market.

The structural factors that led to low training course levels in the West Bank and their impact on labour productivity, based on the interviewees, are summarised in ***Figure 8. 4***.

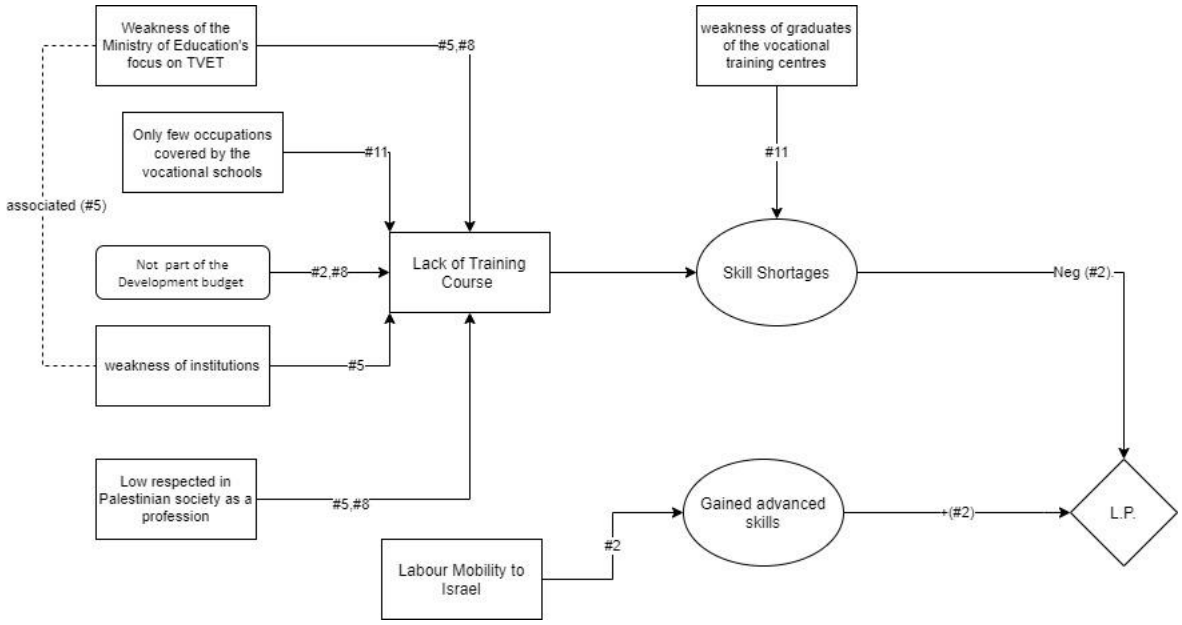


Figure 8. 4: Structural determinants impacting the training in the sector and their impact on labour productivity

As shown in ***Figure 8. 4***, different structural factors have contributed to skill shortages through the lack of training courses for the workers in the sector. TVET lacks unified administration and effective legislation and has been neglected by successive Palestinian

governments[63]. For example, the number of industrial schools in the West Bank is only 12[64] -yet these do not offer much to the construction sector, as they cover a tiny part of the construction market[65] compared to hundreds of academically oriented schools and colleges and universities [66]. Furthermore, the TVET structure is fragmented concerning the institutional type and objectives and the supervisory and responsible parties[67]. The graduates are granted a partially recognised certificate[68]. The P.A. and the contracting companies do not value the workers' quality and skills[69]. For instance, there is no distinction between workers affiliated with professional centres and those who are not in terms of wages and priority of work, which causes the majority of construction workers in Palestine to disregard the significance of vocational training[70]. Thus most of the construction workers in this sector are second-class in terms of skill and experience.[71] It is rare to find a worker who has studied electrical installation or other occupations such as plastering at an institution or vocational school. Instead, most workers possess the skill through experience and work with workers who have work experience[72]. Consequently, the skills of construction workers are acquired through experience accumulated through trial and error and passed down from the older generation to the younger generation[73].

Nevertheless, the main problems with such an approach are that some technicians are not highly skilled in their crafts; therefore, the new workers will learn the job or craft but will never master it. The new worker who is naturally capable of mastering this profession if he/she studies it through a specialised institute or school will be a skilled worker with less competence due to learning from a technician who is not highly skilled in the profession. Also, the worker does not learn how to solve problems[74].

The other structural factor that critically leads to skill shortages in the West Bank is the cultural and social aspect related to society's view of the construction profession as inferior

[63] See interviews #2, #8
[64] Al Nayzak (2011) and WAFA (2022)
[65] Abdullah (2018), Interviews # 1,#5 and #11
[66] Interviews #5, #8
[67] RecoNow (2016), WAFA (2022) and interview #5
[68] WAFA (2022)
[69] Interviews #2 , #8
[70] Interviewes #5, #7, #8
[71] Interview #2
[72] Interview #5, #8
[73] Inteviews # 5, #8
[74] Interviews #7,# 8

regardless of the workers' high salaries [75]. People's demand for vocational education is fragile due to the harsh working conditions on the site and the lack of job security for workers in the construction sector.[76] Added to this is the adverse impact of the Israeli construction markets[77] that have targeted the skilled blue-collar workers from the West Bank.[78] The main consequence of skill shortages and lack of training is the need for on-site close and direct supervision. Accordingly, workers tend to be treated as machines, and the possibility of using new technology to improve productivity will be limited.[79]

8.6 Wages and working conditions of workers

The daily wages for construction workers from The West Bank working in building subsectors differ based on the place of work and their classification, i.e., under the Craft and Related Trade Workers category or the Elementary Occupations category, as shown in ***Table 8. 3*** [80]. The analysis of the interviews and ***Table 8. 3*** indicate that the wages or unit rates are not valued according to the knowledge they incorporate, the inputs, but according to outputs, that is, according to a worker's ability to fulfil the task at hand. Accordingly, the labour process rests on output-based pay.

Category	The West Bank		Israeli Markets	
	Avg. Daily Wage (NIS)	Avg Weekly working hours	Avg. Daily Wage (NIS)	Avg Weekly working hours
Craft	128.92	44.53	275.39	41.51
Elementary	87.72	42.29	209.88	41.83

Table 8. 3: The average daily wage and weekly working hours of Building workers from the West Bank by their place of work and category

The average monthly wage (calculated by multiplying the average daily wage by the average working days per month) for workers working in the West Bank is almost 47% of that for the workers working in the Israeli construction market, more precisely, ILS 2,363.70 in the West Bank compared to ILS 4,998.48 in the Israeli markets for workers classified under the Craft and Related Trade Workers category. Additionally, for the workers in the other category, the average monthly wage in the West Bank (1,441.54 ILS)

[75] Interviews #2,#5, #7, #8
[76] such as Interviewees #7 and #11
[77] It is worth mentioning that most of the Palestinian workers in the construction sector have benefited through their work in the Israeli construction sector to increase their practical experience, see, for example,interviews #2 and #8.
[78] All interviwees
[79] Interivew #7
[80] The raw quantitative data for the years 2014 to 2019

is 39% of that for the workers in the Israeli market (3,660.03 ILS). Table 8. 3 reveals that the West Bank labour force is subject to long work hours. The average weekly hours for craft building workers working in the West Bank are 44.53, reflecting skills shortages of workers in some construction professions. 50% of construction workers working in sub-sectors of buildings in the West Bank work weekly for more than 48 hours.

8.6.1 Daily wage and valuing labour

The daily work of a worker and technician is usually eight hours, from 8 a.m. to 4 p.m., with a half-hour lunch break, which is the minimum under labour law in Palestine [81] , and the weekly working days are six[82]. Due to the lack of skilled labour and lack of competence of the labour available, workers spend more than eight hours getting their work done on time.[83] Wages for blue-collar workers in the West Bank are paid monthly, weekly, daily, hourly or per-piece rates, which is the most common basis for paying skilled labour[84] (Chapters 7& 9). While the amount of work done and accepted by the supervisor is the basis for paying skilled workers rather than their skills or qualifications, the unskilled workers are paid a daily wage by most contracting companies in the West Bank.[85] Also, the lump sum sometimes is used if the output or production cannot be easily measured, such as excavation and demolition.[86] Additionally, construction workers' wages in the West Bank are significantly lower than those offered to Israeli construction market workers, especially technicians or skilled workers. For instance, the rate for workmanship for a tiler is on average 25 NIS/ m^2 in the West Bank, compared to 75 NIS per square meter in the Israeli market, in which skilled workers' daily wage reaches 600 shekels (154 £), compared to 200 shekels (51£) in the West Bank[87]. As a result, most qualified contractors and technicians voluntarily commute to work there, leading to skill shortages in various occupations that are reflected in the quality of West Bank construction projects.[88] For example, Interviewee #11 stresses:

[81] Interview #7, #12
[82] Interview #6, #12
[83] Interview #12
[84] Interview #8,#11.#12
[85] Interviews #1, #3,#4,#7,#8,#9 #11,#12
[86] Interview #11
[87] Interview #5, #6,#8
[88] Interviews #2,#5, #11, #12

> Those currently available are the helper of the previous skilled technical workers, who have moved to work within the Israeli market. Therefore, the same job is repeated more than once due to the lack of efficiency, which requires us to follow up and closely monitor them to ensure proper implementation.

Although labour wages in the middle of the West Bank are higher than in the south and north, the difference is insignificant (at best, not exceeding 5 ILS/ m^2 (1.2£/m^2))[89]. Additionally, the evaluation of wages is linked to the employer, who might consider the experience when paying their workers, but the wage difference is negligible. For instance, a tiler with ten years of experience and another with three years of experience may have a difference in their salaries, but it is not more than ten ILS (£ 2.55) daily[90]. Thus, the mobility of workers between the governorates of the West Bank is very little due to the absence of a fundamental difference in prices between different governorates and the low daily wages in the West Bank, where the minimum wage level for construction workers does not cover the costs of the worker's basic needs.[91] However, the number of construction projects offered is higher in the centre than in the south and north of the West Bank (Chapter 9).

The causes and impacts of several structural and agency factors contributing to skill shortages in the West Bank are summarised in ***Figure 8. 5***. In addition, ***Figure 8. 5*** demonstrates the contention of the contracting firms that labour mobility boosts labour power; thus, the firms are not able to apply the requirements of H&S (***Figure 8. 5***). The non-competitive wage, lack of written employment contract (internal structural factors) and the labour mobility to Israeli markets (agency factor) increase labour disloyalty (agency factor) and constrained the ability of the firms and authorities to impose the Health and Safety regulations in the West Bank (Structural factors), as the second opportunity is always available. The imposition of the H&S measures on construction site workers negatively affected the availability of technicians and workers, who are mobile either to Israel or the informal sector[92]. For example, interviewee #9 stresses:

[89] Interview #11, #5,#8, #12
[90] Interview #5
[91] Interview #3, #5,#6,#8
[92] Interviews #6, #7, #9

Obligating the workers to meet public safety requirements led them to leave the Rawabi City project and work on other projects for their employers or in Israel. Nevertheless, the continuity of construction projects, and thus the continuity of work, made the percentage of compliance with safety requirements higher compared to other projects in the West Bank.

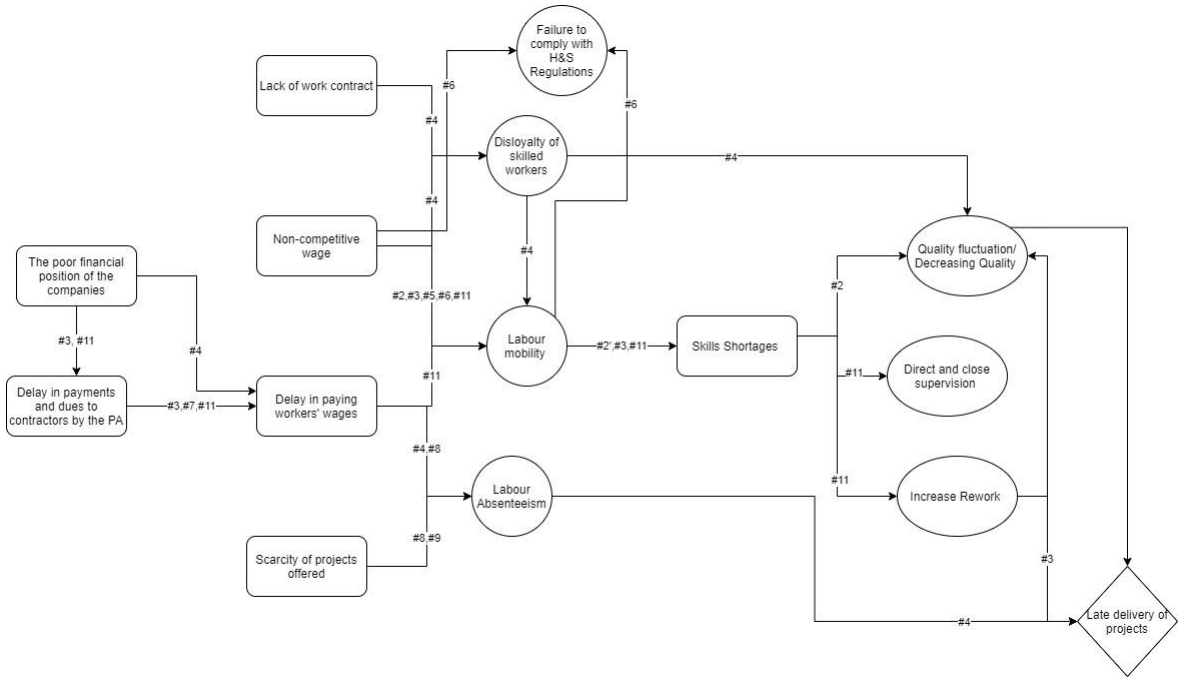


Figure 8. 5: Causes and Consequences of Structural and Agency Determinants Contributing to Skill shortages in the West Bank

Figure 8. 5 depicts that the financial status of construction firms, which is affected by the non-compliance of the Palestinian Ministry of Finance to transfer the overdue receivables to the contractors' bank accounts, has prevented them from meeting their financial obligations to traders and blue-collar workers on time. Thus, these two structural factors have contributed to labour absenteeism, disloyalty and mobility, either internally to other Palestinian employers within the West Bank or the Israeli construction markets. Nevertheless, each of these agency factors has other causes, including the scarcity of construction projects offered and lack of skilled workers leading them to work for more

than one contractor in the same period, which caused delays in multiple projects[93] due to labour absenteeism (***Figure 8. 5***).

Furthermore, labour mobility, which is one of the manifestations of labour disloyalty, is a significant reason for skills shortages in the West Bank, which has resulted in a fluctuation in the quality of work provided and more rework due to poor quality of work; consequently, workers have been subjected to strict, close, and direct supervision (***Figure 8. 5***). In the West Bank, labour disloyalty emerges due to the absence of work agreements and disparity in wages in the two markets, i.e. the Palestinian and the Israeli.

8.6.2 Health and safety of workers at the construction sites

The MOL (2019a) recorded 21 fatal accidents in 2015, 14 in 2016, 11 in 2017 and 7 in 2018 on work sites within the West Bank but did not break them down by sector. Additionally, in the West Bank, the MOL (2019b) recorded 880 work injuries, of which (14) were fatal injuries among workers. In addition, 42% of injuries were to workers in the 15-25 age group. On the one hand, the breakdown of the number of injuries by sector indicated that the percentage in the manufacturing sector, which is the highest among other sectors, was 27% due to the large volume of employment compared to other sectors. The percentage of injuries recorded in the agriculture, services and construction sectors reached 25, about 18 and approximately 12%, respectively (MOL, 2019b).

The report indicated that the work environment was the foremost reason for most injuries. Inadequate working conditions at worksites caused 60% of injuries, and 16% were caused by machinery (MOL, 2019b). The construction sector is the most dangerous among other economic sectors in Palestine. Although the number of accidents in other sectors, such as services and industrial, is higher than in construction, 70- 80% of accidents in construction result in either serious injuries or deaths[94]**.** Most fatal accidents occur in the building industry. According to the report, more than 71% of workers (10 out of 14) who died due to fatal workplace incidents in 2019 were working in the construction industry. Most were under 30 years old and had less than three years of work experience (MOL, 2019b). Contracting firms claim that labour mobility is a constraint to implementing health and safety requirements. Yet, only 71% of all fatal injuries were insured against work injuries

[93] Interviews #4 and #8
[94] Interview #6

(MOL, 2019b), as some contractors evade insurance for their workers to reduce what they have to pay insurance companies for construction projects, attempting to save money at the risk of workers' lives.[95]Regarding these points, interviewee #6 emphasises:

> The foremost causes of these accidents in the sector are the lack of a safety culture and lack of knowledge in using the PPE from the workers' side. […] the other reason is their lack of knowledge of equipment use. Unfortunately, some do their job, do not use tools properly, and do not admit their lack of knowledge about these matters. […] Most of the injuries in this sector are in the youngest age group, i.e. between 20 to 25 years. […]The reason for the younger age group injuries is the scant working experience.

Structural and agency factors at the macro and meso levels that have constrained enforcing these regulations on construction sites in the West Bank are shown in ***Figure 8. 6***. Among significant reasons for the lax enforcement of health and safety requirements on construction sites are a) the low fine for safety violations, which does not exceed 500 Jordanian dinars; b) some contractors bring improper PPE that does not conform to the Palestinian specifications, especially the headset, the mask and the helmet. Interestingly, some of the PPE is not more than toys;c) using outdated vehicles and machines whose licenses were withdrawn in Israel in the construction sites[96]; and d) the insufficient number of inspectors in the West Bank helped to breach health and safety regulations[97] (***Figure 8. 6***). Although the number of inspectors for all sectors in the West Bank increased from 45 to 90 in 2021[98], the governmental procedures through the MOL to apply the safety measures are insufficient in practice due to the lack of the appropriate number of staff from the ministry to follow up and monitor the application of the requirements in all private and public construction projects[99].

[95] Interview #2
[96] Interview #6
[97] Interviewees #2,#4 &#5
[98] Interviewee #6
[99] Interviewees #2,#4,#5

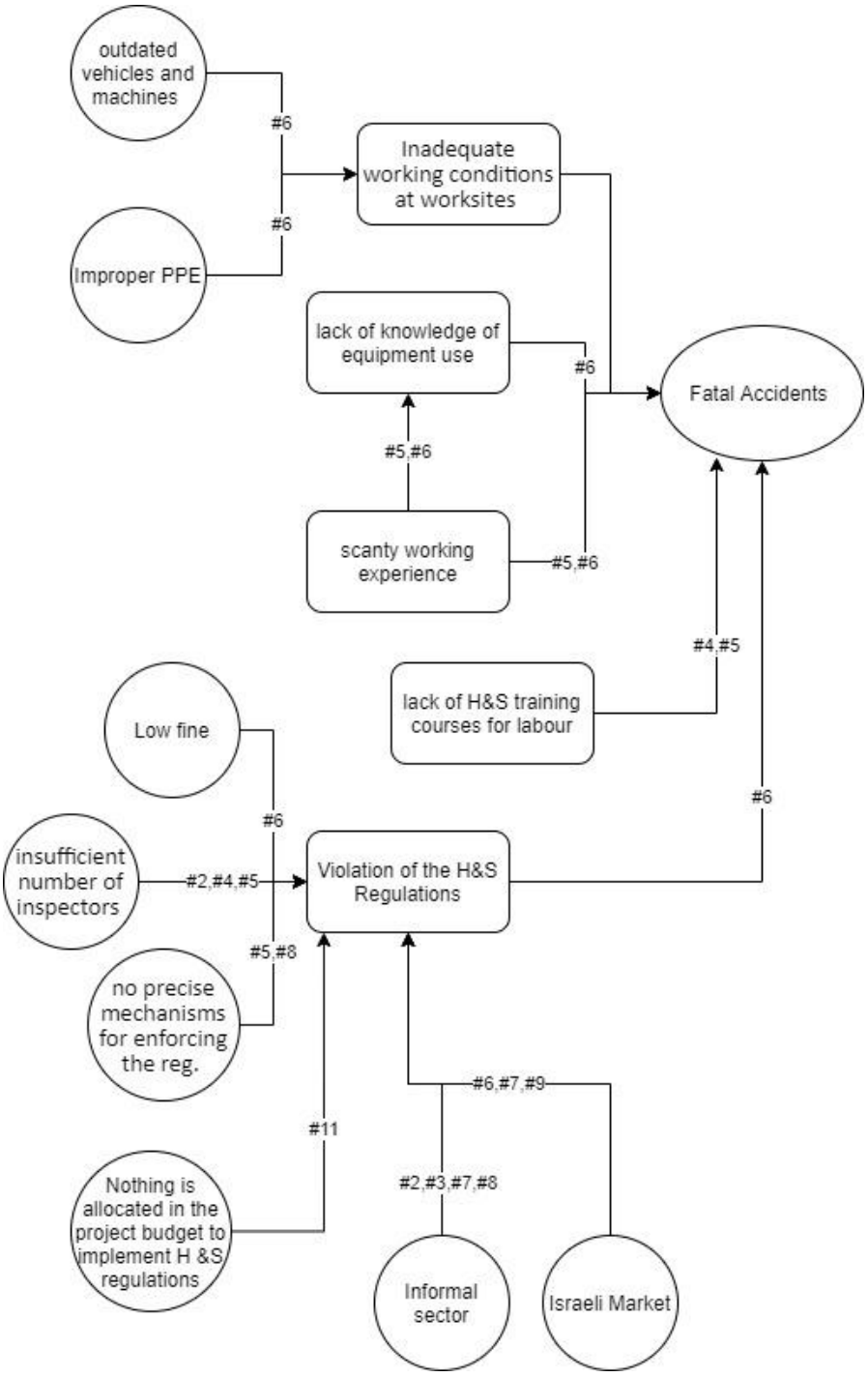


Figure 8. 6: Structural and Agency Determinants at different levels led to accidents at construction sites

Other interviewees[100] asserted that the regulations and laws of health and safety issued by the Palestinian MOL and contracts between the contracting and supervision companies are sufficient and excellent in principle. However, there are neither specific mechanisms,

[100] See for instance, interviews #1, #2, #3,#4,#11

methods, or continuity in implementing these regulations[101]. The mechanisms for implementing these laws on the ground are missing (***Figure 8. 6***). For example; municipalities lack a municipal police presence. Moreover, courts do not deal quickly with work issues and infractions related to the non-enforcement of safety and health regulations[102]. Thus, the implementation and oversight are fragile and problematic[103].

> There is negligence of the MOL in applying occupational safety regulations. For example, unfortunately, the MOL employees work hard to ensure that these requirements are applied when an accident occurs for no more than two months, and then the situation returns to its previous state (Interview #2).

Additionally, the presence of an unregulated informal sector (***Figure 8. 6***), in which widespread injuries among workers have occurred without declaration, and the political division of the West Banks into Areas A, B, and C reduce the ability to enforce compliance with health and safety laws and regulations, especially in the areas outside the PA control[104]. Moreover, adherence to health and safety regulations in the West Bank depends on the sector, whether public or private and the projects' donor. Accordingly, compliance with these regulations is either a) perfectly applied in public projects funded by donors, mainly those funded by USAID; b) partially applied in public projects funded through the PA or c) almost not applied in the private sector projects, which is the largest sub-sector in the construction industry in the West Bank[105]. For instance, interviewee #11 points out:

> The implementation of health and safety procedures is very costly. We can not afford the application of all regulations without any compensation. The upper supervisory authority over us in projects funded by the PA does not obligate us to implement the procedures because their application requires them to pay additional amounts. Therefore, health and safety are not seriously taken when pricing the project. [...] However, unlike the projects funded by the government, all USAID-funded projects allocated a budget

[101] Interviewes #1, #4, #5, #8, #12
[102] Interview #5
[103] Interview #5
[104] Interviews #2, #3,#5,#8,#9
[105] Interviews #2, #4,#5,#11, #12

regarding this issue. Thus, the pricing in these projects covered the cost of applying these regulations.

At the construction sites, workers are not given training courses in applying safety measures and using the equipment but general instructions[106]. Also, safety measures, which are not carried out in an optimum manner but at a minimum level that reduces the possibility of death in the event of an accident, are limited only to hazardous work, such as stone cladding and pointing activities[107]. **Photo 8. 1** to ***Photo 8. 6*** illustrate the inadequate working conditions and the non-compliance with applying health and safety requirements at several construction sites within the West Bank.

Photo 8. 1: Construction workers working on a project in Ramallah city[108]

[106] Interviews #4, #5, #6
[107] Interview #11
[108] From https://www.nbcnews.com/id/wbna40431737

Photo 8. 2: The collapse of the roof of a building under construction during concrete pouring in Nablus[109]

Photo 8. 3:The collapse of the roof of a building under construction during concrete pouring in Hebron[110]

[109] From https://www.wattan.net/ar/news/154161.html

[110] From https://www.paleng.org/

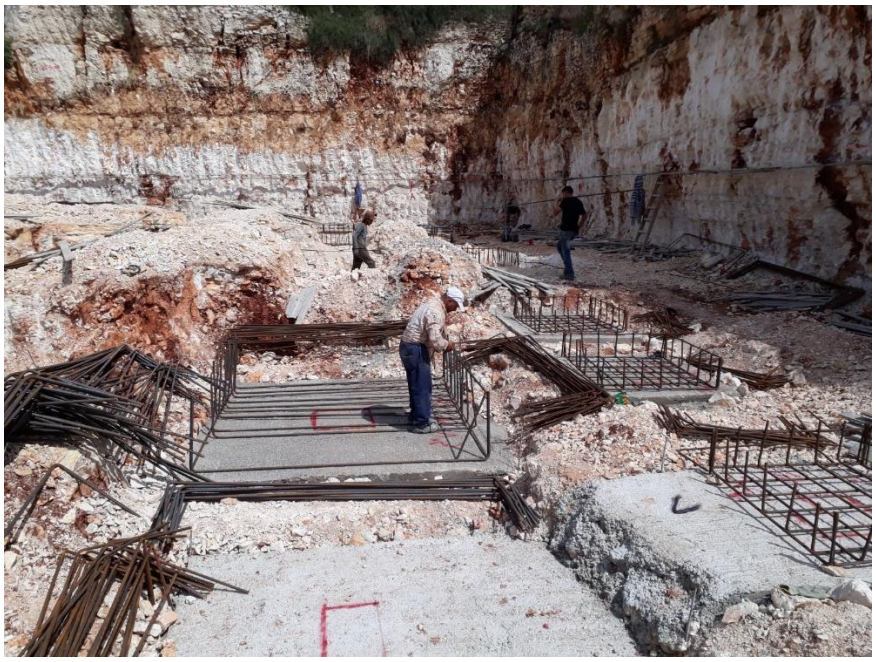


Photo 8. 4: Workers on a construction site in Ramallah without any health and safety measures being applied

Photo 8. 5: Inadequate scaffolding system at a construction site in Ramallah

Photo 8. 6: A worker uses a Kangoo electric drill to open a window in a constructed wall without wearing appropriate personal protective equipment

All parties have minimal interest in adopting safety and health regulations in construction projects, as depicted in ***Photo 8. 1*** to ***Photo 8. 6***, which illustrate that establishing a strict safety system separated from the supervision department to implement those requirements is missing in most building projects in the West Bank, particularly in the private or informal sector[111]. All photographs reveal that most workers perform their duties without taking any health and safety precautions. Although the Palestinian MOL reports show the number of deaths caused by falls from heights or other causes on construction building projects, no official body documents the number and severity of injuries or investigates the employment conditions of workers, such as work insurance and paid sick leave[112].

8.6.3 Planning and coordination

The design's buildability or constructability has repeatedly been mentioned as one of the significant factors that impact labour productivity in the construction industry for developing and developed countries (see Chapter 4). Yet, in the West Bank, the problem of design's buildability was not highlighted as the challenges in the construction projects, if any, are very few and can be overcome easily[113]. In contrast, the structural factors

[111] See Interview #11 & #12.
[112] Interviewees #1, #8 & #11
[113] Interview #5,#7, #8

impacting labour productivity in the West Bank were poor coordination of information between contract documents, including working drawings, specifications and BOQ[114]. One common problem in the working drawings is the lack of coordination and thus leading to clash problems during the execution stage[115]. These problems have been overcome due to the existence of engineering consulting offices with four engineering specialisations, whose outputs are integrated and well-thought-out drawings and designs.[116]Nevertheless, the clash problems depend solely on the quality of the design, which depends on the project budget available and the owner's desires [117]. Furthermore, design and other contract documents are modified to consider the capabilities of contractors in the West Bank and locally available equipment and materials, as many designers do not consider the context of the project. [118]

Another structural problem impacting labour productivity is the lack of planning. The entire planning process is pro forma and lacks planning essentials, and the construction projects are managed by cumulative experience of the contracting firms rather than detailed engineering work and proper planning [119]. For instance, a project plan is nothing more than a graphic representation of the main activities of implementing the project without considering the availability of materials and workers. Additionally, milestones and submittals, including shop drawings, material data, and samples, are always missing [120]. In these schedules, the duration of each activity is estimated based on the contractor's experience[121]. As shown in ***Figure 8. 7***, most construction projects' financial planning or cash flow is missed due to the owner's erratic payments, especially on projects sponsored by the Palestinian government[122]. ***Figure 8. 7*** indicates that the financial management of the contractors is fragile. For instance, interviewee #7 contends:

> The down payment, which is 10% of the contract price, helps the contractor perform better if he uses it well. However, […]it has been discovered that most contractors used the down payment to finance their troubled projects

[114] Interviews #3, #11, #12
[115] Interview #11, #12
[116] Interview #8, #11
[117] Interview #4, #8,#12
[118] Interview #1,#4
[119] Interviews#4,#5, #12
[120] Interview #4,#8, #11, #12
[121] Interview #4,#8, #11
[122] Interviews #2, #3, #7, #8, #11

elsewhere or on their personal or family expenses, such as buying a car. The mobilisation payment provision has been suspended and is no longer used in our projects as we discovered that the contractors are not employing it correctly, which hinders their productivity.

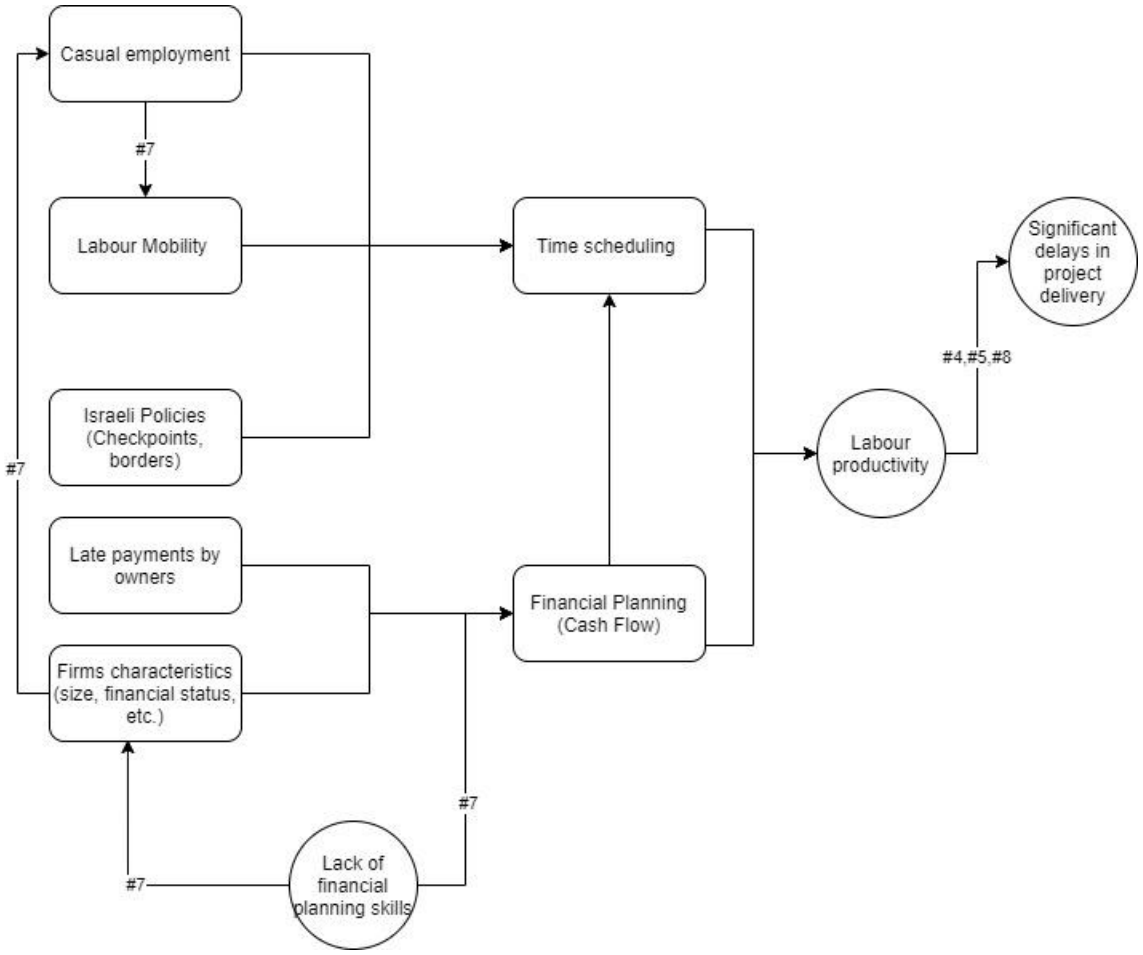


Figure 8. 7: Structural and Agency Determinants impacting the planning process for the building projects in the West Bank

As a mediating factor, political instability and turmoil make this planning subject to change daily (***Figure 8. 7***) and have caused project schedules to become irrelevant or not reflective of site conditions. For example, the workers may sometimes not reach the site because of the Israeli checkpoints and closures in the West Bank[123]. At other times, materials imported are detained in Israeli ports for long and more unpredictable periods than the time agreed between the supplier factory and the contractor[124]. Thus, the ability to

[123] Interveiew #3, #8
[124] Interview #3, #4, #8

implement the timeline is subject to several issues, sometimes beyond the control of all contracting parties[125]. Consequently, since it is difficult to update the schedule multiple times per week to show these changes, the entire construction process is carried out on the sites based on daily crash actions[126] based on the cumulative experience of the contractor.[127] As shown in ***Figure 8. 7***, the contracting firm characteristics are not considered when the owner estimates the time required to deliver the project[128]; for example, interviewee #4 argues:

> In general, contractors, even those classified under category A -level 1, have very weak financing capability. [….] Sometimes, the time set by the owner to finish the project is illogical and does not consider the capabilities of local contractors or the country's political and economic conditions. For example, a more prominent contractor cannot spend more than $100,000 per month on a project; thus, it is nearly impossible to complete a project with a $1 million budget within six months.

Others claim that 70% of the delays in project delivery in the West Bank are due to the lack of liquidity of contractors[129], which in turn led to the absence of workers and delays in the provision of materials by suppliers[130]. The lack of job security ends with having blue-collar construction workers, who in turn are absent from work for a short period if they obtain a short-term job at a reasonable cost or sometimes tie themselves to more than one employer at the same time[131]. In addition, they may move from one contractor to another if offered a higher wage elsewhere.[132] Accordingly, the quality of workers is not constant even during the construction stage of one project[133]. Additionally, the casual and temporary workers, particularly the extensive use of casual and temporary workers, impact

[125] Interview #3, #4
[126] Daily crash actions means to execute the construction work without planning and trying to keep people busy rather than managing their work.
[127] See interviews #4, #5, #7,#11,#12
[128] Interview #4,#7, #8
[129] Interview #7
[130] Interviews #5, #7
[131] Interview #7
[132] Interview #7
[133] Interview #7, #8

the planning process and lead to several reworks[134], as the labour quality is unpredictable and keeps fluctuating[135].

8.6.4 Impact of Israeli policies on industry innovation

There has been no significant change or development in the use of new technology in construction, and workers remain the mainstay of enterprise productivity.[136] Most engineering designs and plans are 2D, mainly based on AutoCAD and sketchy in terms of philosophy; thus, innovation barely exists.[137] For example, BIM technology is neither supported nor used in the design or construction stages[138] , except for the Rawabi city construction project[139]. Nevertheless, a positive impact of the movement of Palestinian workers to Israel has been to help transfer some of the techniques used in constructing buildings in Israel, especially concerning insulation and finishing materials[140]. For example, in the Rawabi city project, the advanced Doka shuttering system used for a long in the Israeli construction markets compared to the sector in the West Bank was easy to implement[141]. Palestinian workers are implementing new technologies in the construction sector, reflecting their learning speed through direct and close engineering supervision.[142] For example, the mechanical and electrical works in Rawabi city were executed by Palestinian workers from the West Bank under the supervision of a Jordanian electromechanical company, which had a four-year management contract[143]. This reflects the fact that most construction site workers have not graduated from technical and vocational education and training in the West Bank. It also highlighted the positive impact of labour mobility to the more advanced Israeli construction markets, as workers gained new experience in terms of materials and some construction methods and transferred them to the West Bank. Construction technology is used on public projects, although its use in

[134] See interviews #4, #5, #8, #12
[135] Interview #2, #4, #8
[136] Interview #7,#8
[137] Interviews #1, #9
[138] Interviews #1, #3, #11
[139] Intrview #9
[140] Interviews #8, #9
[141] Interview #9
[142] Interview #4, #7, #9
[143] Interview #9

the West Bank is minimal due to its high cost and the size of the projects[144]. For instance, interviewee #3 states:

> Some companies use iron scaffolding and tower cranes in the construction phase to save time and cost.

Additionally, Interviewee #7 argues:

> There are currently many consulting offices with more experience than in the past, and these offices usually study any new technology in construction science and try to apply it. Likewise, people have gradually accepted the idea of new technology; for example, Cobiax voided flat plate slab technologies. It was not easy to accept, but now many projects use this technology. Also, Post-tensioned (P.T.) slabs were not used in the past, but now there is a company in Bethlehem with many projects applying this technology in the West Bank. Of course, new ideas and technology are challenging initially, but companies and contractors accept them significantly if they save time and cost.

However, the Israeli occupation has strangled the unrestricted use of building materials through the Protocol on Economic Relations, the Paris Protocol, and its control of all Palestinian outlets. Although the protocol was signed to mend asymmetrical relations between the two economies and expand foreign trade for the Palestinians, the dependence on Israel only deepened. Israeli ports remained the main gates used by the Palestinian people for import and export (Elagraa, et al., 2014). According to Elagraa et al. (2014), since the second intifada outbreak in 2000, Palestinian shippers have faced a myriad of new problems associated with the import and export of goods. These problems include but are not limited to Israeli stringent security procedures and physical barriers, unilateral Israeli control over all outlets, movement restrictions imposed on the Palestinian people and goods, and the 'back-to-back' system. Thus, the sector's productivity in terms of construction materials and equipment used is principally determined by the limitations imposed by the Israeli occupation rather than the sector's capacity. For example, one of the main factors affecting productivity in Palestinian construction in the West Bank is the limited choice of construction materials and equipment available[145]. The West Bank is a

[144] Interviews #3,#4,#5, #10
[145] Interview #5

de-facto landlocked territory aggravated by Israel's unilateral control of borders and transport facilities[146].

Another significant structural factor impacting the availability of construction materials and equipment is the Israeli restrictions on dual-use goods. For example, Israel has used security reasons as a pretext to prevent importing certain building materials, such as bulletproof glass, into the West Bank[147]. On the same pretext, digging in the commercial area of Rawabi City, known as the Q-Center, took about five years to complete because the Israeli side did not allow the use of explosives and gunpowder, which, if used, would have meant that the digging would have been completed in less than a year[148]. Cuyckens (2018) states:

> The definition [for dual-use] provided under the Israeli Defense Export Control law seems to put the focus on the fact that these items are actually intended for civilian use but are compatible with defence use whereas the E.U. definition refers more specifically to items that can be used for both (p. 9).

In addition to the items included in the "control list" of dual-use items outlined in the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, there are dual-use lists. The first consists of 56 articles that require "special Israeli approval" for entry into the Occupied Palestinian Territories. The second, which contains 61 additional articles, is specific to the Gaza Strip (GISHA, 2016)[149]. Accordingly, several construction materials and equipment, considered "dual-use", such as pipes and GPS, particularly those used in infrastructure construction projects, require special permission to be brought in[150]. In turn, this leads to complex working conditions that reduce the construction sector's productivity. For instance, several change orders were requested during the implementation of the building project due to Israel's refusal to bring certain construction materials necessary for the project into the West Bank[151]. Elagraa et al. (2014) stated that excessive bureaucratic controls and lack of transparency and predictability are the two underlying concerns of the Palestinian shippers regarding dual-

[146] Interview #5
[147] Interview #4
[148] Interview #9
[149] GISHA stands for the Legal Centre for Freedom of Movement
[150] Interviews #5, #12
[151] Interview #4

use goods. Under the Israeli system of bureaucratic controls established, the licence needs to be obtained to import the items contained on the dual-use list into the OPT. This system requires that the permit issuance process for each shipment of a dual-use item must be repeated, even if it concerns the same category of imports (Cuyckens, 2018; Elagraa, et al., 2014). Permits take four to eight weeks to be issued and are valid for 21 days from the issue date (Cuyckens, 2018).

Regarding the construction projects, the approvals and issuing of permits for certain construction materials are time-consuming and depend on the source of funding and supervision; for instance, if the donor of the project is the USAID or Germans agencies, approval will be obtained faster[152]. Furthermore, although the dual-use lists were published only after a lengthy legal battle and concerted advocacy efforts by GISHA (GISHA, 2016), the latest dual-use list, in which new items can be added without notice, is not always readily obtainable (Elagraa, et al., 2014). Therefore, the construction sector in the West Bank is limited to a specific set of building materials and equipment that are allowed to be imported into the West Bank[153]. Thus, there has been no significant change or development in using new technologies[154].

8.7 Employment Conditions

As shown in ***Figure 8. 8***, almost 3% of the blue-collar building workers working in the West Bank have a written contract for a limited or unlimited period. On the other hand, over 64% of the workers do not have any work agreement with their employers, and the remaining percentage only have verbal agreements with their employers. These figures, which are confirmed by most of the interviewees, reflect the informality of the building construction sector in the West Bank. Some claim that in the official building subsectors of the West Bank, the percentage of workers with signed employment contracts does not exceed 18% as a maximum[155], while others clarify that the contracts between workers and contractors, if any, are not permanent but rather project-based[156].

[152] Interview #5
[153] Interviews #5,#7, #8
[154] Interview #8
[155] Interview #3
[156] Interviews #1,#3, #4,#5,#8, #11

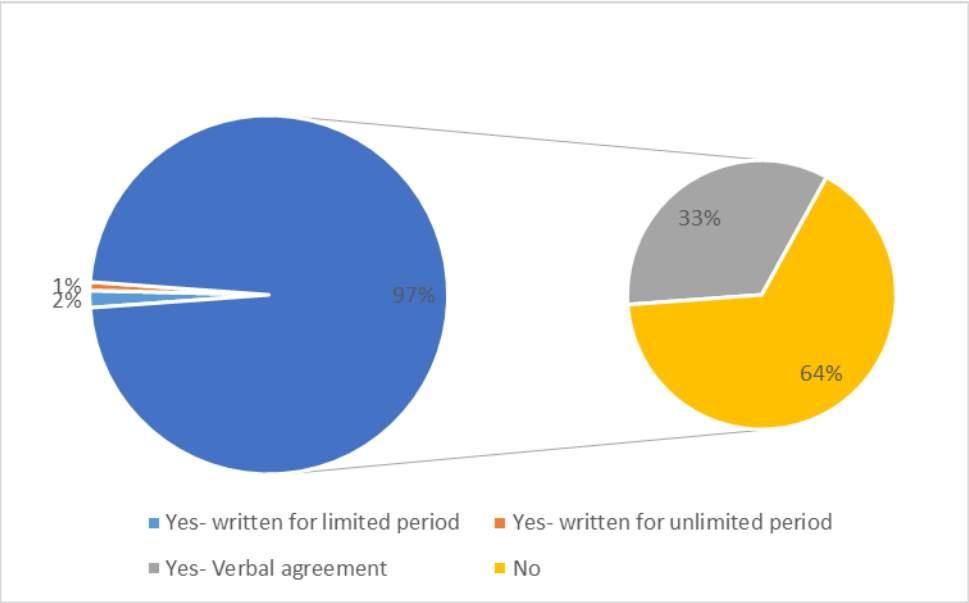


Figure 8. 8: Distribution of the building workers working in the West Bank by their legal status[157]

The forms of the employment contracts written in Arabic emphasise almost everything except the labour, skills and qualifications. The terms of the contracts focus on wages, which are output-based, their duration and the method of payments. For example, according to one of these subcontracts, the price of the plastering works includes all work supplies such as equipment, tools, workers, technicians, and all indirect work requirements such as insurance and transportation for the domestic subcontractors workers[158]. Additionally, the forms of another construction firm in Ramallah were almost similar in terms of conditions[159]. Yet, one of the tiling subcontract agreements stated that the price of the damaged (broken) tiles should be deducted from the second party, i.s. the domestic subcontractor. Furthermore, it adds another condition "If the second party is late in handing over the work as mentioned above in Clause No. 6, it shall be 500 shekels deducted for each day of delay.[160]" These contracts are almost unit pricing contracts and unauthorised subcontracts that are signed with domestic rather than nominated subcontractors. The wage

[157] The PCBS Quantitative Raw data for the periods between 2014 and 2019
[158] A subcontract agreement between a prime contractor from Nablus and a domestic subcontractor for plastering works
[159] Agreement for tile work , a Agreement for stones pointing works and an external works agreement for a government construction project between a local contracting company and local subcontractors
[160] See the Agreement on the work of tiles for a government construction project between local contracting firm and building and tiling subcontractor.

structure in these contracts is strongly craft-based. Also, wage rates vary according to the type of firm and the region.

Contracting firms in the West Bank always sign labour-only contracts with self-employed workers, such as the plasterer, responsible for workmanship and equipment. However, except in some cases on large projects, these agreements are unauthorised subcontracts, and the main contractor is not notified of them[161]. Interviewee #9 clarifies:

> All contracts with workers are under the prime contractor's responsibility. We have no involvement in contracting with workers or subcontractors, nor in how the main contractor coordinates his work. As a real estate development company, what matters to us is handing over the project on the date specified in the contract.

Most companies avoid making contracts with workers because the agreement contains conditions that save the worker's rights and protect workers from exploitation[162]. Usually, the agreements with workers are verbal, and the payment is made using either a daily system, lump-sum or unit pricing[163]. Accordingly, the employment conditions for blue-collar workers in the West Bank are unsecured. In addition, other job security factors are provided to the small percentage of workers working in the West Bank. For example, the proportion of workers entitled to benefit from pension funds or end-of-service benefits is slightly over 3%, and less than 3% and 2.4% of them, respectively, have received paid leave and sick leave[164].

On the other hand, the statistics show that the percentage of job security factors for workers in the Israeli market is higher than in the West Bank. For instance, over 34% of them are entitled to benefit from pension funds, over 29% have received paid annual vacation, and almost 13% have received paid sick leave. Furthermore, less than 3% of the workers from the West Bank working locally, i.e. in the West Bank, have been provided either free private health insurance or free public health insurance, and approximately 5% of them have been insured against injuries at their construction sites[165]. However, the percentages of workers from the West Bank working in the Israeli construction markets

[161] Interviews #4 and #9
[162] Interview #8
[163] Interviews #4, #5, #8, #11 and Figure 8. 8
[164] The PCBS raw data
[165] The PCBS raw data

who have private health insurance or are insured against accidents at the construction sites are 16.5% and 22.5%, respectively. Moreover, only 2% of workers have received training courses during the first period at work, indicating that the health and safety of blue-collar workers working in the West Bank have been ignored by their employers and the clients of the construction projects. For instance, data for 2018 and 2019 show that of construction workers employed in the two sub-sectors in the West Bank, slightly over 1% have vision difficulties, 1% have hearing difficulties, and 2% have difficulty moving and using their fingers. Furthermore, the PCBS Raw data show that every year almost 3.5% of the blue-collar workers have been exposed to injury on construction sites in the West Bank. While less than 15% of injured workers are paid during their absence, data shows that more than 91% of wounded workers had been absent from work until they recovered. Thus, the enforcement and implementation of health and safety regulations on construction sites are weak.

Finally, the statistics show that almost 97.5% of the workers are not members of any labour unions in the West Bank, and thus no one defends their rights. Consequently, the construction sector in the West Bank, which is considered an informal sector (see Chapter 3), shares many of the characteristics of North African and middle east economies in terms of poor working conditions; such workers run the risk of losing their job and delays/ or non-payment of what is due and bear personal responsibility for their own safety and the costs of their medical care. Moreover, the data and analysis show that most workers working in West Bank have no access to health or accident insurance and do not contribute to pension funds, which provide income after retirement. Thus they experience high vulnerability to social risks (lack of job security).

8.7.1 Social security law and Labour Union

The weak affiliation of the blue-collar workers to any of the workers' vocational unions in the West Bank as an agency factor impacts labour security and their productivity in the sector. Although construction workers in the West Bank earn a higher income than others in other sectors[166], employment conditions are insecure[167]. The Palestinian worker moves from one site to another until he reaches 60 years and becomes unable to work[168]. Since the

[166] Interview #2
[167] Interivews #1, #2, #5, #6
[168] Interview #5

workers in the sector are not attached to an institution that preserves their rights and works to solve workers having more than one employer, there will be no other source of financing for workers except their savings after leaving this sector. [169] Thus, the situation of workers is still at risk, and their rights are squandered[170], particularly after the Social Security Law, which was supposed to include work injuries and pensions for workers in the private sector, was suspended by the President of the P.A[171]. Furthermore, the Labor Law stipulates that the worker has a paid weekly holiday for one day after working for six days. The law also determines the number of annual holidays, religious holidays, and official occasions[172]. However, workers' financial and other rights, such as vacations, are not subject to oversight and scrutiny by government agencies, neither the Ministry of Labor nor the courts, due to the nature of temporary contracts on construction projects in the West Bank[173]. For example, Interviewee #6 states:

> The law states that day workers have the same rights as workers with a permanent contract, but their payment method differs. Yet, employers say that whoever works daily is not a permanent worker, and therefore all rights, such as annual leave and weekends, are forfeited for him.

Thus, construction workers are not protected from being exploited by their employers, as the labour union is fragile and the labour law in Palestine is not enforced[174]. For example, in the case of an accident at any insured construction project, the worker will receive just 75% of his salary for a maximum period of six months[175] and a compensating amount through a specific equation from the insurance company[176]. Accordingly, the demand for TVET in Palestine is low[177]; construction workers' demand to be part of the construction market has weakened, and the chance of departure from this sector, if an appropriate alternative were available in other more secured sectors, is increased[178]. Workers' lack of

[169] Interview #2, #5
[170] Interview #1, #6
[171] Interivew #6
[172] Interview #6
[173] Interviews #5, #6
[174] Interviews #1, #2, #5, #6, #7
[175] Interview #6
[176] Interviews #1, #6
[177] Interviews #2
[178] Interviews #1,#2, #5

job security is the main reason for labour absenteeism and disloyalty[179] and motivates them to mobile to Israeli construction markets[180](see ***Figure 8. 9***). Interviewee #5 argues:

> Workers suffer here, and there is legal protection for their work. The workers lack the right to retirement and health insurance because they work under the day-based system; this led to construction workers voluntarily moving to work in the Israeli construction market, especially skilled workers.

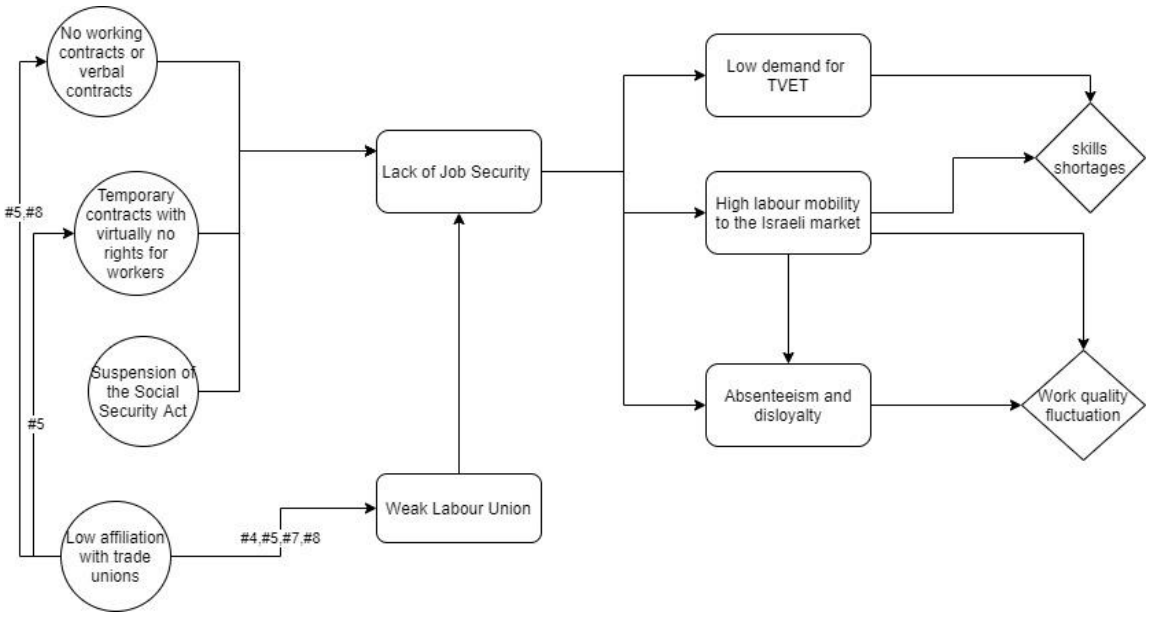


Figure 8. 9: The effects of employment conditions and job security on agency determinants impacting labour productivity

Figure 8. 9 illustrates the structural factors that led to insecure employment conditions, which in turn affected several agency factors, such as labour mobility to Israeli construction markets, labour disloyalty and absenteeism and lower demand for TVET. Consequently, these agency factors, such as labour mobility and low demand for the TVET, have impacted construction productivity by increasing the skills shortages and labour absenteeism problems that lead to fluctuating quality of construction projects. The low labour affiliation with trade and labour unions (as an agency factor) is associated with the weakness of these unions in the West Bank (***Figure 8. 9***), which has impacted the

[179] Interview #1
[180] Interviews#1,#2,#3, #5

valuing of labour in the process and increased employer exploitation of blue-collar workers in the sector and thus mobility increases.

8.7.2 Valuing of Labour

The labour payment is output or production-based rather than related to qualifications[181]. Also, the wage structure is strongly craft-based and employment contracts, if any, are temporary. Therefore, contracting firms often tend to have a high labour turnover[182], thus operating with a high degree of unpredictability in terms of labour, quality, and cost (***Figure 8. 9***). Workers often do not adhere to the specifications and focus on quantity more than the quality of the work to maintain continuity in their work and improve their daily incomes. Thus, this increases the need to have direct and close supervision[183]. Furthermore, the lack of continuous working relationships between workers and contractors, lack of employment contracts, and contracting firms' characteristics have resulted in low or no investment in blue-collar workers' training[184]. Add to this, the proportion of labour costs to the project's price is small[185] and, since the late 1990s, has not increased to cover inflation in the cost of living [186]. Even though the workers' experience might be considered when determining the daily wage or the unit price that is evaluated and decided by the employers or contracting firms, the margin of the difference in wages is small and does not exceed ten ILS per day (less than £3)[187]. Thus, Interviewee #5 concludes:

> While we see an increase in the prices of buildings, we note that the wage rate for workers has remained the same, and given that the purchasing value of the currency has decreased, it can be said that workers' income has decreased.

On the other hand, workers working in the Israeli construction market with work permits have health insurance and end-of-service fees, unavailable to their counterparts working in the Palestinian construction sector. Thus, Palestinian construction workers under this

[181] Interviews #8, #11
[182] Interview #7
[183] Interview #7
[184] Interviews #2,#3, #5, #7, #9, #11
[185] Interview #11
[186] Interview #5
[187] Interview #5

category are valued better than their counterparts in the West Bank in terms of salary and having more secure employment conditions.

8.8 Relation between Labour Mobility and Locality type

As demonstrated in Chapter 7, the dominant factor impacting labour productivity in the construction process is the mobility of construction workers to Israeli construction markets. This agency factor has been considered the leading cause of skills shortages in the West Bank[188]. Labour mobility to the Israeli construction markets is not specific to a particular governorate but affects all West Bank governorates[189]. Thus this section examines the effect of labour mobility on the sending construction market, bearing in mind that almost 57% of blue-collar workers from the West Bank working in the two subsectors are working in the Israeli construction markets (***Figure 8. 3***). The data show that 56% and 62% of the blue-collar construction workers from urban and rural areas work in the Israeli construction markets compared to approximately 32% of those living in refugee camps[190]. A Kruskal-Wallis H test was conducted to determine if labour mobility to the Israeli construction market for workers from the West Bank differs based on locality type, which is: (a) urban (n = 10,432); (b) rural (n = 5,997); and (c) camp (n = 1,117). A Kruskal-Wallis H test showed a statistically significant difference in mobility between the three groups, $\chi 2(2) = 342.138$, $p = 0.0001$. The difference could be linked to these localities' size, building projects and proximity to the green line.

Lack of investment by the Palestinian Authority or local developers in rural areas due to the Oslo Accord's political division of the West Bank compared to urban areas, which are mainly located in Area A, could lead to a higher rate of labour mobility for the workers living in rural areas to Israeli construction markets. The most significant private investment and real estate development project in the West Bank is the Rawabi City project in Ramallah governorate[191]. In addition, construction was limited to areas A and B in all provinces, with residential or non-residential building projects concentrated in city centres.[192] Due to the limited land and the high demand, as Israel controls over 60% of the

[188] All interviews
[189] See for example interview 3
[190] Quantative PCBS data for the period 2014 and 2019
[191] Interview #10
[192] Interview #2, #4, #5, #10

area of the West Bank, mainly in the rural areas, construction prices have skyrocketed.[193] Yet, the dramatic increase in construction prices has not been reflected in the workers' wages, working and employment conditions or training. The most extensive stock of government lands on which housing and mega construction projects can be built is in Area C, under the Israeli occupation control that has rejected all master plans to expand the boundaries of Palestinian towns and villages[194]. As a result, from 1993 until now, all cities have not expanded except for Nablus, which is far from the green line (see Chapters 2 &9), nor have the Palestinian people living in area C been granted building permits[195]. Consequently, a surplus of construction workers from Area C compensated for the shortages in area A, particularly in Ramallah[196].

Nevertheless, the existing labour force is not commensurate with the projects offered in the Palestinian construction market[197] due to the openness of the attractive Israeli construction markets to West Bank workers.[198] As a result, there is a massive shortage of skilled labour, and the construction market in the West Bank is currently suffering due to the lack of qualified technicians[199]. However, areas near the Green Line experienced more severe labour shortages than other areas[200]. Proximity to the Green Line for workers living in rural areas compared to camps and urban areas can result in a higher commute rate to Israeli construction markets. Most of the workers, who live in areas close to the Green Line, work in the Israeli construction market, and the percentage decreases as the distance between the workers' place of residence and the Green Line increases[201].

The statistically significant difference between the urban and rural areas and camps in terms of mobility of workers to the Israeli construction markets could be due to either the work permit requirements imposed by the Israeli occupation force on workers or the lack of their qualifications. Israel issues work permits only for married workers over a certain age. The permits issued by the Israeli occupation force for any purpose, including work

[193] Interview #5, #7,#10
[194] Interview #5, #7, #10
[195] Interview #2,#5,#7, #10
[196] Interview #7
[197] Interview #3 and Tarawa (2021)
[198] All interviews and Tarawa (2021)
[199] All interviews and Tarawa (2021)
[200] Interview #7
[201] Interview #7

permits, depend solely on passing the so-called security check. Several interviewees[202] argued that the available construction workers in the West Bank are those a) who cannot get a job in Israel due to age or a security ban category or b) elder workers over 50. Thus the labour available is restricted[203]. The investigation of the impacts of labour mobility to the Israeli markets on blue-collar workers' productivity in the West Bank, such as the skills shortage, a more extended construction period, and lower final product quality is twofold: the first is the percentage of skilled labour to unskilled labour working in the Israeli construction markets. The other is related to the length of experience and the age of workers moving to the Israeli market.

A Kruskal-Wallis H test was conducted to determine if labour mobility to the Israeli construction market for workers from the West Bank differs based on occupation type, which is: (a) Craft and Related Trade (n = 10,083) and (b) Elementary Occupation group (n = 7,463). A Kruskal-Wallis H test showed a statistically significant difference in mobility between the two groups, $\chi 2(1) = 311.817$, $p = 0.0001$. Furthermore, the T-test revealed that labour mobility to the Israeli market was statistically significantly higher for Craft and Related Trade workers than those under the Elementary Occupation group by more than 13% ($p<0.05$). The data show that the average age of workers working in Israeli markets is almost 37 years, six years higher than workers working locally. Finally, the data show that the working experience for workers working in the Israeli market is 9.5 years compared to 6.9 years for those working locally. Also, the average experience of skilled workers working in the Israeli market is almost 2.5 years higher than their peers working in the West Bank. Accordingly, the results indicate that the construction sector in Israel is more targeted toward skilled blue-collar workers than unskilled ones, causing the construction industry in West Bank to face skills shortage problems. Labour mobility to the Israeli construction markets has led to skill shortages in the construction market in the West Bank, particularly in tilers,[204]steel fixers[205], bricklayers[206], carpenters[207] and plasterers[208]. To relieve the problem of construction labour mobility, the Palestinian Contractor Union asked the ILO and the Arab Labour Organization to exert pressure on the

[202] Interviewees #3, #6, #8
[203] Interviews #3,#6, #8
[204] Interviews #7,#11, #10
[205] Interviews #10, #11, #12
[206] Interviews #11, #12
[207] Interview #7, #11, #12
[208] Interview #7,#11, #12

Israeli government to allow construction workers from the Gaza strip or foreign workers to work in the West Bank[209] . The request submitted to the Israeli government through the Palestinian Civil Status Authority, which demands that the Israeli side allow at least 10,000 construction workers to enter and work in the West Bank[210], shows the significant shortage of trained, skilled and experienced workers in the West Bank[211]. It also shows the inability of the construction firms to compete with the wages offered by the Israeli markets[212] due to the intense competition among companies in the West Bank in providing unrealistic bid prices to win the bid [213].

The underlying factors that contributed to the increase in the rate of labour mobility into the Israeli construction market are a) the significant difference in the daily wage between workers working in the West Bank and their counterparts working in Israel (the wage in Israel is three times the one in the West Bank)[214], b) Job insecurity for construction workers working in the West Bank compared to their counterparts working legally in the Israeli construction market[215] and c) the better working conditions in Israel in terms of continuity of work and no delay in the payment of labour dues.[216] While the Israeli construction market bears part of the skills shortage in the Palestinian construction market, the Palestinian Authority also bears part of the problem due to the absence of qualified vocational education institutions in Palestine and the low investment in the TVET sector[217]. Consequently, the rework due to poor workmanship has dramatically increased.[218] Direct and close supervision of workers has been dramatically increased to reduce the reworks in the projects[219] leading to an increase in the overhead cost[220].

On the other hand, labour mobility to Israeli construction markets has benefited the construction sector in Palestine by introducing new construction materials and construction methods, particularly in the finishing stage[221]. For instance, interviewee #8 states:

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[209] Interview #3 and Tarawa (2021)
[210] Tarawa (2021)
[211] Interview #1, #6, #7, #8
[212] Interviews #2, #7, #10,#11
[213] Tarawa (2021) , interviews #3, #7, #11,
[214] Interviews #1, #2, #6, #7, #8, #9, #11, Tarawa (2021)
[215] Interview #7, #8
[216] Interviews #1,#4,#8, #9
[217] Interview #5 and Tarawa (2021)
[218] Interviews #1, #4,#8, #11
[219] Interview #4, #7, #8, #9
[220] Interview #9
[221] Interviews #1, #2, #4, #7, #8, #9

> [The] positive impact of our workers' movement to Israel helped transfer some of the techniques used in constructing buildings in Israel, especially concerning insulation and finishing materials. […]The workers in the West Bank lack experience in working with these materials. Thus, Israeli workers are relied upon to train the workers working in the West Bank.

Finally, it is worth repeating that

8.9 Conclusions

This chapter, which indicates that the definition of the term at the macro level is missing, summarises different concepts linked with the term labour productivity, and various definitions have been given at the meso and micro levels. Although several concepts, including skills, training, and labour mobility, have been considered from the factors impacting labour productivity, most of these concepts have been disregarded in the definitions provided. In addition, Israeli policies, through controlling 60% of the West Bank area and the movement of labour and construction materials, have played a crucial role in determining the structural and agency factors impacting labour productivity. All building materials are imported from or through Israel. Israel imposes high customs duties on imported construction materials, controls the energy sources of electricity and fuel, and controls their prices, which raises the cost of the construction process[222]. Consequently, the whole productivity components in the sector are directly or indirectly affected by Israeli policies. The working conditions in the building projects become more complicated as these policies have directly impacted the planning of the construction projects and added new cause for change orders, which is Israel's refusal to bring certain construction materials and equipment necessary for the project into the West Bank. Thus, there has been no significant change or development in the use of new technology in construction, in which workers remain the mainstay of enterprise productivity.

Additionally, the statistical data and interviewees indicated that demand in the Israeli construction markets is mainly confined to skilled building workers from the West Bank. Despite the positive impact of labour mobility to the Israeli construction market on the productivity of the sector in the West Bank by transferring some of the techniques used in constructing buildings in Israel, especially concerning insulation and finishing materials,

[222] Interview #2, #10

this mobility is considered among the main reasons for skills shortages in the West Bank. This chapter has attempted to clarify the causes and effects of construction labour mobility to the Israeli market on the productivity of the sector in the West Bank and presented the employment and working conditions of building workers in the West Bank. Wage disparity between workers in Israel and their counterparts in the West Bank is the most fundamental cause of labour mobility of construction workers from the West Bank to the Israeli construction markets. In addition, Job insecurity for construction workers working in the West Bank compared to their counterparts working legally in the Israeli construction market and the better working conditions in Israel in terms of continuity of work and no delay in the payment of labour dues are among the leading causes of labour mobility.

The data analysis showed a statistically significant difference in labour mobility based on the type of place of residence for workers, with a higher rate of labour mobility for the workers living in rural areas to Israeli construction markets. The proximity to the green line and the size of the construction projects in the centres of the West Bank governorates interpret this statistical relationship. Additionally, because of Israel's control of more than 60% of the West Bank, particularly in rural areas, there has been a lack of investment by the Palestinian Authority and local developers in these areas of the West Bank compared to urban areas, which are primarily located in Area A. For example, camps very close to city centres are among the lowest place for sending labour to the Israeli construction market compared to other areas of residence, i.e. rural and urban areas in the West Bank. This issue will be investigated and explored more in the next chapter.

The results indicate that the construction sector in Israel is more targeted towards skilled blue-collar workers than unskilled ones. Workers available in the sector are second-class workers in terms of skill and experience, as well as 50% of craft building workers working in sub-sectors of buildings in the West Bank work weekly for more than 48 hours**,** representing skill shortages**.** Thus, labour mobility is a significant reason for skills shortages in the West Bank, which have led to more rework due to bad quality of work and thus, strict, close and direct supervision has been imposed on labour. The Palestinian Authority also bears part of the skills shortage problem due to the absence of qualified vocational education institutions in Palestine and the low investment in the TVET sector. As a result, the construction labour process in the West Bank rests on low levels of training and vocational education. The percentage of secondary students joining vocational

education is comparatively low, at 8 per cent in the West Bank (Tarawa, 2021), due to the low absorption capacity of the vocational schools in the West Bank and society's view of the construction profession as inferior regardless of the workers' high salaries compared to other sectors in the Palestinian economy.

Furthermore, people's demand for vocational education is fragile due to the harsh working conditions on site and the lack of job security for workers in the construction sector. The construction sector in the West Bank shares many of the characteristics of North African and middle east economies in terms of poor working conditions, such as running the risk of losing their job and delay/ or non-payment of what is due, and workers are bearing personal responsibility for their safety and the costs of their medical care. Less than 3% of the blue-collar building workers working in the West Bank have a written contract, whether for a limited or unlimited period. Almost all these contracts are unit pricing contracts and unauthorised subcontracts signed with domestic rather than nominated subcontractors. The employment conditions are unsecured. The situation of workers is still at risk, and their rights are squandered, particularly after the Social Security Law has been suspended by the President of the PA. Thus, the sector has also remained dispersed in terms of legal affiliation and poor coordination between the various authorities. Furthermore, labour unions in the West Bank continue to be weak as many construction workers do not realise their advantages. Thus, construction workers are not protected from being exploited by their employers.

The occupational structure of construction labour in the West Bank, between " white-collar " and "blue-collar" occupations, has remained rigid and sharply divided. Furthermore, the payment for blue-collar workers is output or production-based rather than according to qualification. The wage structure is strongly craft-based. Wage evaluation is linked to the employer, who might consider the experience when paying their workers, but the wage difference is negligible. Although labour wages in the middle of the West Bank are higher than in the south and north, the difference is insignificant. Construction workers' wages in the West Bank, which cannot be compared to those offered in the Israeli construction market, do not cover the workers' basic needs.

Hundreds of construction companies and contractors control the construction sector in the West Bank with weaknesses in their financial planning skills. Their intense competition to win the bid has resulted in lower prices than the actual estimated costs of the project.

Moreover, the financial status of construction firms, which is affected by the non-compliance of the Palestinian Ministry of Finance to transfer the overdue receivables to the contractors' bank accounts, has prevented them from meeting their financial obligations to traders and workers on time. Thus, these two structural factors have led to labour absenteeism, disloyalty and mobility, either internally to other Palestinian employers within the West Bank or the Israeli construction markets. Additionally, on-the-job training is almost non-existent in the sector. Thus, most of the injuries in this sector are in the youngest age group, i.e. less than 30 years old, due to meagre experience and lack of training to work in construction projects. Workers in the industry incur 71% of all work-related fatalities.

The results show that the health and safety of blue-collar workers working in the West Bank have been ignored by their employers and the clients of the construction projects. At the macro level, the enforcement and implementation of the health and safety regulations in the construction sites are weak due to the lack of specific mechanisms and methods and the lack of the appropriate number of staff from the ministry to follow up and monitor the application of the requirements in all private and public construction projects. Furthermore, health and safety issues are not taken seriously when pricing the project at the firm level, nor while allocating the project budget except the ones funded by the USAID.

Finally, labour has never been considered a part of any innovation in construction; the concentration is on the materials and equipment, leading to the conclusion that productivity has not yet been considered a social-technical issue. Yet, are working conditions, employment conditions, the applicability of H&S regulations and labour mobility to the Israeli market similar in all governorates? Which agency and structural factors are different in these governorates and why? To what extent have insecure working conditions affected productivity in terms of quality and labour turnover? Finally, what are the impacts of Israeli policies on labour productivity in these governorates? How have the companies managed to mitigate the effect of Israeli policies on labour and materials movement? All of these questions will be answered in the next Chapter.

9 CHAPTER 9:

Exploring the Determinants of Labour productivity in Different Governorates

9.1 Introduction

Chapter 7's regression analysis of three selected governorates revealed that structural and agency factors influencing labour productivity vary by locality. This chapter examines the factors of construction labour productivity in the three governorates, comparing and contrasting their similarities and differences. The chapter initially examines whether the labour productivity for building sectors in the three selected governorates differs significantly. **Figure 9. 1** demonstrates labour productivity in the West Bank and the three main cities, calculated as m^2/Labour.hr.

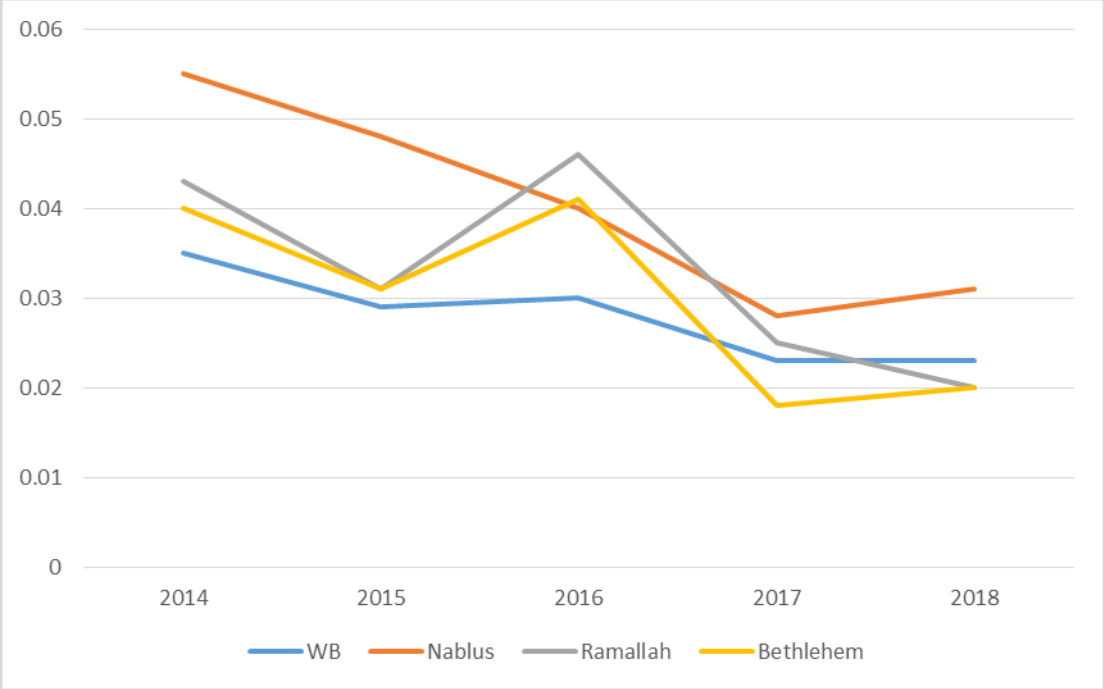

Figure 9. 1: Construction labour productivity for building construction subsectors by project locality[223]

A Kruskal-Wallis H test was conducted to determine if the productivity of construction workers in the building construction subsectors was different for workers who are working in : (a) Nablus (n = 979); (b) Ramallah (n = 566); and (c) Bethlehem (n = 746). A

[223] The PCBS Raw Data between 2014 and 2019 and the PCBS quarterly reports for Building License Statistics

Kruskal-Wallis H test showed a statistically significant difference in productivity between the three groups, $\chi 2(2) = 92.544$, $p = 0.0001$. Yet, the result of the Kruskal-Wallis H test conducted to determine if the productivity of construction workers in the building construction subsectors was different for workers who are working in : (a) Nablus (n = 979), and (b) Ramallah (n = 566) showed that difference in productivity in these two cities is statistically insignificant. This could be related to the output, i.e. the new building construction areas licenced between 2014 and 2018 (***Figure 9. 2***), or to each city's input (labour. hr).

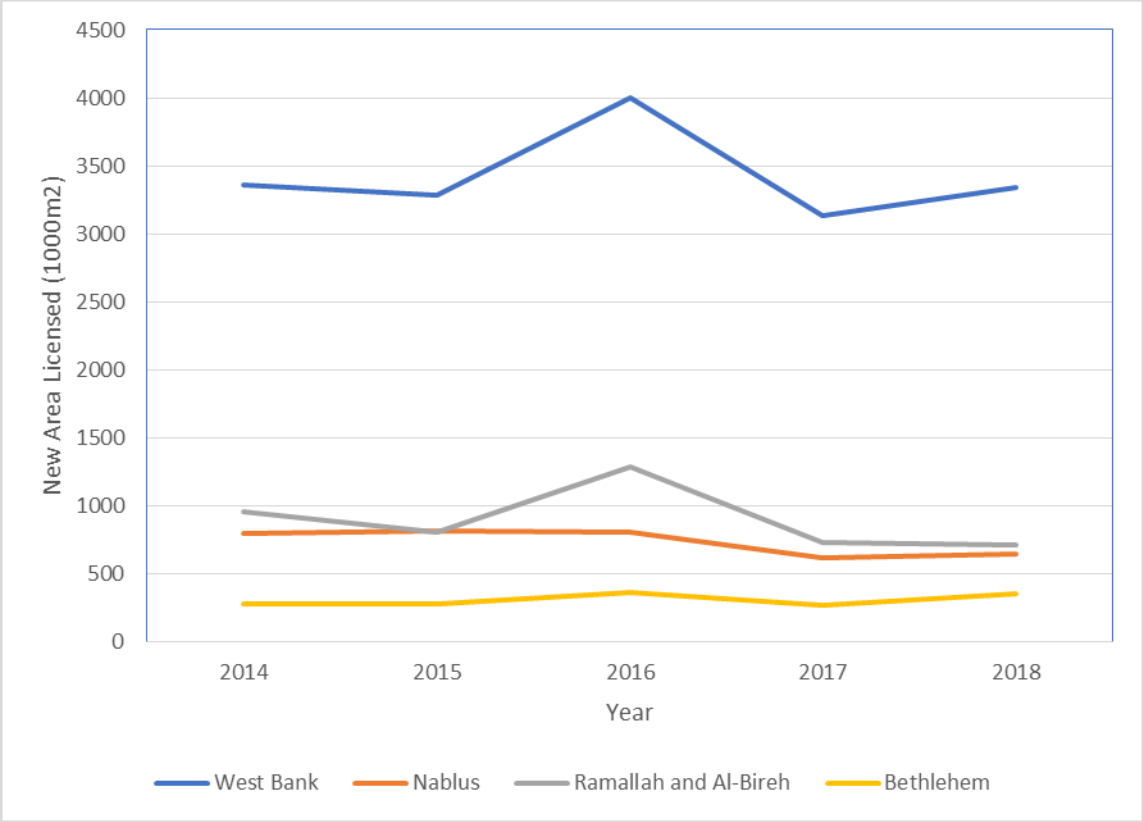

Figure 9. 2: Area Licensed for Building construction sector in the West Bank and the three main governorates between 2014 and 2018[224]

9.2 The structure of the construction industry in Ramallah

The number of registered construction contractors in Ramallah city is 173, comprising over 30% of the total number of firms in the West Bank (PCBS, 2019). While almost 35% of these companies are registered under the Construction of Buildings subsector, coded 41, over 54% are considered under the Specialised Construction Activities subsector, coded

[224] Calculated from the PCBS quarterly reports for Building License Statistics

43. The remaining firms are registered under the Civil Engineering subsector, coded 42, (PCBS, 2019). As the case in the West Bank, small firms dominate the construction sector in Ramallah governorates. Overall, 55% of construction workers from Ramallah work for firms employing under five workers, 36% work for firms that have up to 9 workers, a tiny percentage (4%) works for firms employing between 10 and 19 workers, and the remaining works for firms, which have 20 or more employees.

The average size of the construction workforce from the Ramallah governorate is 21,025, representing 14% of construction workers from the West Bank. 98% work either in the construction buildings subsector (56%) or in the specialised construction activities subsector (43%). The percentage of full-time equivalent (FTE) regular labour is 99.23%. This includes the following groups of workers:

- Employees (white-collar): 1,983 (12% of them working in the Israeli construction markets)
- Self-employed: 1,871 (4% of them working in the Israeli construction markets) (**Figure 9. 3**)
- Wage Employees: 16,496 (46% of them working in the Israeli construction markets) (**Figure 9. 3**)
- Unpaid Family Members: 96 (**Figure 9. 3**)

Figure 9. 3 indicates that the percentage of workers in the construction of buildings and specialised construction activities subsectors working internally, i.e. in Ramallah governorate, is almost 55% for each, compared to 43% in each working in the Israeli construction markets. Moreover, tiny percentages of workers engaged in the construction of buildings (2%) and specialised construction activities subsectors (less than 2%) are mobile with respect to other governorates within the West Bank. The average hourly labour productivity for the workers working in the building construction subsectors in Ramallah is calculated to be 0.035 m^2/labour.hr[225], which is roughly 20% higher than the

[225] The quarterly productivity for construction workers from Ramallah governorate working in the building construction subsector and the specialised construction subsector for the years between 2014 and 2018 was calculated based on the following equation:

$$Labour\ Productivity = \frac{\Sigma(New\ Areas\ \ Licensed\ for\ Residential,\ \ Non-Residential\ Buildings\ and\ Boundary\ walls)}{Total\ Number\ working\ \text{hours for}\ \ building\ workers\ working\ in\ Ramallah}$$

one calculated for workers working in the two subsectors in the West Bank as a whole (***Figure 8. 3***).

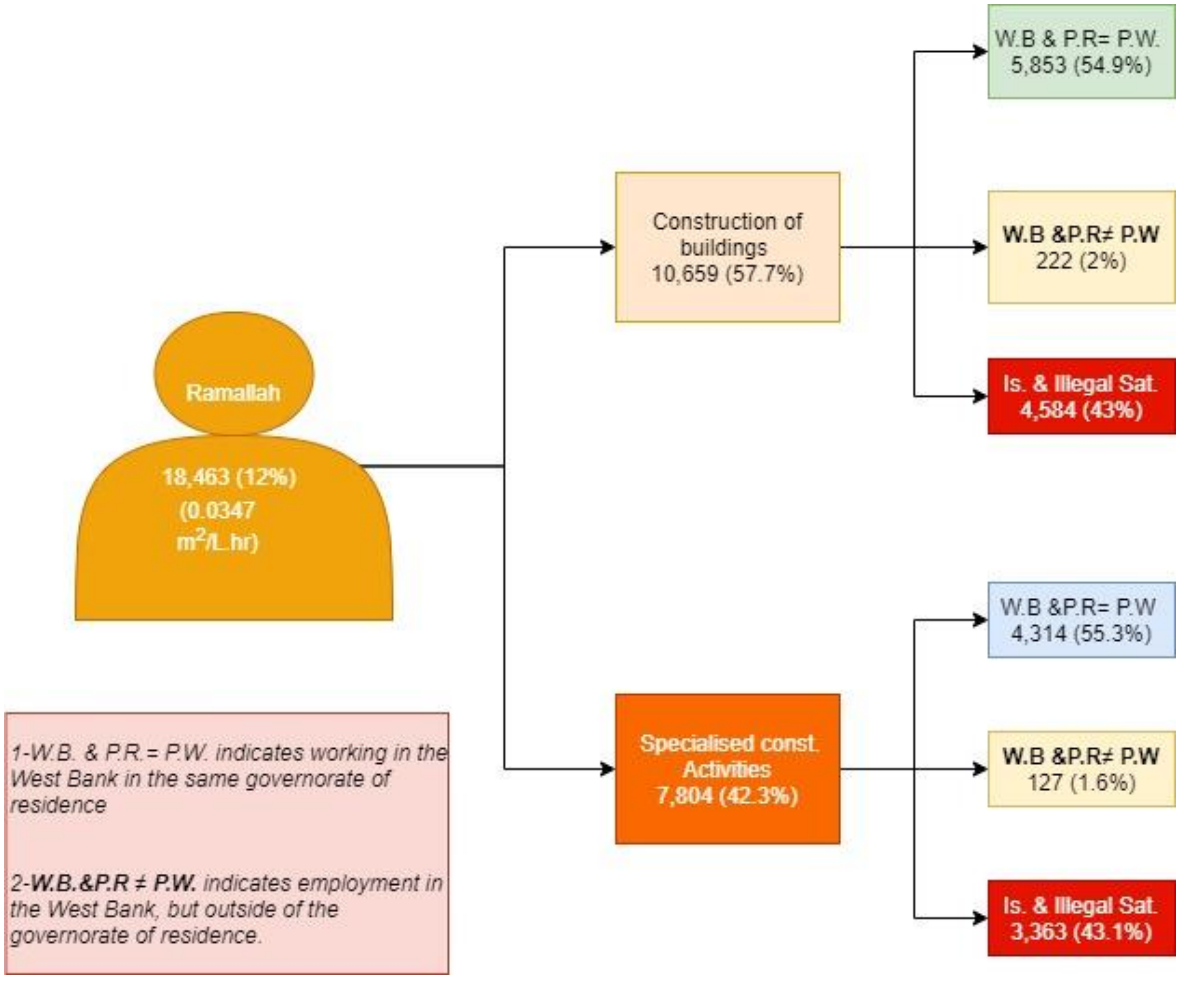

***Figure 9. 3*:** Breakdown of the Blue-collar Workers from Ramallah by subsector and place of work

9.2.1 Main characteristics of the labour force from Ramallah

The **average age** among blue-collar workers is 34.8 years. 25% of the workforce is 25 years old or below, three-quarters are between the ages of 15 and 42, and less than 10 % are over 50[226], indicating no ageing workforce problem. The construction labour process in Ramallah, as in the remaining governorates in the West Bank, rests on rigid trade divisions, which are neither reflected by the PCBS reports nor its raw data (see Chapter 8). The distribution of construction workers from the governorate based on their higher educational qualifications, shown in ***Figure 9. 4***, indicates that over 50% have less than ten

[226] The PCBS Raw data

years of schooling (completed middle school), and a tiny percentage (5%) has completed either associate diploma or Bachelor degree.

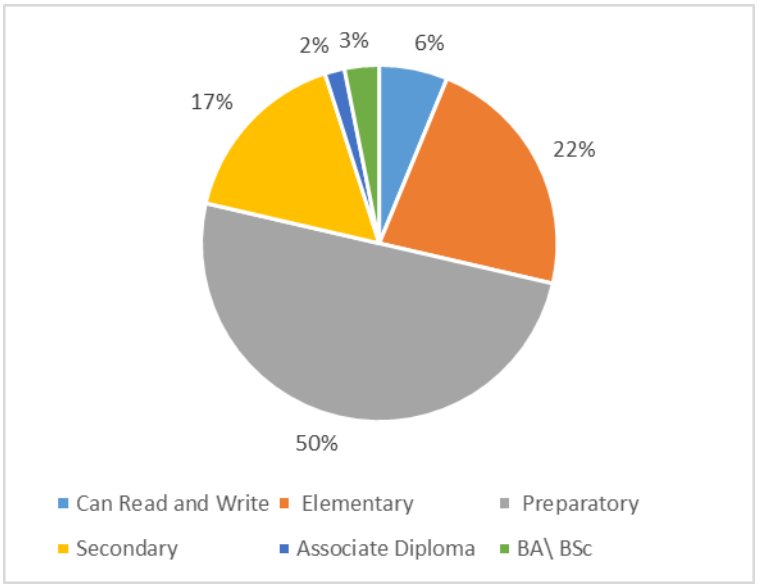

Figure 9. 4: Distribution of the blue-collar Workers from Ramallah by their Educational Attainments[227]

The **average number of years of schooling** among blue-collar workers is 9.8; less than 4% of blue-collar workers have attended training courses, such as those managed by the Ministry of labour or run by the UNRWA, such as Qalandia institute, and over 98% of them began working in the construction sector without receiving any on-the-job training from their employers[228]. This indicates that the construction labour process in Ramallah also rests on low levels of training.

9.2.2 Working and employment conditions and Wages

As shown in ***Table 9. 1***, the daily wages for construction workers from Ramallah working in building subsectors differ based on the place of work and their classification. The wages are not valued according to the knowledge they incorporate but according to outputs rather than inputs (see Chapters 7 & 8). The average monthly wage (calculated by multiplying the average daily wage by the average working days per month) for workers working in Ramallah or within the West Bank is less than 50% of that for those working in the Israeli construction market, more specifically, ILS 2,572.98 in Ramallah compared to ILS 5,197 in the Israeli markets for workers classified under the Craft and Related Trade Workers

[227] The PCBS Raw Data
[228] The PCBS Raw Data

category. For the workers in the other category, the average monthly wage in Ramallah (1830.8 ILS) is almost 45% of the Israeli market workers (4079.61 ILS). The average weekly hours for craft building workers working in Ramallah is 46.4, including an average of 1.4 hours of overtime (***Table 9. 1***). 50% of construction workers working in sub-sectors of buildings in Ramallah work weekly for more than 48 hours, which could represent skill shortages or exploitation[229].

Category	Ramallah or in the West Bank		Israeli Markets	
	Avg. Daily Wage (NIS)	Avg Weekly working hours	Avg. Daily Wage (NIS)	Avg Weekly working hours
Craft/Skilled	121.4	46.4	237	42.9
Elementary	92	44.9	194.6	42.5

Table 9. 1: The average daily wage and weekly working hours of Building workers from Ramallah based on their place of work and category[230]

The construction sector in Ramallah shares many of the characteristics of North African and the Middle East economies in terms of poor working conditions, such as running at risk of losing their job and delaying/ not paying their dues, and workers bearing personal responsibility for their safety and the costs of their medical care. As shown in ***Figure 9. 5***, 98% of the blue-collar building workers working in the governorate do not have a written contract, whether for a limited or unlimited period. 45% of the workers do not have any work agreement with their employers (***Figure 9. 5***). Other job security factors are only provided to the small percentage of workers from the governorate who work locally, indicating that most workers working in Ramallah experience high vulnerability to social risks (lack of job security). For example, the proportion of workers entitled to benefit from pension funds or end-of-service benefits is 2.5%, and about 2.4% and less than 2% of them, respectively, have received paid leave and sick leave[231]. The percentages for job security factors for the workers working in the Israeli market are not high but still higher than the percentages in the West Bank; for instance, over 4% of them are entitled to benefit from pension funds, and almost 3% have received paid sick leave[232].

[229] To be verified in the case study projects interviews.
[230] Researcher's Calculations using the PCBS Raw Data
[231] The PCBS Raw Data
[232] The PCBS Raw Data

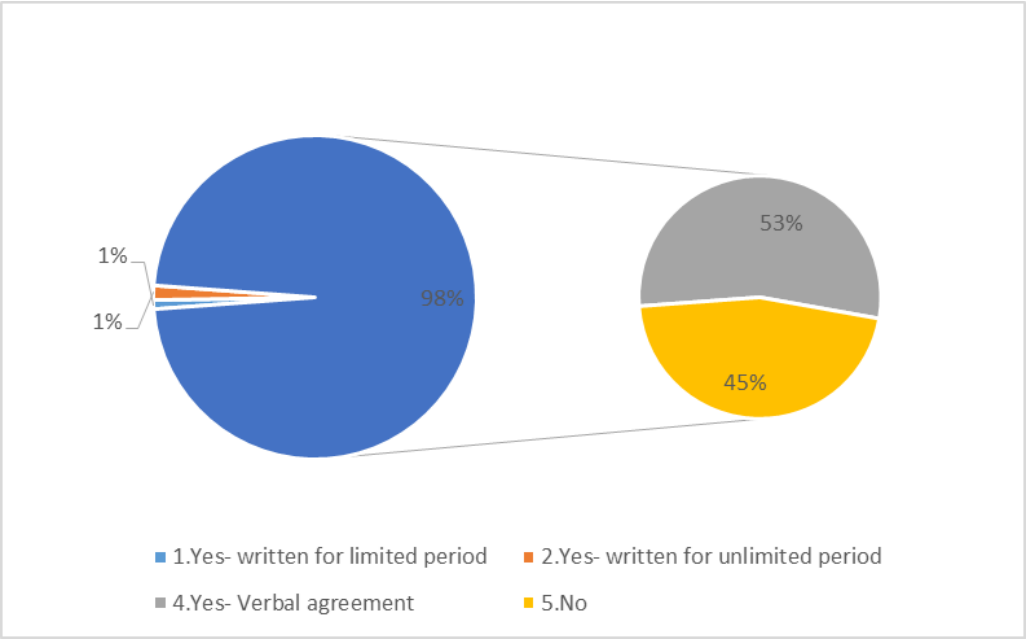

Figure 9. 5: Distribution of the building workers based on their legal status[233]

Among construction workers employed in the two sub-sectors in Ramallah, 2% have vision difficulties, 5% have hearing difficulties, and 1% have difficulty moving and using their fingers.[234] However, less than 1% of the workers from the governorate working locally, i.e. in Ramallah or other governorates in the West Bank, have been provided either free private health insurance or free public health insurance, and approximately 3% of them have been insured against injuries at their construction sites. Almost 2% of workers have received training courses during the first period at work. The percentages of workers from Ramallah working in the Israeli markets who have private health insurance or are insured against accidents at construction sites are 6% and over 22.2%, respectively. Perhaps, the weak affiliation of the blue-collar workers to any of the workers' occupational unions has led to these bad situations for the workers. The statistics show that almost 96% of them are not members of any labour unions, indicating that no one is defending their rights. The reasons and impact of weak affiliation for labour unions as an agency factor on labour security and thus their productivity is derived from the interviews conducted for the case studies projects in Ramallah.

[233] The PCBS Raw Data for 2014 to 2019
[234] The PCBS Raw data for 2018 & 2019

9.3 Relationship between Labour mobility and locality type in Ramallah

Almost 43% of the blue-collar workers in the two subsectors work in the Israeli construction markets (**Figure 9. 3**). A Kruskal-Wallis H test that was conducted to determine if labour mobility to the Israeli construction market for workers from Ramallah differs based on locality type, which is: (a) urban (n = 363); (b) rural (n = 703); and (c) camp (n = 108) showed a statistically significant difference in mobility between the three groups, $\chi 2(2) = 43.391$, $p = 0.0001$. The cause of the difference in productivity, which could be related to the number of building projects, proximity to the green line or the Israeli security requirements (Chapter 8), is derived from the interviews.

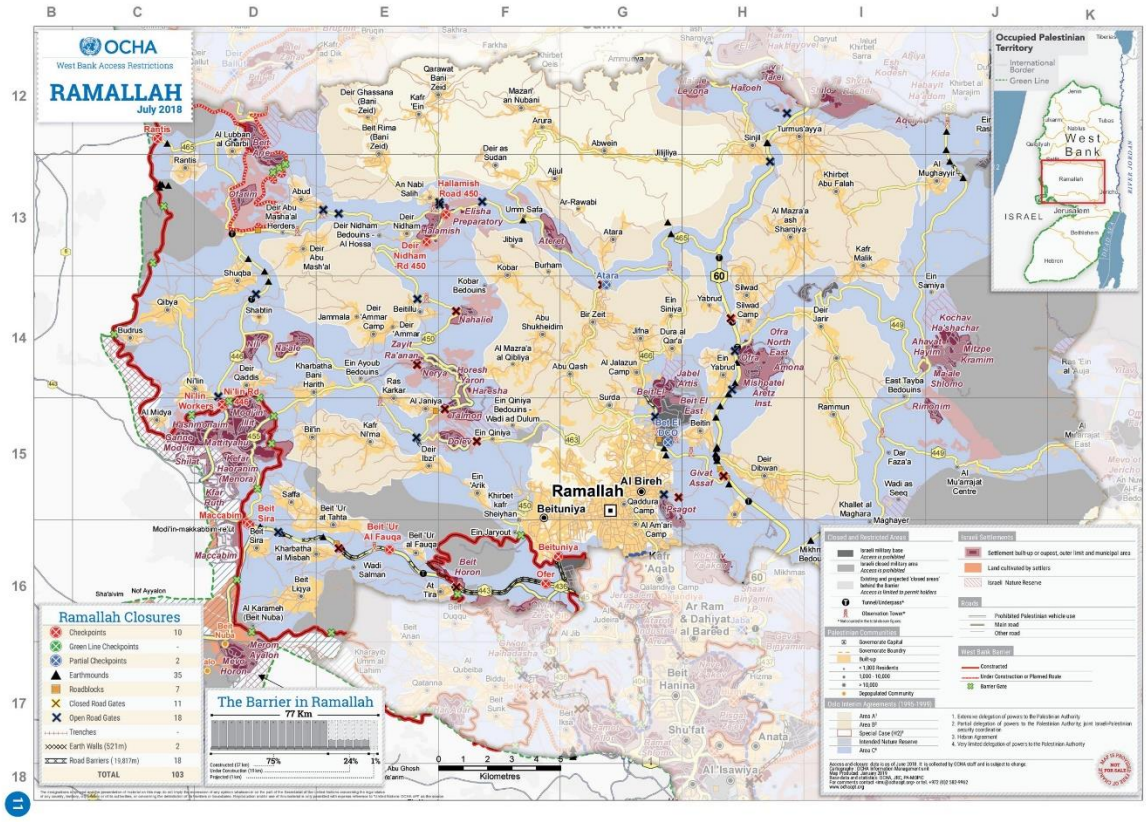

Figure 9. 6: Ramallah Governorate Map

Source: (OCHA, 2020)

Figure 9. 6 shows that most of the rural communities in Ramallah are located in area C. All the camps and urban areas in the governorate are built-up areas and located in areas A and B. Since these areas are expected to have massive construction compared to rural localities, the percentage of workers living in rural areas and working in Israel is higher

than in other localities. The PCBS raw data reveal that 50% of the construction workers from rural areas work in the Israeli construction market compared to 35% and 27% of those from the urban and camp localities. The percentage of skilled labour to unskilled labour working in the Israeli construction markets, the length of experience, and the age of the workers moving to the Israeli markets indicate that labour mobility could lead to skill shortages.

A one-way ANOVA test conducted to compare the effect of 'occupation' on labour mobility to the Israeli construction markets revealed that there was a statistically significant difference in labour mobility between the two groups (F (1, 1172)= [6.48], p=[0.011]). The Bonferroni posthoc test revealed that labour mobility to the Israeli market was statistically significantly higher for Craft and Related Trade workers than the workers under the Elementary Occupation group by almost 8% (p=0.011). Additionally, the average age of workers working in Israeli markets is 38 years, six years higher than those working locally, and the working experience for workers working in the Israeli market is over ten years compared to seven years for those working locally[235]. The average experience of skilled workers working in the Israeli market is five years higher than their peers working in Ramallah. Accordingly, the results indicate that the construction sector in Israel is more targeted towards skilled blue-collar workers than unskilled ones. The following section explores the impact of labour mobility and other labour productivity determinants based on case studies for construction projects executed in Ramallah. The case studies refer to the four non-residential buildings built in the Ramallah governorate; two were constructed in the towns of Surda and Turmusaya, and the other two were built in the city of Ramallah. The construction phase for one of these projects took place between 2004 and 2007, and thus the effect of different Israeli policies is studied.

9.4 Case #1: Medical Facility

9.4.1 Overview

The PECDAR is the owner's representative for this medical facility. A grant of US$10 million was allocated to finance the construction and equipping of the facility, with US$5 million designated for the construction phase. A Jordanian architectural engineering consulting firm conducted the design and technical assistance work. The project was

[235] The PCBS Raw Data

locally tendered on a bill of quantity basis. The contractor was selected based on a competitive bidding process through a call for pre-qualification. The winner was a Palestinian contracting firm responsible for constructing the structural and architectural works. ***Table 9. 2*** summarises crucial project information, including the contract's type, price and the date of commencing. The contract documents clearly state the rules of health, safety and Protection of the Environment. According to the tender documents for the project, the contractor should submit a detailed bar-chart programme, i.e. Critical Path Method schedule and material procurement and delivery schedule.

Item	**Case Study #1: Medical Facility**
Type of Contract	Separate Design and Construction (Bill of Quantities)
Tender Price	U.S. $ 4,869,641
Advanced Payment	15% of the contract sum
Contract duration	720 calendar days
Starting Date	February 7 2005
Expected Completion Date	February 7 2007
Actual Completion Date	February 10 2008
Amount of Liquidated Damages	U.S.$ 2000 per day, for each day or part thereof not substantially complete
Limit of Liquidated Damages	Total liquidated damages not to exceed (10%) of the contract sum
Minimum Amount of Interim Certificates	No less than (5%) of the Contract amount

Table 9. 2: Key information concerning the construction phase of Medical Facility #1

Yet, the programme submitted is neither detailed nor has any information regarding the procurement and delivery of material. The programme was not updated to reflect the changes on site, such as delays because of extra work, the Israeli siege and the closure of checkpoints in the West Bank. The programme just mentioned the human resources used during the contraction stage without giving any extra information on how the duration of each activity was estimated or calculated. There was no financial schedule for this project. As indicated in ***Table 9. 2***, the project completion date was on February 10th 2008, which was not reflected in the work programme submitted by the contractor. Accordingly, the

employer was entitled to liquidated damages of $486,964.1 (10% of the contract value). Yet, the construction firm submitted claims to a total value of $ 249,151.74 and 19 claims asking for a time extension for the period of the construction stage[236].

9.4.2 Internal Labour Mobility and Political Instability

The Israeli occupation force closed the internal checkpoints in the West Bank, and since most of the workers in the project were from the north of the West Bank, the work was stopped for five days. As a result, the workers temporarily moved to Ramallah to be able to execute the construction phase on time[237]. The case illustrated that most construction workers in the project were not from the Ramallah governorate. Accordingly, the Israeli policies and political instability as external structural factors harm internal labour mobility within the West Bank, and thus, labour productivity decreased (***Figure 9. 7***). ***Figure 9. 7*** indicates that the internal checkpoints led to an increase in material prices due to special requirements for delivering the materials during the second Intifada (Chapter 8). This worsened the contracting company's financial predicament.

9.4.3 Change and Variation orders

Change and variation orders, which reflect the shortcomings of the owner's vision of the project and the importance of investing in the design to solve these problems before starting implementation (Abdallah, 2015), impacted labour productivity in this project. Several variation orders were requested, including a 50 cm increase in the height of the facility's ground, first and second floors to harmonise the level with the adjacent medical facility and redesign the project's air conditioning system. These variations led to extra time and cost and slowed down the work of the project[238]. In addition, the change order concerning the air conditioning system affected the financial credit of the construction company as it needed to request a loan from a local bank. Accordingly, importing the required equipment from abroad was affected and delayed[239] (***Figure 9. 7***), indicating that the construction firm's financial status was precarious, and it relied on bank loans. None of these variations was reflected in the project schedule. Additionally, neither the time

[236] Contract Documents received from PECDAR
[237] Claims report
[238] Claims report & Forms of time extension documents
[239] Claims report & Forms of time extension documents

extension forms nor the claim report had considered the effects of these changes and variation orders on workers' productivity and the continuity of their work.

9.4.4 Delay in Payment

Time and financial claims applied by the contractor were to a value of 55 days and $ 33,120 as compensation for the late payment of financial dues to the construction firm, severely affecting its cash flow. In addition, these claims cover the financial repercussions of the owner refusing to pay the changes and exceeding the quantities in the contract during the contract extension period due to the limited contract budget[240]. The delay in payment led the contractor to request bank facilities and take a loan to pay for materials and subcontractors[241](***Figure 9. 7***). Additionally, steel prices dramatically increased from $385 to $650 per tonne during the construction stage. Accordingly, this unexpected increase in material prices affected the contractor's financial status and thus led to a delay in paying workers' wages on time[242] (***Figure 9. 7***).

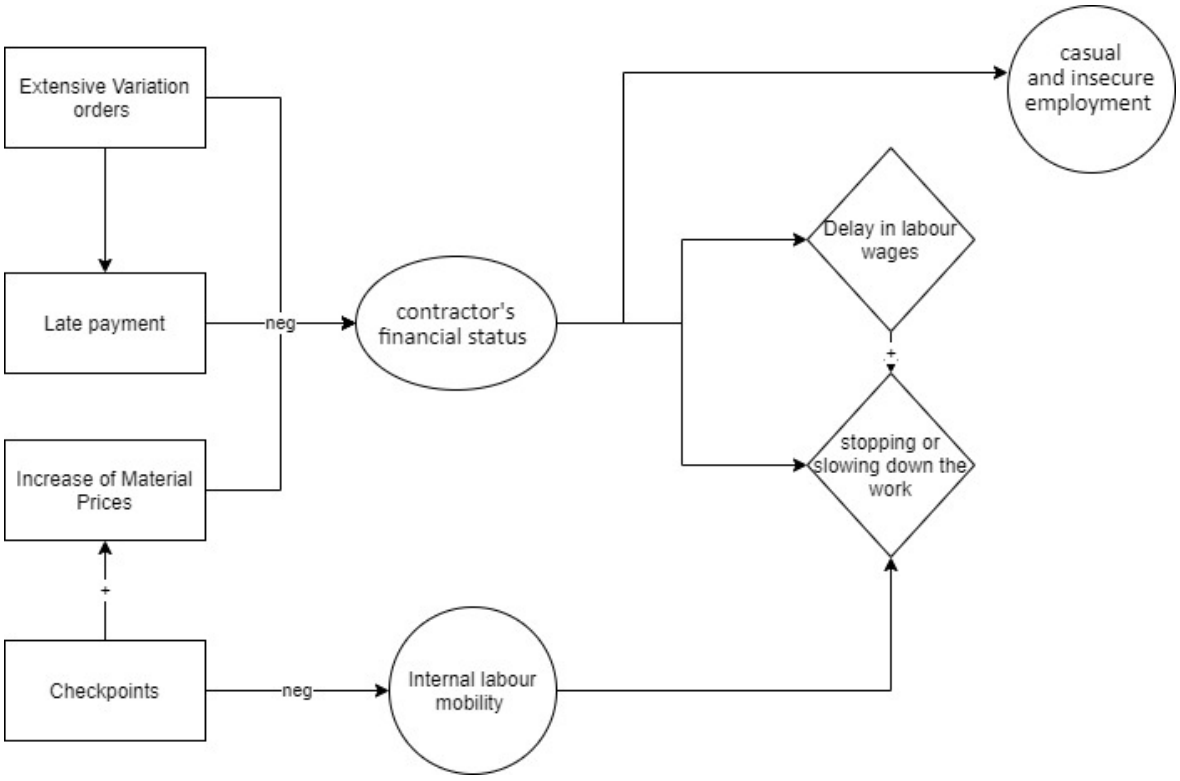

Figure 9. 7: Summary of the main structural and agency determinants impacting labour productivity in the project

[240] Claims Report & Forms of time extension documents
[241] Claims Rport
[242] Claims Report

9.4.5 Labour wages

The payment system is on a daily base based on output, not qualifications. ***Table 9. 3*** shows the hourly rate of each occupation provided by the contracting company. The rates show that experience, year of study and other essential labour inputs are not considered in this rate. Furthermore, the rates show that workers were getting paid daily; that is, the workers were day labourers and were not paid during vacations, leaves and holidays. The average daily wage (121 ILS) is almost similar to those given to workers working in Ramallah these days (***Table 9. 1***), supporting the finding in Chapter 8 about the depreciation of the worker's wages in the West Bank as one of the main causes for labour mobility to the Israeli construction markets.

Furthermore, the Gant chart for this case shows that the construction labour process rests on casual self-employment and rigid trade divisions[243]. The resources sheet shows that the main contractor divided the work between several non-nominated subcontractors, some of which are labour-only[244], indicating that the employment in this project is casual and insecure, with extensive use of 'labour-only' subcontractors working to tight output targets and prices.

Labour description	**Rate ($/hr)**
Craftsman chargehand	3.5
Ganger	4
Mason	4
Blocklayer	4
Carpenter	4
Steel Fixer	4
Plumber	4
Lorry driver	4
Excavation or similar equipment driver	4
Labourer	3
Semi-skilled labourer	3.5
Steel erector	4
Crane operator	4

Table 9. 3: Hourly rate for several occupations in the Project[245]

[243] The Time Schedule
[244] The Time Schedule
[245] The Contract Agreement

9.4.6 Health and Safety

The rules controlling H&S in this project are very abstract[246], reflecting that the owner and the contractor were ignoring the implementation of these rules. In this project, there was no assignment for a person to be responsible for health and safety issues on the site. The claims for time extension submitted by the contractor had never focused on the health and safety requirements for several variation orders, such as the increase in the height of several facility floors by 50 cm each. Additionally, the Ramallah Municipality requested the contractor stop work on the project for five days and required the contractor to implement safety instructions while excavating the project[247]. Rather than penalising the contractor for this violation, the engineer agreed to extend the contract period for three days in response to the contractor's claim for a time extension due to this downtime[248].

9.5 Case #2: Medical Facility

9.5.1 Overview

This project is a medical facility, which has an overall area of 8,100m2 and consists of four floors, constructed by the PECDAR in collaboration with the Ministry of Health in the governorate of Ramallah, specifically in Turmus 'Ayya. While an international grant of US$ 15 million covered the construction and equipping of the facility, the land, whose area is 15 dunums (1 dunum=1000m2), was donated by the people of that town. A Palestinian consulting Engineering centre conducted the design of this project. The project was locally tendered on a bill of quantity basis. Based on a competitive bidding process, the contractors were selected through a call for pre-qualification. The structural and finishing works tenders were awarded to two Palestinian construction firms accredited by the PCU. This case study examines the finishing works of the project, which began when 85 % of the structural work was accomplished[249]. ***Table 9. 4*** summarises essential information regarding the finishing stage of the project, such as the type of contract, price, and date of commencement.

[246] The Contract Agreement & BOQ
[247] Forms of time extension documents
[248] Forms of time extension documents
[249] Forms of time extension documents

Item	Case Study #2: Medical Facility
Type of Contract	Separate Design and Construction (Bill of Quantities)
Tender Price	$ 6,962,027.32 (the final price= 6,646,252.26)
Advanced Payment	15% of the contract sum
Contract duration	240 calendar days
Starting Date	December 29 2016
Expected Completion Date	August 27 2017
Actual Completion Date	November 27 2018 (697 calendar days)
Amount of Liquidated Damages	$ 2000 per day, for each day or part thereof not substantially complete
Limit of Liquidated Damages	Total liquidated damages not to exceed (10%) of the contract sum
Minimum Amount of Interim Certificates	No less than (5%) of the Contract amount

Table 9. 4: Key information concerning the finishing works phase of Medical Facility #2

9.5.2 Employment and Working conditions

As the structural phase contractor did not hand the site over to the finishing contractor for significant portions of the project, the employer required the finishing contractor to carry out many of the structural works. Accordingly, the contract duration was extended by 45 days to carry out the new assigned works. Additionally, as the finish works were delayed on several floors since the workers of the structural contractor were working on these floors, the contract duration was extended by 127 days[250]. This case shows weak coordination between the owner and the contractors responsible for the construction. For instance, different variations and change orders, such as delays in deciding on the electrical room and late receipt of information regarding the required finishing work in the X-ray and CT-Scan rooms, added eight days to the project durations. In addition, the owner-designated kitchen fittings contractor produced delays resulting in a 20-day schedule extension. Consequently, all these activities delayed the project by 200 days altogether[251]. One primary cause of the delay is inadequate infrastructure, specifically the power grid. The frequent power cuts, the weakness of the electric current, and the delay of the

[250] Forms of time extension documents
[251] Forms of time extension documents

Jerusalem Electricity Company in raising the current led to the project's delay of twenty days in the finishing phase[252].

Additionally, the late payment of financial dues to the construction firm severely affected its cash flow. The construction firm had been unable to finance the work internally until the employer compensated it, and thus the pace of work slowed down. The contractor requested 20 days to be added to the original contract term to compensate for the slower work rate due to the late payment[253]. The financial status of the structural contractor, who did not have an excellent cash flow to spend on the project until reimbursed by the owner, is a primary reason for this delay[254]. The employment of workers on the project is based on self-employment and extensive subcontracting, particularly labour-only subcontracting, their pay is output-based, and none of them had been reimbursed for the delay in their wages [255], indicating insecure employment conditions. Furthermore, the photos provided for this project (**Photo 9. 1** to ***Photo 9. 3***) show that neither the owner nor the contractor considered the health and safety of the workers during the construction stage. For instance, **Photo 9. 1** shows that construction workers were not wearing the required personal protective equipment, such as safety shoes, helmets and masks. In addition, ***Photo 9. 3*** shows that neither the steel bars were covered nor sheet piles were used to support excavated areas, which were left without cover or barrier.

[252] Forms Forms of time extension documents & claims report
[253] Forms of time extension documents & claims report
[254] See the Interview #4 at meso level
[255] See the Interview #4 at meso level

Photo 9. 1: Workers during the First Fix for Electro-mechanical installation

Photo 9. 2: Workers use an electric stone-cutter without any safety precautions

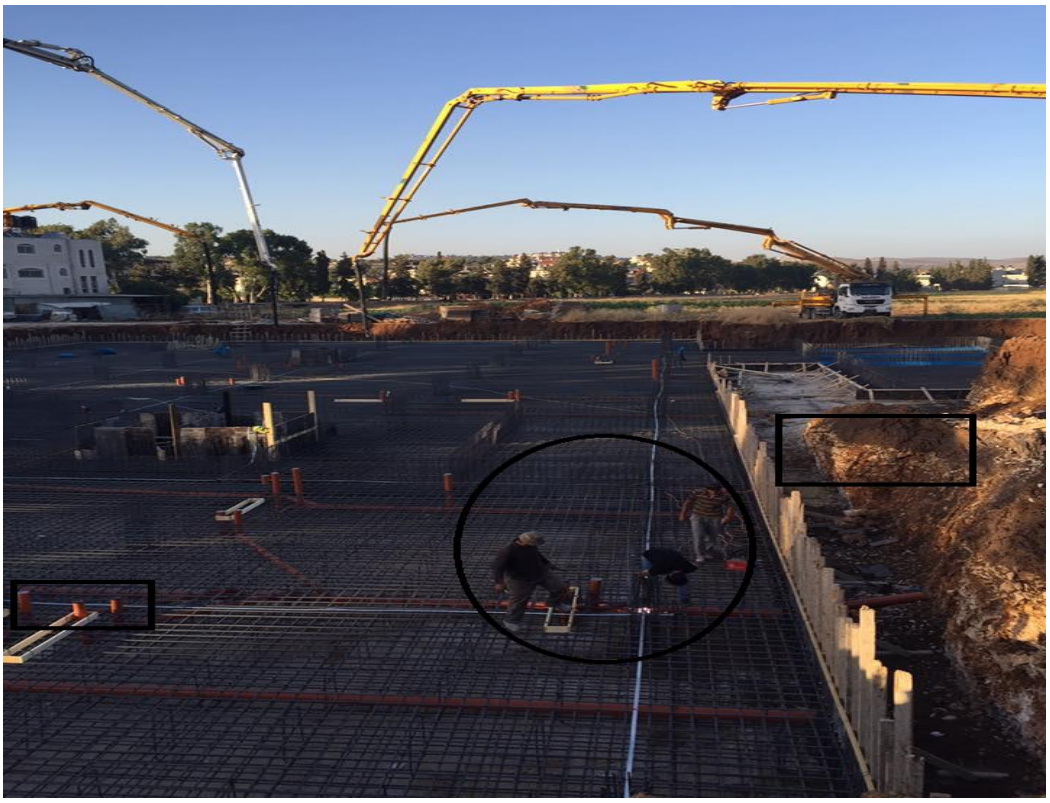

Photo 9. 3: Excavation and Steel rebar activities without any safety precautions

9.5.3 The Impacts of Political Instability and Israeli policies

The Israeli policies controlled all aspects of labour productivity in this project. As most project workers are not from the Ramallah governorate, the closure of the internal checkpoints in the West Bank resulted in the 13-day suspension of project activity[256]. In addition, most materials used in the finishing phase were imported through Israeli ports. The closing of the crossings between the West Bank and Israel due to their holidays delayed the project's delivery for the project for ten days[257]. The major challenge faced by the contracting firm was labour mobility which led it to difficulty providing an experienced workforce for the project. Although the firm made several contracts with several subcontractors, most left the work and relocated to the Israeli construction sector. Thus, the work was slowed down and occasionally halted, and the project period was prolonged by 55 days to compensate for this issue[258].

[256] Forms of time extension documents & claims report
[257] Claims report
[258] Forms of time extension documents, claims report & Interview #4

9.6 Case #3: School

9.6.1 Overview

The built-up area of the school, located in Ramallah city and implemented through the Ministry of Education and Higher Education (MEHE), is 3,361.4 m^2. The Joint Financing Arrangement (JFA) grant covered the construction cost for the four-story school, which was built on land donated by The Municipality of Ramallah[259]. A Palestinian consulting Engineering centre conducted the design and supervision of the school[260]. The project, a turnkey one, was locally tendered on a bill of quantity basis. Then, based on a competitive bidding process, the contractor was selected through a call for pre-qualification. The winner is a Palestinian construction company accredited by the National Classification Committee as Grade A building contractor[261]. The costs of structural and finishing work phases, which amounted to about $ 1.86 million, were revised to $1.96 million during the construction phase due to various change orders[262]. ***Table 9. 5*** provides essential information regarding the project's construction stage, such as the type of contract, price, and commencing date.

Item	**Case study #3: School**
Type of Contract	Separate Design and Construction (Turnkey)
Tender Price	$ 1,858,539.82 (the final price= 1,962,238.79)
Advanced Payment	10% of the contract sum
Contract duration	480 calendar days
Starting Date	September 25 2018
Contract Completion Date	January 18 2020
Actual Completion Date	March 30 2021 (917 calendar days)
Limit of Liquidated Damages	Total liquidated damages not to exceed (10%) of the contract sum
Minimum Amount of Interim Certificates	No less than (5%) of the Contract amount

Table 9. 5: Key information concerning the construction phase of School #3

[259] Monthly progress reports
[260] Design Drawings & Monthly progress reports
[261] Work specifications and Monthly progress reports
[262] Monthly progress reports & Interviewee R3S-A

Labour productivity for this project was calculated to be 0.053 m^2/l.hr[263], almost 35% higher than the governorate average (**Figure 9. 3**). The project was delayed by 428 days[264]. Part of this delay period (14%, as shown in ***Figure 9. 8***) is because the project schedule did not consider the allocation of resources required, nor did it consider public holidays and working during the winter and summer seasons while preparing the time plan. Nevertheless, the main reason for the delay was the rigour and the centralisation in taking the owner's decisions, the MEHE, regarding important and urgent variation orders (VO) in the project[265]. For instance, interviewee R3S-A states:

> The contractor was fantastic and able to do the work. However, the designer used an unapproved site plan while designing the school. Therefore, the municipality asked the contractor to stop work on the part of the project until municipal employees installed the monument line that runs through the project land. Even though the municipality stopped the project in part for three weeks, the bureaucracy from the owner in making decisions had led to a delay of more than two months. I sent them a letter asking VO regarding the school's electrical room, […] I sent it in September 2019, followed it up with eight reminders, and finally got approved over a year later, on October 11, 2020 […].

As depicted in ***Figure 9. 8***, the project was halted for 94 days, 78 of which were due to the lack of a supervisor engineer. This prompted the Ramallah Municipality to issue a stop-work order. Approximately 64 days of non-work were due to design changes in the project, mainly due to the differentiation between the actual and assumed soil-bearing capacity values. Accordingly, the designer modified a portion of the project's foundations. Moreover, the implications of the coronavirus were the new and unanticipated factor that hindered site productivity (***Figure 9. 8***).

[263] The productivity was calculated using the following equation:

$$Productivity = \frac{0.9 * Total\ Building\ Area\ (m2)}{Average\ Number\ of\ blue - collar\ worker * 8\ hours * 479 days}$$

The supervising engineer indicates that the average number of workers at the site was 15 / day, and the number of working hours was eight. Based on progress reports 1 through 28, it was found that the number of actual working days on the project was 479 days, with 90% of the building completed.

[264] Monthly progress reports

[265] Monthly progress reports & Interviewee R3S-A

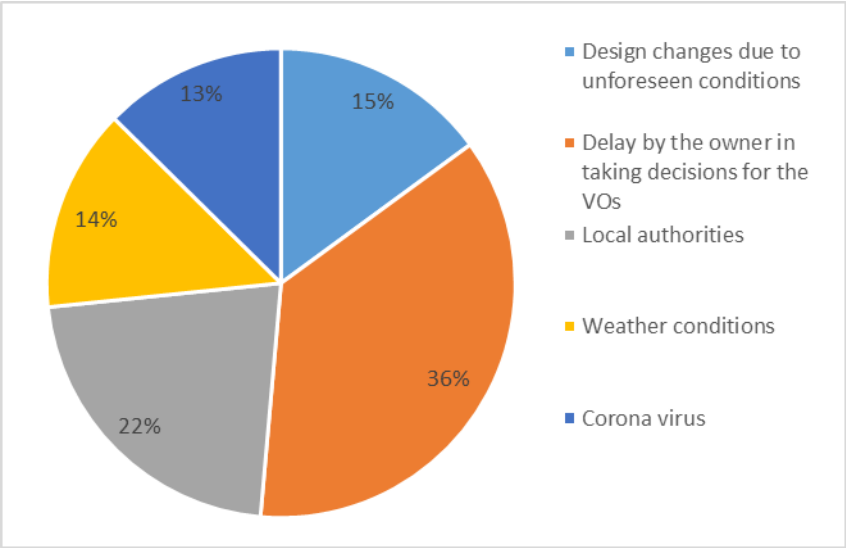

Figure 9. 8: Reasons for project delays[266]

9.6.2 Working Conditions

The late instructions from the owner and the dependence on a wrong site plan to design the project led to stopping the work for several months and later slowing down the workers' progress[267]. Thus, the subcontractor responsible for structural work worked less than his capacity[268]. Thus, his payment, which is output based, was affected[269]. Furthermore, the monthly progress reports indicated no reported safety violations or accidents on the site. However, the photos show that the health and safety regulations were only partially implemented. Although the work quality was good[270], the working conditions for workers were not[271]. For example, the steel protection caps for the steel bars were not used (***Photo 9. 4***). Thus, due to the unused approved rebar safety caps, the risk of injuries caused by coming into contact with the end of a concrete reinforcing bar was high (***Photo 9. 4***).

[266] Monthly progress reports
[267] Monthly progress reports
[268] Monthly progress reports
[269] Interviewee R3S-A
[270] Interviewee R3S-A
[271] Photos in the Monthly progress reports

Photo 9. 4: Non-use of approved rebar safety caps during construction

The scaffolding system was not safe (***Photo 9. 5***). ***Photo 9. 5*** shows that neither a safe system of the erection was being followed nor was the tower structure correctly assembled. Moreover, the platform guardrail was not appropriate. The photos depict that the workers were wearing just helmets and vests. However, none wore appropriate personal protective equipment, such as goggles, face shields, gloves, earmuffs, and safety shoes (***Photo 9. 6***), indicating that the working conditions of workers are difficult and dangerous. Additionally, these photos illustrate the weak following up by the authorities, including the MOL and municipalities, in applying the safety precautions on the construction sites and the absence of adequate mechanisms for enforcing these measures (Chapter 8).

Photo 9. 5: Unsafe Tower scaffold used in the project

Photo 9. 6: Workers' violations of health and safety requirements

The project's cash flow, whose preparation was based on the financial dues and the expenditures of the construction firm[272], shows that the cash-out lagged behind the cash-in, as shown in ***Figure 9. 9***. Thus, no financial problems were facing the contractor because of the delay in the dues.

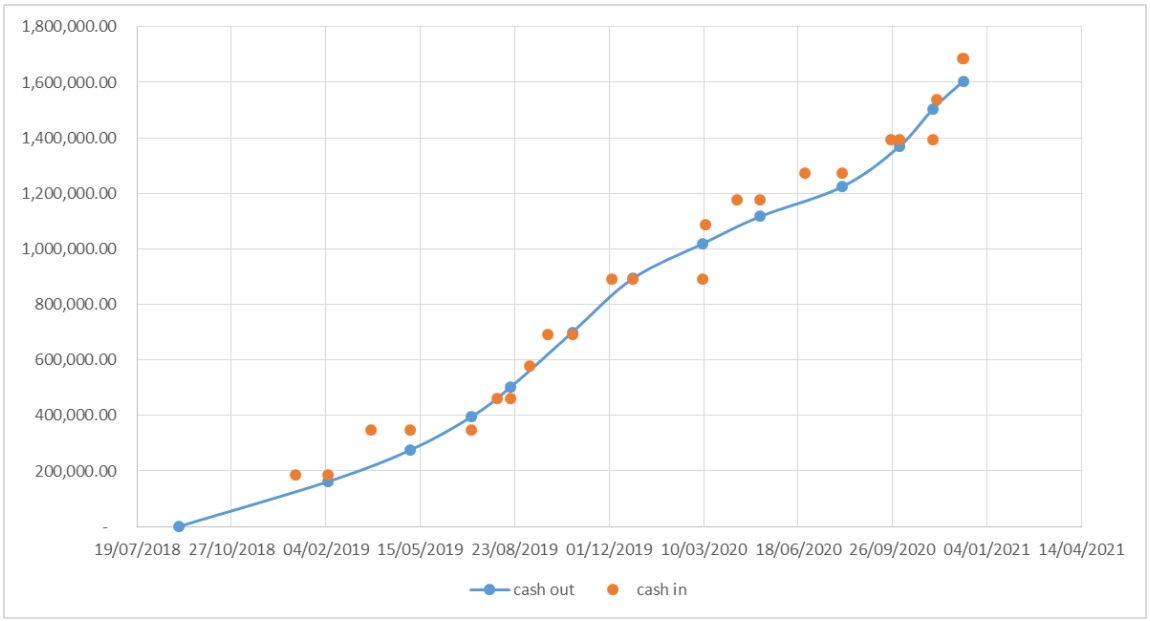

Figure 9. 9: Construction stage cash flow[273]

[272] Based on the information provided in the monthly progress reports, the researcher calculated it.
[273] Resarcher Calculation based on data in the progress reports

As shown in ***Table 9. 5***, the minimum value of each interim certificate should be 5% of the contract value. **Figure 9. 9** demonstrates that most interim certifications took more than one month to achieve this contract condition. **Figure 9. 10** depicts the slowdown of the actual progress. The amount of the actual project completed lagged behind the scheduled one through the whole construction stage (**Figure 9. 10**).

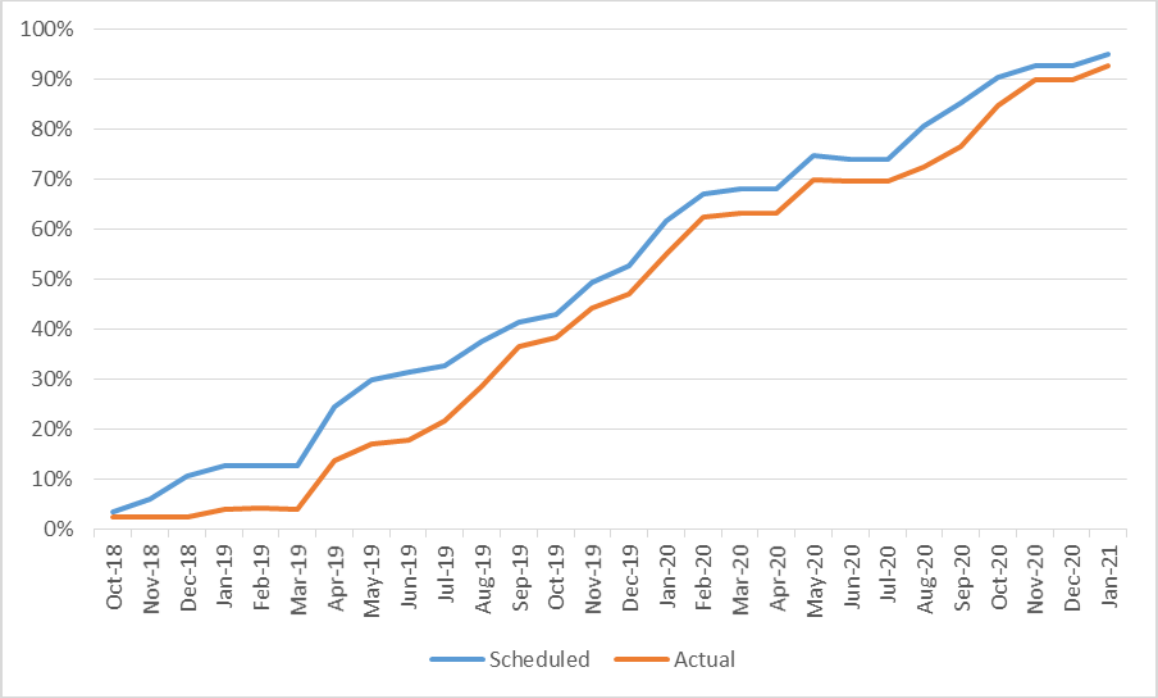

Figure 9. 10: Scheduled and Actual project per cent complete[274]

The main reasons for the slow progress were the futile procedures and modifications requested by the Engineering Office of the MEHE and the routine and bureaucracy in making decisions regarding the project's variation orders[275]. For instance, work on the project was practically stopped between January and March 2019 due to the bureaucracy in approving the new design of the footing system[276]. Yet, since March 2020, the main reason for stopping or slowing down work was the Covid 19 restrictions imposed by the Palestinian government[277] (***Figure 9. 8***). The problem was not related to the availability of materials. The contracting firm used the advanced payment to import all materials required during the finishing stage; the construction company was not affected by the fluctuations in

[274] Resarcher Calculation based on data in the progress reports
[275] Monthly progress reports & Interviewee R3S-A
[276] Monthly progress reports & Interviewee R3S-A
[277] Monthly progress reports & Interviewee R3S-A

the prices of building materials that occurred internationally due to the unexpected increase in freight costs[278]. Interviewee R3S-A states:

> Although most construction materials used during the finishing stage were imported from Turkey, especially insulation materials, the contracting firm was not affected by the financial and temporal repercussions of the Corona pandemic. Most of the supplies were imported before the pandemic's beginning.

As part of the workers, particularly during the finishing stage, were not from Ramallah, the work on the project was slowing down due to the government's new plan of closing the governorates based on the number of people infected in each governorate. Moreover, as workers' employment on this project is based on self-employment and extensive subcontracting, particularly labour-only subcontracting, and the payment for them is output based[279], they were affected by the stopping or slowing down of the project.

9.6.3 Israeli policies and labour mobility

The impact of Israeli policies and labour mobility on labour productivity in this project was minimal for several reasons, including the excellent financial status of the construction firm and the contractor's experience in importing construction materials from abroad. For instance, at the project's beginning, the contractor focused on obtaining approval for the essential building materials, especially those that had to be imported from abroad[280]. Thus, all materials were received on time. Additionally, most workers working on this project were from the Ramallah governorate[281]. ***Figure 9. 11*** shows the towns and villages of most workers who worked on the project[282]. These workers are from the north and northeast of Ramallah governorate, i.e. far from the Green Line. Accordingly, the main contractor did not suffer a skills shortage due to labour mobility to the Israeli markets. Interviewee R3S-A states:

> The one who carried out the structural works of the school was a sub-contractor from the town of Al-Mughayer - Ramallah, along with his workers, who were his relatives. […]. All workers were present daily during that phase except for Friday.

[278] Interviewee R3S-A
[279] Interviewee R3S-A
[280] Interviewee R3S-A
[281] Interviewee R3S-A
[282] Interviewee R3S-A

They were between 15-20 workers among the skilled and their assistants. [….] We did not encounter rework due to poor workmanship. The workers were skilled enough. Plaster contractor from Al-Mughayer in Ramallah and brick construction from Mazari' An-Nubani – Ramallah. […]As for the tile work, the contractor from Deir Ibzi' - Ramallah left his job to work in Israel. However, he was replaced by another contractor from Abu Falah within a short time. Except for the subcontractor from Deir Ibzi', all workers complied. The commitment was high because the contractor did not delay paying their dues and the excellent output-based price due to the lack of labour in the West Bank and the project's proximity to their place of residence.

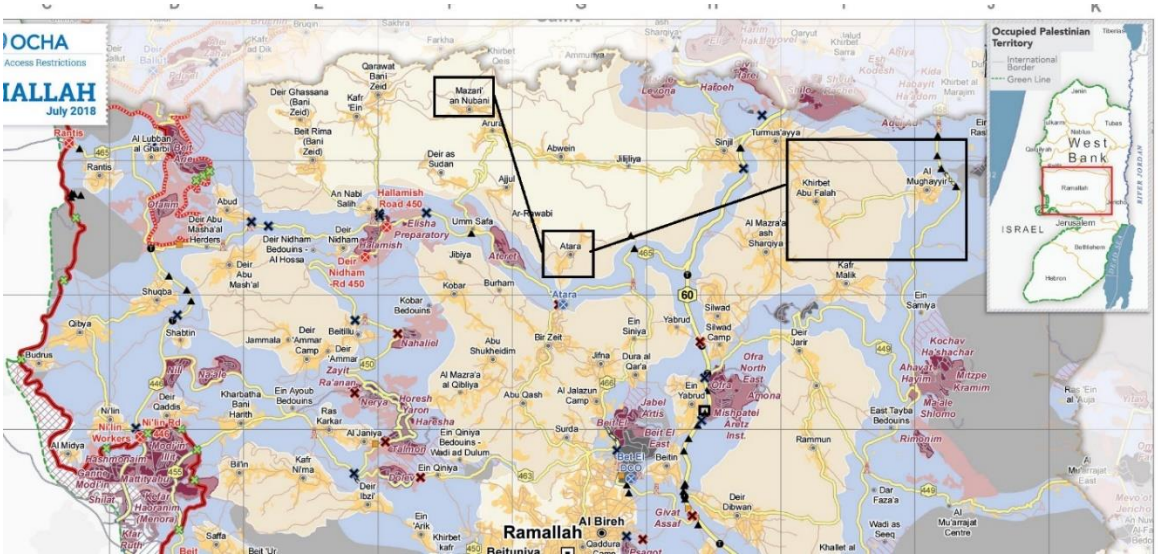

Figure 9. 11: Highlighting the place of residence for most of the construction workers[283]

This case indicates that labour mobility has increased workers' wages in the West Bank and a shortage of skills in the industry. For example, some activities, notably aluminium works, were carried out by a sub-contractor from Nablus[284], which indicates that the number of workers in Ramallah is not enough for the number of projects on offer.

[283] Interviewee R3S-A
[284] Interviewee R3S-A & Monthly progress reports

9.7 Case study #4: School

9.7.1 Overview

This school, located in Ramallah city, particularly in Sarda town, was implemented through the PECDAR. A grant of 4 million U.S. $ from a Palestinian businessman covers the construction and finishing of two buildings in the Academy: the Academic Building and the Administration Building. The Academic Building has a total area of 2,580 m^2 and consists of two floors. A Palestinian consulting engineering firm was responsible for the design, while two Palestinian consulting engineering firms collaborated on the supervision[285]. The project was locally tendered on a bill of quantity basis. Based on a competitive bidding process, the contractors were selected through a call for pre-qualification. The winner was a Palestinian construction firm accredited by the PCU as a Grade A building contractor.

Item	**Case study #4: School**
Type of Contract	Separate Design and Construction (Bill of Quantities)
Tender Price	$ 4,071,347
Advanced Payment	10% of the contract sum
Contract duration	730 calendar days
Starting Date	March 13 2019
Contract Completion Date	March 12 2021
Expected Completion Date	September 30 2021 (933 calendar days)
Limit of Liquidated Damages	Total liquidated damages not to exceed (10%) of the contract sum
Minimum Amount of Interim Certificates	No less than (5%) of the Contract amount

Table 9. 6*:* Key information concerning the construction and finishing of the Academic Building and the Administration Building in the school

Table 9. 6 summarises essential information regarding the project's construction stage, such as the type of contract, price, and date of commencing. As shown in ***Table 9. 6***, the project contract duration has been extended by 28% of the original contract duration (730

[285] Work specifications document

calendar days). Labour productivity for the Academic Building was calculated to be 0.023 m^2/l.hr[286], nearly 66% of the governorate average. ***Table 9. 7***, which provides the worker productivity calculated for several activities based on the unquoted BOQ and the schedule of the academic building, illustrates that productivity rates for activities such as plastering and tiling are less than the average for different projects in the same governorate.

Activity	Productivity rate (m^2/day)	Average Productivity rates[287](m^2/day)
Plastering	18.70	24-30
Block works	20.04	15-20
Tiling works	11.10	20-30
Painting works	40.60	40-50

Table 9. 7: Labour Productivity rate for some of the finishing works in the Academic Building[288]

Finally, the project schedule submitted for this project did not consider the various essential items required to have a good plan, such as allocating necessary resources, public holidays, work during winter and summer, and cash flow. While the planner was determining the early start of each activity, such as block and tiling works, neither work continuity for subcontractors and workers on these tasks was considered nor the critical path was not highlighted.

9.7.2 Employment and working Conditions and Wages

The project's employment conditions for blue-collar workers are similar to the other cases in the governorate and the West Bank (Chapter 8). The main contractor for the project does not have specialised construction labour. The people who work directly with the main contractor are six professionals, including the site engineer, quantity surveyor, and workers superintendent[289]. There is no direct labour relationship with blue-collar workers; most of the work on this project is performed by labour-only subcontractors who are compensated according to their output. Consequently, there is no means to calculate or compare the labour productivity in this project[290].

[286] Researcher's calculation
[287] The average productivity rates are based on Table 4.1 and Table 4.2
[288] Researcher's Calculations
[289] Interviewees R4S-B & R4S-C
[290] Interviewee R4S-B

> All construction work on this project was carried out by a subcontractor who brought the workers, his relatives or friends from the same town. However, finishing activities such as paints, tiles, plaster and electromechanical works have been distributed to several subcontractors. Therefore, the company provided the subcontractors with the required building materials and coordinated between them and the supervision party in the project (Interviewee R4S-B).

The late payment of financial dues to the contracting firm had severely affected its cash flow. Thus, The firm could not finance the work internally until the client compensated it, leading to the work rate being slowed or stopped (***Figure 9. 12***). There is neither a guarantee of work continuity nor a guarantee of the contractor's obligation to pay subcontractors at the agreed time in the West Bank[291]. For instance, Interviewee R4S-B argues:

> If there is a delay in the workers' salaries beyond the agreed-upon time, especially for the technical and expert workers, their productivity falls and becomes zero. However, the availability of financial compensation on time leads to higher workers' productivity. Thus, the delay in paying labour dues, especially technical ones, reduced the workers' productivity in this project.

The most crucial reason for the delay is the prime contracting firm's financial difficulties with its bankers[292]. As a result, the banks denied the company access to loans and other facilities, which impeded the completion of the project. Additionally, the second primary reason for the delay is the repercussions of the Coronavirus, such as the national shutdown and change in accepted methods of purchasing building materials[293] (***Figure 9. 12***). For instance, Interviewee R4S-B states:

> The contract term is 24 months (two calendar years). The project started on 3/13/2019 and was supposed to finish on 3/13/2021. Nevertheless, the project is not yet complete and has been extended for at least six months. What happened in a nutshell: a) the project has been suspended for a long time due to the national closure, b) Skilled technical workers flock to the Israeli construction market, and c)

[291] Interviewees R4S-B & R4S-D
[292] Interviewees R4S-A & R4S-D
[293] Interviewees R4S-A, R4S-B & R4S-D

> the contracting company's general financial conditions and the epidemic's repercussions. Before the pandemic, material suppliers and traders used to accept PDC[294] checks. Usually, the payment date is delayed between 90 to 120 days. Nevertheless, since the epidemic's beginning, the projects offered have dramatically decreased. Thus, if you want to buy a nail, you have to pay for it. As a result, contractors' liquidity and cash flow were affected, and they could not cover material prices. So there was a setback in the payment process, and the contractor could not save money to speed up the pace of work on the project. In addition, the contractor cannot pay in cash for the materials, which has led to a significant delay in the provision of materials. Their ability to pay workers' wages on time was also affected.

Additionally, Interviewee R4S-D, who adds two critical points regarding the impact of the epidemic on the productivity of labour, states:

> The global crisis due to the epidemic outbreak led to a change in the payment method for material suppliers and merchants we deal with, which affected the company's financial position. […]. However, all material suppliers now refuse to move materials and orders until we pay 80% of their price in cash […]. In addition, most of the materials used for finishing are imported from or through Israel. Thus, an unexpected increase in the prices of some materials due to the significant rise in the sea freight cost occurred. The increase was 10-15% over the bid price.

[294] PDS stands for *Post-dated Checks*

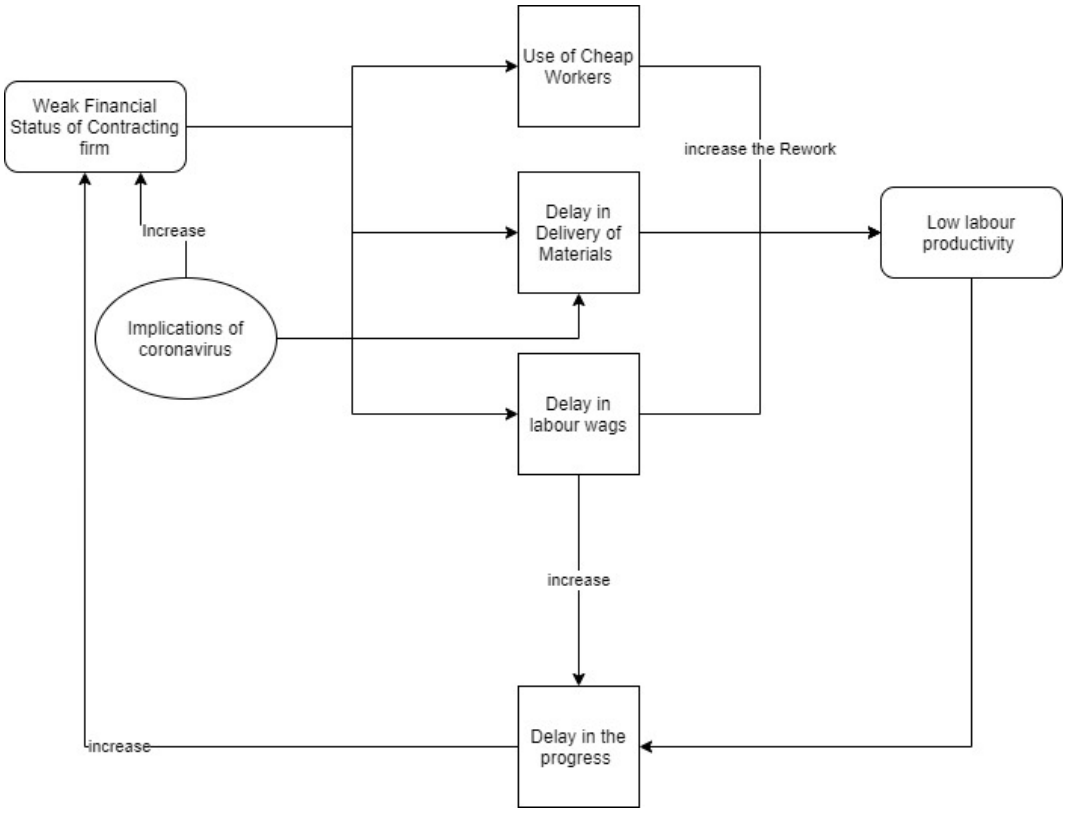

Figure 9. 12: the effect of the financial status on other structural and agency determinants in the project

To mitigate the considerable expense increase, the contractor attempted to save costs by assigning work to cheap workers and delaying dues to various subcontractors[295]. However, the supervision did not accept the quality of their work, and the project's progress significantly slowed down[296]; thus, the situation worsened (***Figure 9. 12***). As shown in ***Figure 9. 12***, the weak financial status (structural factor) affects the payment of workers (agency factor), which affects the work progress. Thus, the impacts of the structural and agency factors are reciprocal. Consequently, to break this interrelationship between factors that leads to a closed loop of cause and effect and helps the main contractor financially, the owner's representative (PECDAR) agreed to pay the contractor's bills even if their amounts were less than that 5% of the contract amount. Yet it did not help as the contracting firm was financially distressed[297]. Additionally, The firm's expenses are not governed by the company's needs and project expenditures[298]. Even though the Ministry of Public Works

[295] Interviewees R4S-A & R4S-B
[296] Interviewees R4S-A & R4S-B
[297] Interviewee R4S-A
[298] Interviewee R4S-A

and Housing compensated the contractors by extending the contract periods by 89 days due to the Corona outbreak[299], the contracting company cannot order lift cabinets or light bulbs for this project as suppliers require a letter of credit (L.C.)[300] and the bank rejected the company's request for an L.C. as there were no guarantees[301].

Furthermore, the cash flow and schedule provided for the project were not professional. For example, the plan lacked essential elements such as the human and non-human resources and material delivery milestones required[302]. In addition, the cash flow was not tied to the work schedule, and robust financial planning for the project was missing[303]. The contracting firm did not provide the required number of workers to carry out the work as the wages of these workers are higher than its ability to pay due to the scarcity of skilled labour, who control prices and impose their conditions in the West Bank[304]. For example, due to labour mobility that leads to skill shortages, the workmanship price for tiles per square meter includes technician and assistant fees between 20 and 25 shekels, which was previously between 17 and 18[305].

Consequently, the authority of the contracting company or supervisory body over the application of health and safety requirements was affected, and thus the commitment and implementation on site were weak[306]. For example, Since skilled labour is required on more than one project and by more than one contractor, the imposition of any fine for a safety violation causes workers to leave the project to work on another project or for another contractor[307].

Moreover, the weakness of the supervisory authorities, such as the MOL, and their mechanisms contributed to the ineffectiveness of applying these rules. Visits and tours of the Ministry's inspectors depend on the project location[308]. Since this project is located in Sarda, relatively far from the city's centre, the project has not been visited since the beginning of the construction stage. However, the follow-up is higher for other projects

[299] A copy of the decision of the Ministry of Public Works and Housing
[300] Interviewee R4S-B
[301] Interviewees R4S-A, R4S-B & R4S-C
[302] Time schedule Document
[303] Interviewee R4S-B
[304] Interviewees R4S-B & R4S-C
[305] Interviewee R4S-A
[306] Interviewees R4S-B, R4S-C & R4S-D
[307] Interviewees R4S-B & R4S-C
[308] Interviewees R4S-B, R4S-C & R4S-D

supervised by the same consultant office or executed by the same contracting firm located in or near the city centre[309]. Additionally, the lack of available projects and intense competition among the contenders to win the bid leads to sacrificing the costs of safety precautions, which are usually between 5% and 8% of the bid value[310]. Due to adding a small profit margin and ignoring the costs of health and safety precautions while pricing, the contracting firm does not provide the workers with the proper PPE[311].

> The owner does not reimburse the contractor for compliance and the implementation of safety precautions. So, the contracting company and even subcontractors circumvent applying the health and safety rules by considering the PPE as just safety shoes and helmets, most times of poor quality. All contractors try to reduce operational costs by saving on this item (Interviewee RS4-D).

> The contracting company does not take this clause into account during pricing. When required to bring personal protective equipment for workers, companies offer the cheapest shoes and helmets. Some of them do not even meet the requirements for a helmet and cannot be considered appropriate personal protective equipment. The so-called safety officer uses a hand hammer to check safety shoes and helmets in Israel. Nevertheless, the PPE provided by companies is of poor quality as there are no regulatory body checks on whether the PPE provided meets OSHA standards, for example (Interviewee RS4-B).

9.7.3 Israeli policies and political instability

The workers in this project are from Ramallah, Nablus and Hebron[312]. However, the impact of political instability on the availability of construction materials and the internal movement of workers from Nablus and Hebron in this project compared to labour mobility to the Israeli markets is negligible[313]. Israeli policy regarding allowing construction workers in Israel is the second primary reason for delaying this project. The firm faced the difficulty of providing an experienced and skilled workforce. It made several contracts with several subcontractors, but most of them left the work because they went to work in

[309] Interviewees R4S-B, R4S-C & R4S-D
[310] Interviewee R4S-B
[311] Interviewees R4S-B & R4S-D
[312] Interviewees R4S-B & R4S-D
[313] Interviewee R4S-D

the Israeli construction sector[314]. Thus, the work was slowed down and sometimes stopped (***Figure 9. 12***).

> The second leading cause of the delay is the lack of skilled labour or subcontractors. What is paid daily to workers in the West Bank is between 100 and 150 shekels, while in Israel, they receive at least three times this salary. So, when any skilled worker or assistant worker obtains a work permit, he leaves work. Moreover, unlike in the West Bank, there is an operational continuity and an obligation to pay on time in Israel. […]. Sometimes, you find technicians at high prices that we cannot afford (Interview R4S-D).

> Technical workers are not readily available, and most of them, if they get a job in Israel, leave us to obtain a higher financial return. For example, the local tilers receive a daily salary of between 200 and 250 shekels, while they receive a daily wage of between 600 and 800. In addition, the payment date there is fixed without any delay. Therefore, we have suffered from the scarcity of skilled technical workers in the project because of labour mobility to work in Israel. [….] According to our calculations, to complete the activities according to the contractor's schedule, the contractor must provide at least 40 workers daily. However, the project's number of skilled and unskilled workers is between 15 and 20, which means that the delay will be at least 50%. […] we asked the contractor to provide two shifts (day and night) to cover the delays, but he did not respond due to financial matters and the scarcity and lack of skilled labour in the West Bank (Interview R4S-B).

9.8 The structure of the construction industry in Nablus

According to the PCBS (2019), the number of registered construction contractors in Nablus is 104, comprising over 18% of the total number of firms in the West Bank. While 48% of these companies are registered under the Construction of Buildings subsector, coded 41, over 43% are considered under the Specialised Construction Activities subsector, coded 43. In Nablus governorates, small firms dominate the construction sector. In total, over 56% of the construction workers from Nablus work for firms employing under five workers, almost 35% work for firms that have up to 9 workers, less than 8%

[314] Interviewees R4S-B & R4S-D

works for firms employing between 10 and 19 workers, and a tiny percentage (less than 2%) works for firms that have 20 or more employees.

The average number of construction workforce from the Nablus governorate is 18,180, representing 13% of construction workers from the West Bank. 96% work either in the construction buildings subsector (53%) or the specialised construction activities subsector (43%). The percentage of full-time equivalent (FTE) regular labour is 98.6%. This includes the following groups of workers:

- Employees (white-collar): 1,603 (12% of them working in the Israeli construction markets)
- Self-employed: 1,256 (17% of them working in the Israeli construction markets)
- Wage Employees: 14,886 (47% of them working in the Israeli construction markets)
- Unpaid Family Members: 433 (4% of them working in the Israeli construction markets)

Figure 9. 13 indicates that the percentages of blue-collar workers in the construction of buildings and specialised construction activities subsectors working internally, i.e. in Nablus governorate, are 49% and 44%, respectively, compared to 41% and 48% working in the Israeli construction markets. The percentages of workers in the construction of buildings workers and specialised construction activities subsectors who are mobile to other governorates within the West Bank are 10 and 8, respectively. Additionally, the average hourly labour productivity for workers working in the building construction subsectors in Nablus is calculated to be 0.0404 m^2/labour.hr, which is 14% higher than the one calculated for workers in the two subsectors working in Ramallah (**Figure 9. 3**).

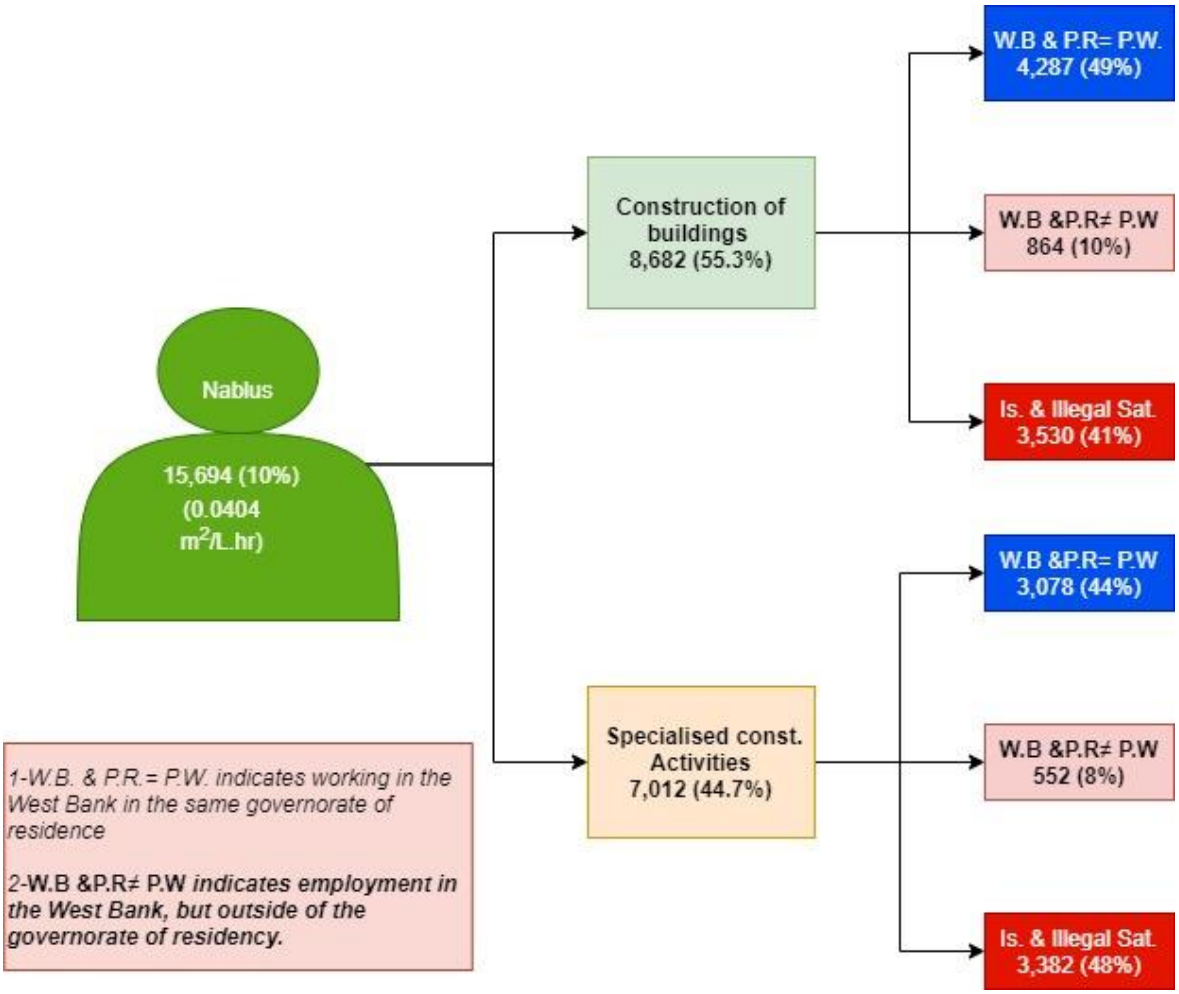

Figure 9. 13: Breakdown of the Blue-collar Workers from Nablus by subsector and place of work

9.8.1 Main characteristics of the labour force from Nablus

The average age among blue-collar workers is 33.5 years. However, 25% of the workforce is 23 years old or below. As three-quarters are between 15 and 43 years old, and 8 % are over 52[315], it can be deduced that there is not an ageing workforce problem. Like the rest of the governorates in the West Bank, the construction labour process in Nablus rests on rigid trade divisions and deficient levels of training. The **average number of years of schooling** among blue-collar workers is 9.8[316]. ***Figure 9. 14***, which depicts the distribution of construction workers from the governorate based on their higher educational qualifications, reveals that over 78% have less than ten years of schooling (completed middle school), and the percentage that has completed an associate diploma is 3.4%. However, approximately

[315] The PCBS Raw Data
[316] The PCBS Raw Data

5% hold a bachelor's or master's degree. Surprisingly, only 7% of the blue-collar workers working in building subsectors have attended training courses, such as those managed by the Ministry of labour or run by the UNRWA, such as the Qalandia institute. Additionally, almost all blue-collar workers started working in the construction sector without receiving any on-the-job training from their employers[317].

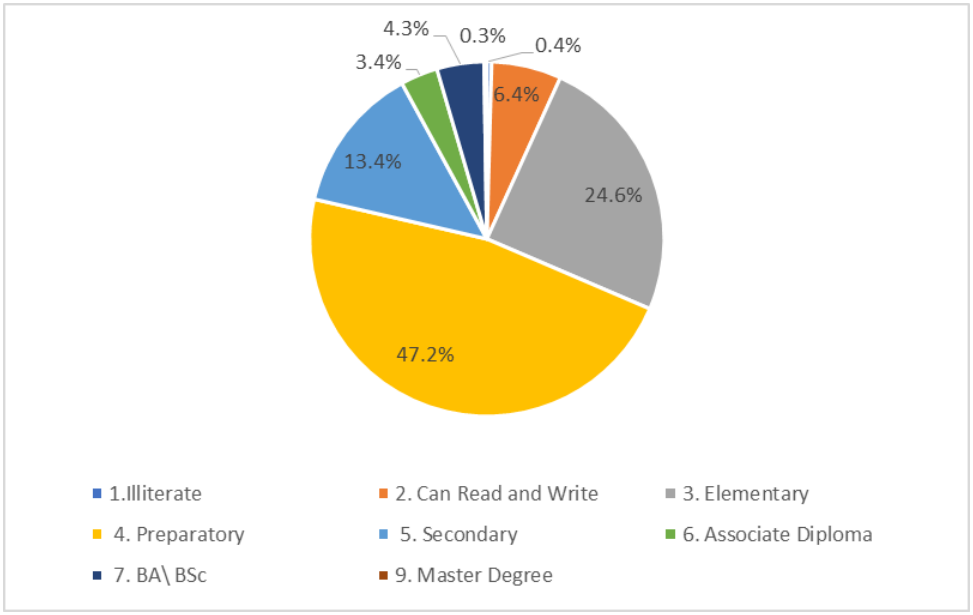

Figure 9. 14: The distribution of the blue-collar workers from Nablus based on their Educational Attainments[318]

9.8.2 Working and employment conditions and Wages

The daily wages for construction workers from Nablus working in the building subsectors differ based on the place of work and their classification, i.e. under the Craft and Related Trade Workers category or the Elementary Occupations category (***Table 9. 8***). The average monthly wage for workers working in Nablus or within the West Bank is less than 40% of that of the workers working in the Israeli construction market, more specifically, ILS 1,954.07 in Nablus compared to ILS 4,484.75 in the Israeli markets for workers classified under the Craft and Related Trade Workers category. Additionally, for the workers in the other category, the average monthly wage in Nablus (1,143.53 ILS) is almost 35% of that of the workers in the Israeli market (3,289.66 ILS).

[317] The PCBS Raw Data
[318] The researcher's calculation based on the PCBS Raw Data

Category	Nablus or in the West Bank		Israeli Markets	
	Avg. Daily Wage (NIS)	Avg Weekly working hours	Avg. Daily Wage (NIS)	Avg Weekly working hours
Craft	113.05	45.12	302.84	39.66
Elementary	79.34	40.37	222.59	39.45

Table 9. 8: The average daily wage and weekly working hours of Building workers from Nablus based on their place of work and category[319]

Another issue shown in ***Table 9. 8*** is workers' long working hours in Nablus. The average weekly hours for craft building workers working in Nablus is 45.12, which is shorter than the one for the workers from Ramallah. Notably, 50% of construction workers working in sub-sectors of buildings in Nablus work weekly for more than 48 hours.

Almost none of the blue-collar building workers working in the governorate have any work agreement with their employers, whether written or verbal[320]. As a result, the construction sector in Nablus shares many of the characteristics of North African and middle east economies in terms of poor working conditions, such as running at risk of losing their jobs and delaying/ not paying their dues, and workers are bearing personal responsibility for their safety and the costs of their medical care. In addition, they experience high vulnerability to social risks (lack of job security). For example, the proportion of workers entitled to benefit from pension funds or end-of-service benefits is less than 1%, and less than 1 % and almost 1% of them have received paid leave and sick leave. In addition, less than 1% of workers from the governorate working locally, i.e. in Nablus or other governorates in the West Bank, has been provided either free private health insurance or free public health insurance, and approximately 5% have been insured against injuries on their construction sites[321].

Moreover, among construction workers employed in the two sub-sectors in Nablus, 1.3% have difficulties with their vision, less than 1% have hearing difficulties, and over 2% have difficulty moving and using their fingers[322], indicating that poor working conditions and the health and safety of blue-collar workers from Nablus have been ignored by their employers and the clients of the construction projects. Perhaps, the weak affiliation of the blue-collar workers to any of the workers' vocational unions has led to these bad situations

[319] The researcher's calculation based on the PCBS Raw Data
[320] The PCBS Raw Data
[321] The PCBS Raw Data
[322] The PCBS Raw Data for 2018 & 2019

for the workers, as almost 96% of the workers working in Nablus are not members of any labour unions defending their rights [323].

On the other hand, the percentages for job security factors for the workers working in the Israeli market are higher than the percentages in Nablus; for instance, almost 31% are entitled to benefit from pension funds, and over 6% have received paid annual vacation[324]. In addition, the percentages of workers from Nablus working in the Israeli markets who have public health insurance or are insured against accidents at construction sites are 12% and almost 9%, respectively, and approximately 37% of the governorates workers who work in the Israeli construction markets are affiliated with the workers/Vocational unions[325]. These figures and the wage disparity between the two construction markets could explain the labour mobility in Nablus.

9.8.3 Relationship between Labour mobility and locality type in Nablus

A Kruskal-Wallis H test, which conducted to investigate if Nablus building workers' mobility to the Israeli construction market varies by locale type: (a) urban (n = 884), (b) rural (n = 1002), and (c) camp (n = 139), showed a statistically significant difference in mobility between the three groups, $\chi 2(2) = 93.847$, $p = 0.0001$. Most of the Palestinian rural areas in Nablus are considered areas B (see Figure 9. 15). However, the lack of investment by the Palestinian Authority or local developers in Nablus compared to Ramallah may result in fewer construction activities in these areas (**Figure 9. 2**). Thus, construction workers from rural areas may need to move to Israel or the illegal settlements, as Nablus, which is far from the green line compared to other governorates, is surrounded by several illegal settlements (***Figure 9. 15***).

Figure 9. 15 shows that all the camps and urban areas in the governorate are built-up areas and located in area A, indicating higher construction activities than rural localities. Over 52% of the construction workers from rural areas work in the Israeli construction markets compared to almost 37% and 15% of the urban and camp localities[326]. Security requirements also play a crucial role in labour mobility.

[323] The PCBS Raw Data
[324] The PCBS Raw Data
[325] The PCBS Raw Data
[326] The PCBS Raw Data

> […] Working in Israel is more comfortable due to the machinery. Yet, the security ban is currently preventing me from working in Israel. I have been a former prisoner since the 1987 intifada, the first intifada. I am now trying to lift the security ban and obtain a work permit with several institutions. If I get it, I will move to work there, as the salary is higher and the working hours are shorter than the West Bank (Interviewee N6M-C).

Additionally, a one-way ANOVA test conducted to compare the effect of 'occupation' on labour mobility to the Israeli construction markets revealed that there was a statistically significant difference in labour mobility between the skilled and unskilled workers groups (F (1, 2023)= [44.01], p=[0.0000]). The Bonferroni posthoc test revealed that labour mobility to the Israeli market was statistically significantly higher for Craft and Related Trade workers than the workers under the Elementary Occupation group by over 14% (p=0.0000). Additionally, the average age of workers working in Israeli markets is over 38 years, six years higher than workers working locally, and their working experience is over ten years compared to seven years for those working locally[327]. The average experience of skilled workers working in the Israeli market is almost three and half years higher than their peers working in Nablus, demonstrating that the Israeli construction industry seeks out skilled blue-collar workers with more experience. For example, Interviewee N6M-D states:

> I worked in a settlement as a farmer. I worked 8 hours and earned 70 shekels, so I quit working with them because the income was low, and I could not work in the Israeli construction sector, as I still did not have the skills. Frankly, I prefer to work in the Israeli construction sector. It is better from a financial point of view, but I do not find the opportunity; I am not a specialist in a particular activity.

[327] The PCBS Raw Data

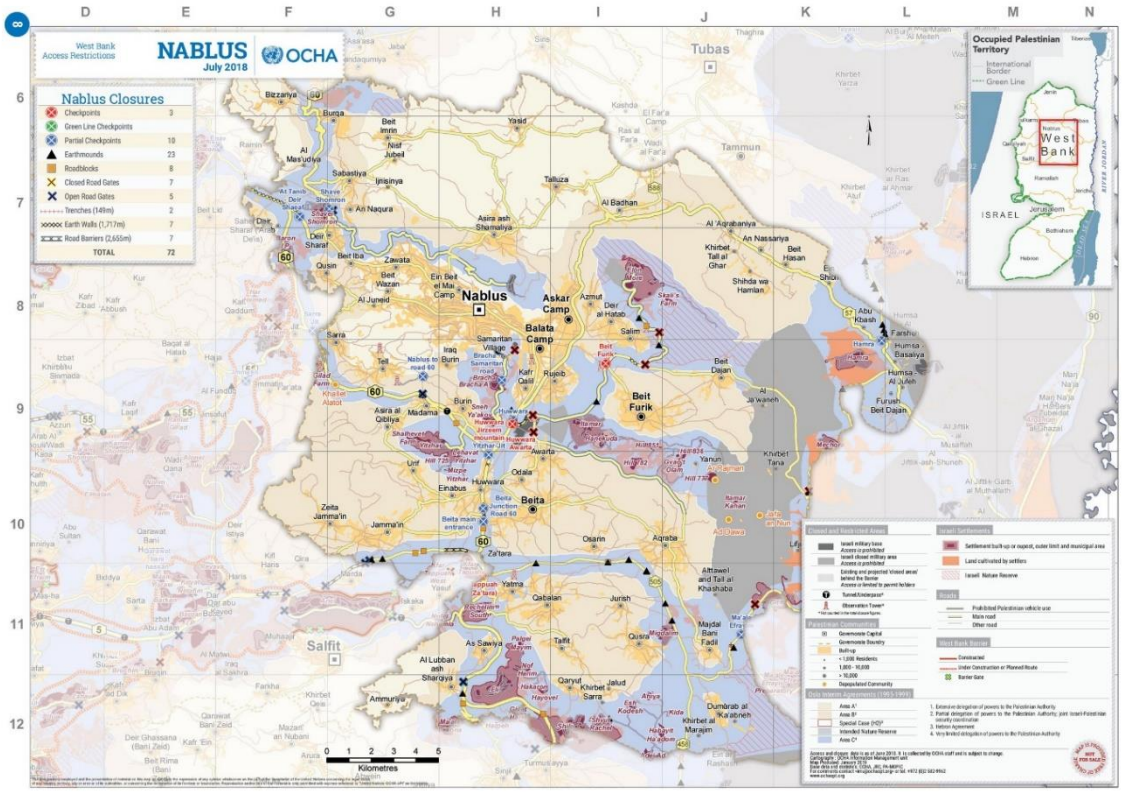

Figure 9. 15: Nablus Governorate Map

Source: (OCHA, 2020)

9.9 Case study #5: Medical Facility in Nablus

9.9.1 Overview

This case study covers the construction works in one out of four medical facilities in Nablus that a local university owns. The construction phase of the building was funded by a grant from the Arab Bank for Economic Development in Africa (BADEA) through the Islamic Development Bank. A Jordanian architectural engineering consulting company was responsible for the design and technical assistance. The supervision was carried out by the University's Department of Engineering Works in collaboration with the United Nations Development Program (UNDP).

The project was locally tendered on a bill of quantity basis. Based on a competitive bidding process, a local contracting firm accredited by the PCU as a Grade A building contractor was selected through a call for pre-qualification. ***Table 9. 9*** summarises essential information regarding the project's construction stage, such as the type of contract, price, and date of commencing. Although this project's labour productivity was

not calculated due to a lack of information, the interviews and daily reports indicated that the project completion time was as planned. However, due to new work and several change orders by the owner**,** the original contract date was extended (***Table 9. 9*)** by 365 days[328].

Item	**Case Study #5: Medical Facility**
Type of Contract	Separate Design and Construction (Bill of Quantities)
Tender Price	$ 1,866,613.84 (the final price= 3,066,613.84)
Advanced Payment	10% of the contract sum
Contract duration	365 calendar days (Actual duration= of 730 calendar days)
Starting Date	September 10 2017
Expected Completion Date	September 10 2018
Actual Completion Date	September 10 2019
Limit of Liquidated Damages	Total liquidated damages not to exceed (10%) of the contract sum
Minimum Amount of Interim Certificates	No less than (5%) of the Contract amount

Table 9. 9: Key information concerning the construction phase of Medical Facility #5

Interviewee N6M-A, who ignores the quality of workers, perceives labour productivity as the completion rate per schedule while achieving the required quality of work, which depends on the quality of materials and engineering supervision. Unlike the Ramallah cases, the project's planner for the schedule considered public holidays and working during the winter and summer seasons. The project's schedule was updated monthly to review the project's progress[329]. A decision was made based on each progress review, especially if some operations were getting out of phase. Accordingly, the update was used to look back at what happened and look forward to what needs to be done. For example, more workers are allocated to the lagged activities, which need to be speeded up to complete on time, as shown in ***Figure 9. 16***. This project tends to focus on the output rather than the labour input. Some activities were implemented in the shift system, and others by increasing working hours from 8 to 10 hours per day[330].

[328] Monthly progress reports
[329] Monthly progress Reports and Interviewees N6M-A & N6M-B
[330] Interviewee N6M-B

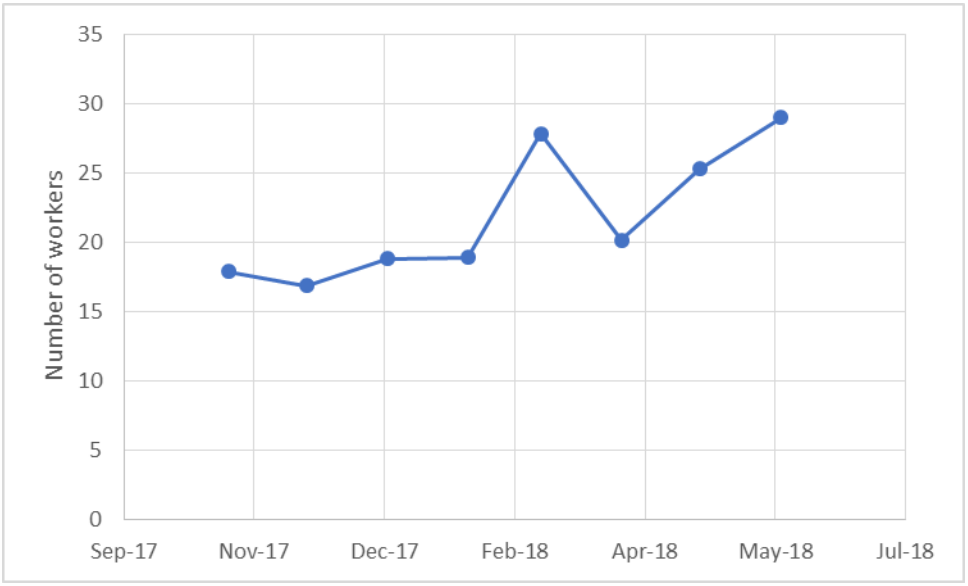

Figure 9. 16: Total Number of Blue-collar workers allocated between October and June 2018[331]

9.9.2 Employment and Working Conditions

The workers are highly skilled and highly qualified, especially those who work in the Israeli market. However, as recruitment in the industry is based on the ability of the worker to perform the job in his hand, not on technical qualifications, the workers need close and direct supervision through the labour superintendent[332]. Interviewees N6M-A & NAM-B state:

> We judge workers' skills by observing their work and ability to complete work with their own hands. Therefore, I always ask the technician for a sample of his work, and accordingly, I decide whether or not to hire him […]. The superintendents of workers in the company are a graduate of a technical institute, holding a diploma in civil or architectural engineering, or a technician with more than ten years of experience in construction. Both cases are available in our company. For us, the workers' superintendent is the dynamo of the project, and he is the one who organises and monitors the work. Therefore, he must have extensive knowledge and experience to solve problems and help workers implement their work (N6M-A).

[331] Researcher's Calculation based on the Daily Reports
[332] Interviewee N6M-A

> […]Proceeding from our previous experience with the problems of hiring unqualified workers, we chose in this project qualified and well-experienced workers, and we did not let the workers do the work alone, but we supervised them closely. For example, in this project, the number of superintendents was 3. In addition, the engineering team includes the project engineer and the site engineers on-site (N6M-B).

Most of the workers were daily wage earners[333]. The weekends and holidays were not paid[334]. The weekly hours for construction workers were 52, including an average of 7 hours of overtime[335]. There would be no rewards even if they produced more than expected. However, if their output is less than expected, they will be blamed and told to be more productive, or they will be sacked[336]. Employment conditions are unsecured, except for getting paid at the time agreed upon with the employer[337]. The contracting firm also often tends to have a high labour turnover[338], thus operating with a high degree of unpredictability in terms of labour, quality, and cost.

> Wages are calculated based on physical effort and production. The daily salary of a non-specialised worker is between 90-120 shekels. For example, a technical assistant might get 120 shekels if he can perform some task that helps the technician get done faster, such as cutting tiles or stones. In this case, we call him semi-skilled. However, unskilled workers take around 90 ILS daily. In addition, a skilled worker gets a daily wage depending on his productivity. However, his daily wage is between 200 and 250 shekels if he works based on the daily system (Interviewee N6M-A).

> […]Work starts from 6:30 a.m. to 3 p.m.; my working hours are 8.5 a day to get 210 shekels as a daily wage. I always work six days a week. Any additional hour pays us based on the regular hourly rate. There is no law for calculating overtime, which is subject to the contractor, but if I work less than 45 hours per week, the difference will be deducted from my weekly salary. Also, we do not get paid if we

[333] Interviewees N6M-A & N6M-C
[334] Interviewees N6M-C & N6M-D
[335] Interviewee N6M-C
[336] Interviewees N6M-C & N6M-D
[337] Interviewees N6M-A, N6M-B, N6M-C & N6M-D
[338] Interviewees N6M-A & N6M-C

> are disrupted by heavy rain. […] The daily salary directly depends on the operator's agreement. During the layoff from my current employer, I worked for another contractor giving me 150 shekels a day instead of 210, even though I did the same tasks. […] I've spent nearly 40 years on construction sites without health insurance, end of service, or pension (Interviewee N6M-C).

Furthermore, the monthly reports indicate no reported safety violations or accidents on the site. However, the photos show that the health and safety regulations were only partially implemented. All photos show that the workers were working under unsafe conditions. For example, the steel protection caps for the steel bars were not used (***Photo 9. 7***), which increases the risk of injuries caused by coming into contact with the end of a concrete reinforcing bar.

Photo 9. 7: Non-use of approved rebar safety caps during construction

Additionally, the photos show that the workers were wearing just helmets and vests. However, none wore appropriate personal protective equipment, such as goggles, face shields, gloves, earmuffs, and safety shoes (***Photo 9. 8***), indicating that the working conditions of workers are difficult and dangerous.

Photo 9. 8: Workers' violations of health and safety requirements

As in Case 4 in Ramallah, Interviewee N6M-A claimed that scarcity of skilled labour has resulted in the contracting company losing control over applying health and safety requirements at the site. One of that arguments is that since skilled labour is required on more than one project and by more than one contractor, the imposition of any fine for a safety violation causes workers to leave the project to work in Israel[339]. Additionally, intense competition among the contenders to win the bid leads to sacrificing the costs of safety precautions. As the contractor is not compensated for compliance and applying safety precautions by owners, except the USAID, UNRWA and UNDP, there is a weak commitment and implementation on site[340], which is increased due to the failure of the MOL to impose and ensure the implementation of safety instructions in projects[341].

On the other hand, the workers indicate that the contracting firm does not provide the workers with the proper PPE. The contracting company circumvented the health and safety law by considering the PPE as just the safety shoes and helmets[342] , trying to reduce operational costs by saving on this item. For instance, Interviewee N6M-C argues:

[339] Interviewees N6M-A
[340] Interviewees N6M-A & N6M-B
[341] Interviewees N6M-A, N6M-B & N6M-C
[342] Interviewees N6M-C & N6M-D

> We only hear about the Oversight and follow-up of the MOL inspectors in the news. If the supervision asks the contractor to apply the H&S requirements in some projects, they bring a cheap helmet and vest. One time, I asked about a safety boot, and he told me that its price was 150 shekels, and if he brought it, the cost would be deducted from my weekly wage. Therefore, the application is deceitful. A week ago, […], an accident happened, and thus we were obligated to wear the helmet that day. […]. The contractor does not care about the workers. If you cut or break a plank in the project, the contractor gets angry, but if the worker falls, he does not worry, as his treatment expenses will be on the project's insurance. Frankly, they care about machines and materials more than workers. Contracting companies do not care about training workers and do not give them safety courses. There is no accountability for contractors for their negligence against workers.

Finally, The contracting company used a socio-technical approach to compensate for delays during the construction phase and mitigate the impact of skills shortages in the industry by using new construction systems, such as a modular steel formwork system[343]. In addition, the contracting company used a tower crane to speed up the construction process[344]. Such factors, including machinery in use, the availability of labour and skill, the completeness of design information and the design quality, contributed to explaining the speed at which this project proceeded. For instance, Interviewee N6M-B states:

> […] We noticed that there are many columns of standard dimensions of either 60 * 160 cm or 60 * 140 cm, and I used to allocate a steel-rebar technician and assistant for three working days to erect the formwork and rebar for each. Doing this activity in that way was not financially feasible. So it was suggested to use modular metallic formwork, especially as the supervision on the part of the owner was very strict and focused on minor details. Therefore, the modular formwork system was used for columns in this project. The steel-rebar technicians and assistants were trained in using this system. The first column took four working days between shuttering, casting and deshuttering of formwork. Then the production became an average of one column per day for each crew, i.e. the rebar technician and his assistant. Accordingly, physical efforts, time and expenses were saved.

[343] Interviewees N6M-A & N6M-B
[344] Interviewee N6M-A

9.9.3 Israeli policies

With the excellent financial status of the construction firm and the contractor's experience in the process of importing construction materials, the effect of Israeli policies, including the presence of Israeli construction markets and the requirements for importing from abroad, as an external structural factor, was minor in this project. On the one hand, the reinforcing steel used was 32 mm in diameter, which is largely unavailable in the local market, and therefore it took time to be imported and supplied to the project[345]. Additionally, electricity specifications are very high, and special pipes were used for the extensions imported from Jordan specifically for this project[346]. However, on the other hand, the project was completed according to its time as project delays were overcome by increasing the number of workers and increasing working times[347]. For Example, Interviewee N6M-B argues:

> […]The Israeli control over the crossings and borders affected us, raised operational costs and affected the project's plan. For example, shipping electrical pipes from Jordan led to a 15-day delay in pouring the first ceiling. The pipes were ready from Jordan within ten days, but the import and clearance procedures took approximately 30 days. To overcome these delays, we used shift systems.

Most of the workers who worked on this project were from the Nablus governorate[348]. These workers live far from the Green Line. Workers' commitment was high[349] because the contractor did not delay paying their dues and the project's proximity to their place of residence[350]. Accordingly, the main contractor did not suffer a skills shortage due to labour mobility to the Israeli markets[351]. Yet, the contracting firm suffers from the increase in the daily wages of the skilled labour due to their shortages in the West Bank, mainly in fixing steel reinforcement activity, which is a costly activity as steel fixers are not available in abundance due to the labour mobility to the Israeli market[352].

[345] Interviewee N6M-B
[346] Interviewee N6M-B
[347] Monthly Progress reports and Interviewees N6M-A, N6M-B & N6M-C
[348] Interviewees N6M-A & N6M-B
[349] Daily reports
[350] Interviewees N6M-A, N6M-B & N6M-C
[351] Interviewees N6M-A, N6M-B
[352] Interviewee N6M-A

9.10 The structure of the construction industry in Bethlehem

The number of registered construction contracting companies in Bethlehem is 46, comprising almost 8% of the total number of firms in the West Bank (PCBS, 2019). While almost 59% of these companies are registered under the Construction of Buildings subsector, coded 41, over 28% of these firms are considered under the Specialised Construction Activities subsector, coded 43. Like the previous governorates, small firms dominate the construction sector in Bethlehem governorates. In total, almost 60% of the construction workers from Bethlehem work for firms employing under five workers, 28% work for firms that have up to 9 workers, less than 6% work for firms employing between 10 and 19 workers, and the proportion of workers working for companies with 20 or more employees is slightly over 6%[353].

The average number of construction workforce from the Bethlehem governorate is 11,560, representing 8% of the construction workers from the West Bank[354]. Almost all work either in the construction buildings subsector (62%) or the specialised construction activities subsector (38%). The percentage of full-time equivalent (FTE) regular labour is 66.41%. This includes the following groups of workers[355]:

- Employees (white-collar): 857 (24% of them working in the Israeli construction markets)
- Self-employed: 304 (slightly over 9% of them working in the Israeli construction markets)
- Wage Employees: 6,460 (over 55% of them working in the Israeli construction markets)
- Unpaid Family Members: 56

[353] PCBS Raw Data
[354] Researcher's Calculations based on the PCBS Raw Data
[355] Researcher's Calculations based on the PCBS Raw Data

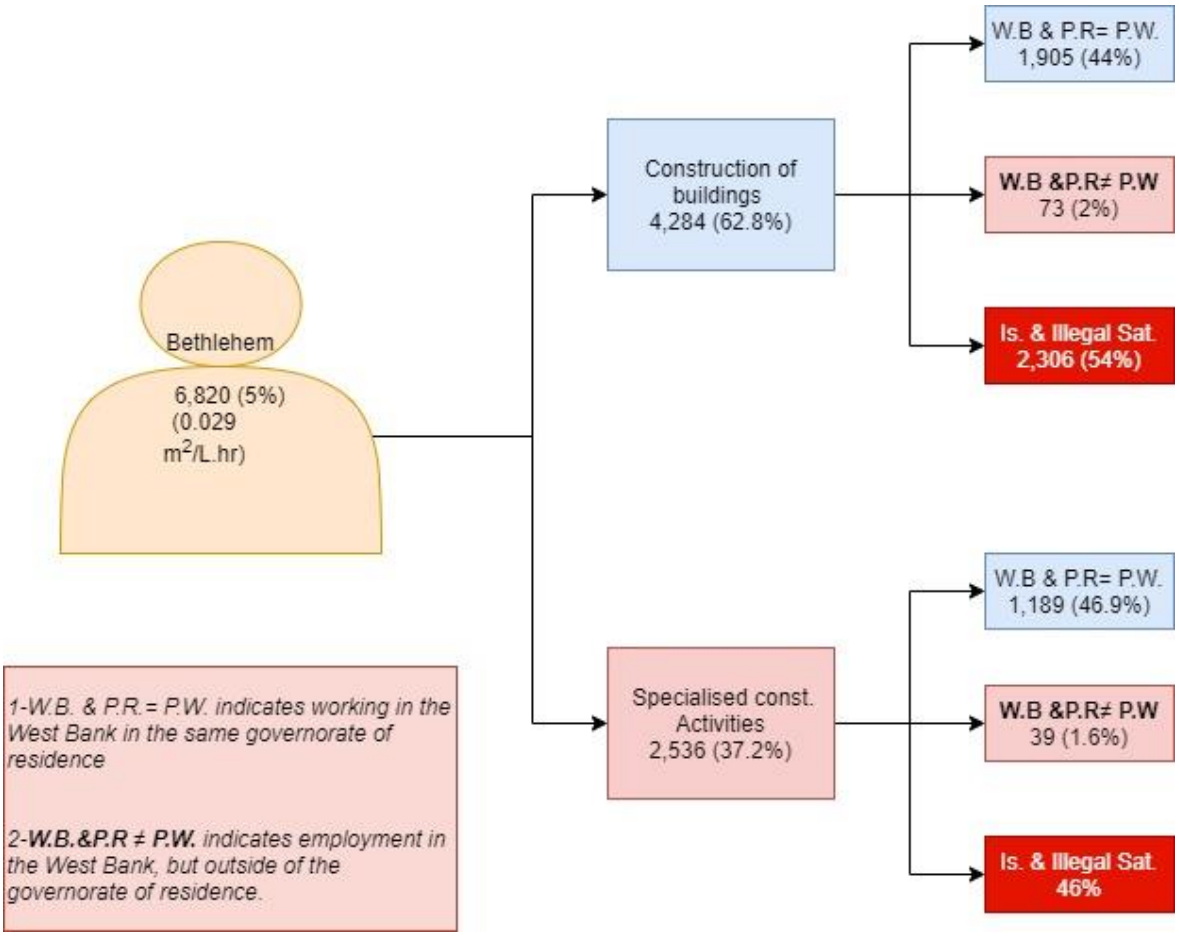

Figure 9. 17: Breakdown of the Blue-collar Workers from Bethlehem by subsector and place of work

Figure 9. 17 reveals that 44% and 47% of workers in the construction of buildings and specialised construction activities subsectors are employed domestically, compared to 54% and 47% of workers in the Israeli construction markets. In addition, only two per cent of each category is mobile between West Bank governorates. The average hourly labour productivity of Bethlehem's building construction sub-sectors is around 0.029m^2/labour.hr, roughly the same as the productivity of the two sub-sectors on the West Bank.

9.10.1 Main characteristics of the labour force

The **average age** among blue-collar workers is 35 years. However, 25% of the workforce is between 13 and 25 years old. Three-quarters are below the age of 44, and 10 % are between the ages of 51 and 71[356], indicating no ageing workforce problem. Additionally, the **average number of years of schooling** among blue-collar workers is almost ten[357], over three-

[356] The PCBS Raw Data
[357] The PCBS Raw Data

quarters have less than ten years of schooling (completed middle school), a tiny percentage (slightly over 2%) have an associate diploma, and less than 4% hold a bachelor's degree (***Figure 9. 18***).

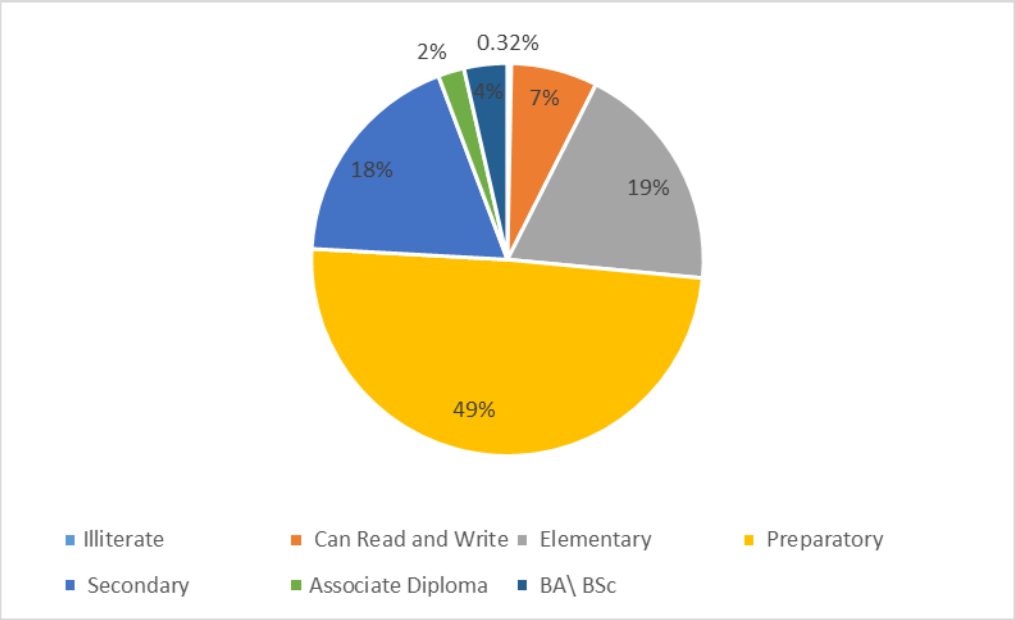

Figure 9. 18: The distribution of the blue-collar workers from Bethlehem based on their Educational Attainments

The construction labour process in Bethlehem rests on low levels of training. Only 12% of the blue-collar workers working in building subsectors have attended training courses, such as those managed by the Ministry of labour or run by the UNRWA, such as the Qalandia institute. Nevertheless, 51% of whom are working in the Israeli construction markets[358]. Like the workers from Nablus, almost all blue-collar workers started working in the construction sector without receiving any on-the-job training from their employers[359].

9.10.2 Working and employment conditions and Wages

As in the other provinces, the labour process rests on output-based pay[360], and the daily wages for construction workers from the governorate working in building subsectors differ based on their place of work and classification, i.e. skilled labour and labourers, as shown

[358] The PCBS Raw Data
[359] The PCBS Raw Data
[360] Case study interview

in ***Table 9. 10***. The average monthly wage for workers working in Bethlehem or within the West Bank is 65% of that for the workers working in the Israeli construction market, more specifically, ILS 2,178.44 compared to ILS 3,343.53 in the Israeli markets for workers classified under the Craft and Related Trade Workers category. For unskilled workers, the average monthly wage in Bethelem (1,295.64 ILS) is almost 60% of that for workers in the Israeli market (2,173.74 ILS). ***Table 9. 10*** depicts that the average weekly hours for craft building workers working in Bethlehem is less than 42, which is less than full time (45 hours a week). Less than 25% of construction workers working in sub-sectors of buildings in Bethlem work weekly for more than 48 hours[361], indicating that the number of working hours and the percentage of workers working more than 48 hours weekly in this governorate is less than in the other two provinces.

Category	Bethlehem or in the West Bank		Israeli Markets	
	Avg. Daily Wage (NIS)	Avg Weekly working hours	Avg. Daily Wage (NIS)	Avg Weekly working hours
Craft (Skilled)	151.22	41.85	245.43	39.55
Elementary (Unskilled)	105.54	39.06	173.92	38.24

Table 9. 10: The average daily wage and weekly working hours of Building workers from Bethlehem based on their place of work and category[362]

Like the other two governorates, the construction sector in the governorate shares many of the characteristics of the North African and Middle East economies in terms of poor working conditions, such as being at risk of losing their job and delaying/ not paying their dues, and workers bearing personal responsibility for their safety and the costs of their medical care. Most of the workers working in the governorate have no access to health or accident insurance and do not contribute to pension funds. Thus, they experience high vulnerability to social risks (lack of job security).

Over 99.5% of the blue-collar building workers in the governorate do not have a written contract, whether for a limited or unlimited period. Only a tiny percentage of workers (0.4%) has a written contract for a limited period. Almost 99% of the workers have a verbal agreement with their employers, and other job security factors are provided to the

[361] PCBS Raw Data
[362] Researcher's Calculation based on the PCBS Raw Data

small percentage of workers from the governorate who work domestically[363]. For example, the proportion of workers entitled to benefit from pension funds or end-of-service benefits is less than 5%, less than 3% received paid leave, and almost 1% sick leave. Additionally, less than 2% of the workers from the governorate working locally, i.e. in Bethlehem or other governorates in the West Bank, has been provided either free private health insurance or free public health insurance, and approximately 5% have been insured against injuries on their construction sites. A very tiny percentage (less than 0.5%) of workers has received training during the first period at work. These percentages indicate that the health and safety of blue-collar workers have been ignored by their employers and the clients of construction projects. Perhaps, the weak affiliation of the blue-collar workers to any of the workers' trades unions has led to this fragile situation for workers, as none of them is a member of any trade union[364].

On the other hand, the percentages for job security factors for the workers working in the Israeli market are higher than the percentages in Bethlehem; for instance, over 21% are entitled to benefit from pension funds, over 11% have received paid annual vacation, and 5.5% have received paid sick leave. The percentages of workers working in the Israeli markets with private health insurance, free public health insurance, or insured against accidents at the construction sites are over 5%, almost 7.5% and slightly over 23%, respectively.

9.10.3 Relationship between Labour mobility and locality type

As shown in ***Table 9. 11***, although the area of the Bethlehem Governorate represents 12% of the total area of the West Bank, the areas that Palestinians can use to carry out their construction work (A and B) are 14% of the area of the governorate. This figure explains the scarcity of construction projects implemented in the governorate, as there is a shortage of available land. The area of new buildings licensed in the governorate between 2014 and 2018 is 1,544,900 m^2, representing 9% of the total licensed building area in the West Bank[365]. This area represents less than 42% and almost 34% of the area of the new buildings licenced in Nablus and Ramallah governorates, respectively (***Figure 9. 2***). On

[363] The PCBS Raw Data
[364] The PCBS Raw Data
[365] Researcher's Calculation based on the PCBS Building licenses quarterly reports between 2014 and 2018

the other hand, the labour force in the construction sector from the governorate represents 8% of the West Bank labour force working in the construction sector.

Governorate	% from the Area of WB	% of Area A	% of Area B	% of Area C
West Bank*	100	18	18	64
Ramallah	15	11	25	64
Nablus	11	18	39	43
Bethlehem	12	8	6	86

* The total area of the West Bank is 5660 KM^2

Table 9. 11: The percentages of Areas A, B and C in the West Bank and the three governorates

Table 9. 10 indicates that the average weekly working hours for skilled and unskilled workers working in Bethlehem or other governorates in the West Bank are 41.85 and 39.1, respectively, almost three hours less than the average working hours for construction workers in the West Bank. The average monthly working days for workers from Bethlehem who work locally or within the West Bank and are classified under the Craft and Related Trade Workers category is 14.1 days compared to 19.1 for building workers from other West Bank governorates who work locally. In addition, for workers in the other category, the average monthly working days in Bethlehem (12.3 days) are approximately five days less than the average monthly working days for workers from other governorates who work locally[366]. Thus, this governorate has the highest labour mobility compared to the other two. Perhaps the lack of investment by the Palestinian Authority or local developers in the governorate compared to Ramallah and the proximity to the greenline compared to Nablus (***Figure 9. 19***) could lead to a higher rate of labour mobility to the Israeli construction markets compared to the rates of mobility of the construction workers from the other two governorates to the Israeli construction markets.

[366] The PCBS Raw Data

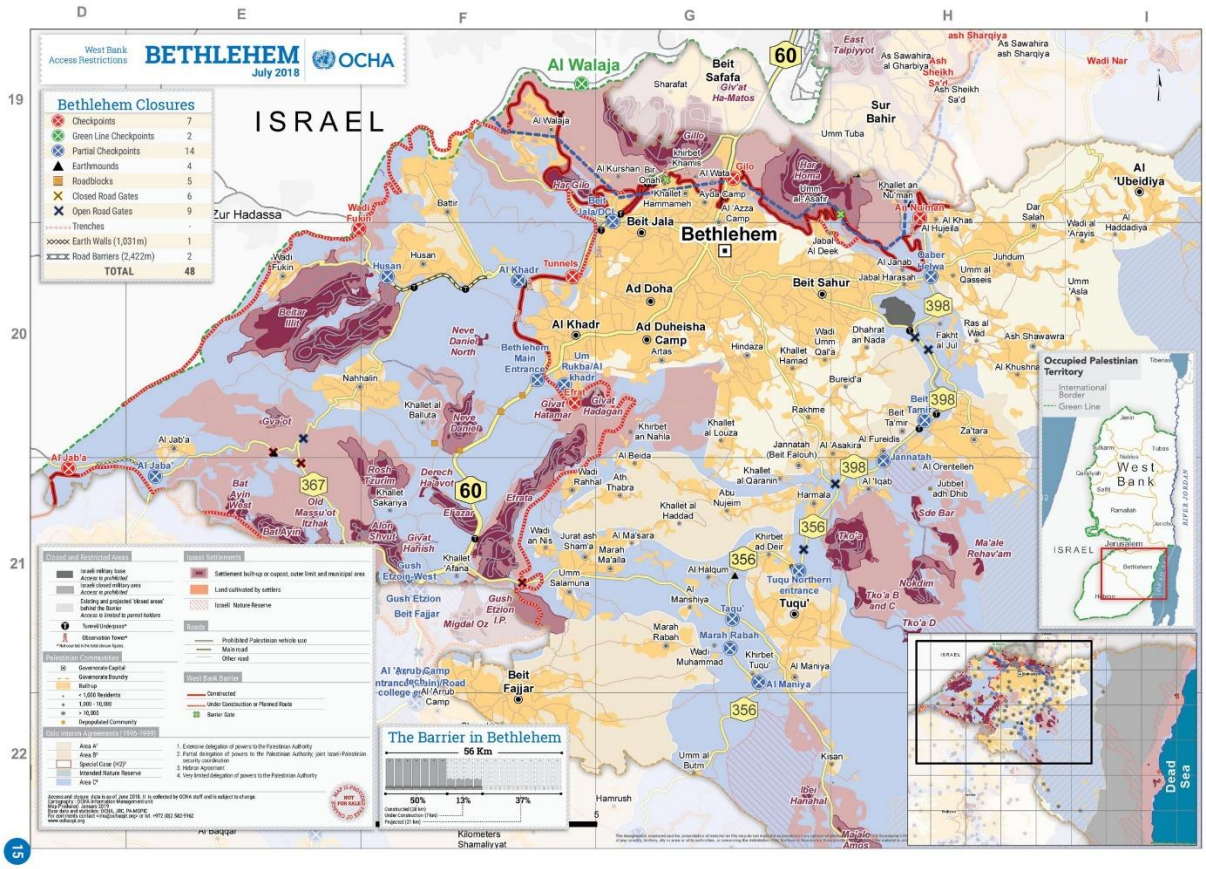

Figure 9. 19: The map of Bethlehem governorate

Source: (OCHA, 2020)

Over 52% of the blue-collar workers working in the two building subsectors work in the Israeli construction market (***Figure 9. 17***). A Kruskal-Wallis H test was conducted to determine if labour mobility into the Israeli construction market for workers from Bethlehem differs based on locality type: (a) urban (n = 1,149), (b) rural (n = 573) and (c) camp (n = 127). The test showed a statistically significant difference in mobility between the three groups, $\chi 2(2) = 54.091$, $p = 0.0001$, and revealed that the difference in mobility between workers from urban and rural areas is statistically insignificant, while there is a statistically significant difference between workers from these two areas and the camps. The data supported this finding. Almost 56% and approximately 52% of the construction workers from urban and rural areas work in the Israeli construction markets compared to 21% of those living in refugee camps[367].

[367] PCBS Raw Data

However, as in the other governorates, the construction sector in Israel is more targeted towards skilled blue-collar workers than unskilled ones. A one-way ANOVA test conducted to compare the effect of 'occupation' on labour mobility to the Israeli construction markets revealed that there was a statistically significant difference in labour mobility between the two groups (F (1, 1847)= [10.94], p=[0.001]). The Bonferroni posthoc test revealed that labour mobility to the Israeli market was statistically significantly higher for skilled workers than the workers under the Elementary Occupation group by almost 8% (p=0.001). Additionally, the average age of workers working in Israeli markets is almost 37 years, three years older than workers working locally. The working experience for workers working in the Israeli market is slightly over eleven years compared to 9.5 years for those working locally[368].

9.11 Case study #6: Medical Facility in Bethlehem

9.11.1 Overview

This Medical facility consists of five floors. The area of each floor is approximately 780m^2. The case study covers the building envelope and finishing of the interior works for the third floor, which were funded by a US $485,000 grant from the BADEA through the Islamic Development Bank. The electromechanical design and technical assistance work were conducted by a local engineering office, and the supervision was conducted by the PECDAR. The project was locally tendered on a bill of quantity basis. Based on a competitive bidding process, a Palestinian construction firm accredited by the PCU as a Grade B building contractor was selected through a call for prequalification. **Table 9. 12** summarises essential information regarding the project's construction stage, such as the type of contract, price, and commencement date.

As per agreements signed with the various financing bodies, PECDAR did not compensate the contractor for the financial losses due to the emergency and abnormal conditions that impacted the country (**Table 9. 12**) . The contract documents include a confirmation letter signed by the contractor that clarifies that the contractor can not claim any financial losses incurred due to the delay in implementing the project[369].

[368] PCBS Raw Data
[369] The contract Agreement & terms of the contract

> […]Sometimes, excusable delays were caused by reasonably unforeseen conditions and not within the contractor's control. For example, the supplier delayed the delivery of materials, such as tiles in the case of the gifted school project (two weeks late) and light fixtures in the Bethlehem project, due to new shipping procedures and our lack of control over any sea or land port as the Palestinian Authority. Nevertheless, although we accepted the time extension claim for such delays, the contractor was only compensated for the time and not the extra expenses incurred due to these delays (Interviewee B5M-A).

Item	**Case Study #6: Medical Facility**
Type of Contract	Separate Design and Construction (Bill of Quantities)
Tender Price	$ 458,777 (Final price= US $ 575,034.05)
Advanced Payment	10% of the contract sum
Contract duration	240 calendar days (Actual duration= of 616 calendar days)
Starting Date	October 23 2019
Expected Completion Date	June 23 2020
Actual Completion Date	June 30 2021
Amount of Liquidated Damages	1/1000 of the contract value per day, for each day or part thereof not substantially complete
Limit of Liquidated Damages	Total liquidated damages not to exceed (10%) of the contract sum
Minimum Amount of Interim Certificates	No less than (5%) of the Contract amount
Currency	U.S. dollar. Prices are fixed and not subject to fluctuations in currency exchange rates or building materials prices.

Table 9. 12: Key information concerning the finishing and building envelope phase of Medical Facility #6

Although the amount of the variation orders was almost 25% of the original contract value (**Table 9. 12**), the project extension period was 372 calendar days; that is, the actual project duration is over 250% of the original contract duration. The figures for labour productivity of the whole project and several activities are lower than the average for the governorate and those calculated for several activities in various Ramallah-based projects (***Table 9. 13***).

Activity	Productivity rate (m^2/day)	Average Productivity rates[370](m^2/day)
Plastering	14.13	24-30
Block works	12.67	15-20
Tiling works	20.16	20-30
Painting works	57.04	40-50
Waterproofing	25.76	-

Table 9. 13: Labour Productivity rate for some of the building enveloping and finishing works in the project[371]

Labour productivity for this project was calculated to be 0.022 m^2/l.hr[372], which is approximately 27% lower than the governorate average (***Figure 9. 17***). The approach of the contracting firm in this project was to assign cheap labour to execute the work, and they did not deliver the requisite number of workers[373]; thus lower productivity rates were not unexpected. Interviewee B5M-A states:

> […]Because of the lack of skilled labour and the poor workmanship of the workers who work with their company, we asked the contracting firm to repeat several activities. Additionally, the supervision commission refused to accept several works not compliant with the contract drawings and specifications. Also, the problems of rework due to poor workmanship have repeatedly occurred during the closing phases of the project, i.e. partial acceptance and the project closing. […]We requested several amendments based on the supervision commission's observations.
>
> […] The number of full-time workers in the project working under our supervision is only five, and the rest are subcontractors, such as the plasterer, tiler and aluminium subcontractor. None of our workers has been working in the Israeli construction markets. As a contracting company, as a result of the scarcity of labour, we target workers who can not work there, such as university students, whom we give flexible time to balance their studies and work during the exam period in the course of their studies at the Open University. Only two of our ten workers dropped out of

[370] The average productivity rates are based on Table 4.1 and Table 4.2

[371] Researcher's Calculation based on the actual BOQ and the building schedule as submitted by the main contractor

[372] The duration used to calculate productivity was 441 working days, of which 101 calendar days and 88 Fridays were subtracted from the total period to cover the closing period and the weekends. Moreover, the number of workers in the project, according to the contractor, was nine workers who worked nine hours a day.

[373] Interviewee B5M-A

> school. One of them finished the fourth grade of primary school, got a training course in HVAC in Jordan, and worked with us as a labourer. The other studied at the university for a year and then left (Interviewee B5M-B).

As with the case studies from Ramallah, the project schedule submitted for this project did not consider the essential items required to have a good plan, such as allocating necessary resources, public holidays, work during winter and summer, and cash flow. Likewise, while the planner was deciding on the early start of each activity, such as block and tiling work, work continuity for subcontractors or workers on these tasks was not considered. Additionally, the critical path for the chain of critical activities in the project was not highlighted, and the project's schedule was never updated to review the project's progress[374], indicating that the works were executed based solely on daily crash actions[375].

> […] The schedule was submitted only for supervision as part of the contract document. However, we did not commit to it in the project. I have managed the activities as I saw fit and according to the expenses that could be afforded. For example, the electrical works were delayed to avoid paying huge sums at the beginning of the project to the supplier and contractor, which was about 30,000 dollars. We did this in a way that the supervision did not notice. For example, I agreed with the electrician to work on the first fix for two days and then be absent for three weeks. Thus, the work started, but the achievement was almost zero (Interviewee B5M-B).

9.11.2 Wages and Working conditions

The other main reasons that led to this enormous delay in handing over the project on time were a) the weak financial position of the contracting company and b) the repercussions of the epidemic that led to the imposition of a tight closure on the Bethlehem Governorate[376]. As the construction firm could not finance the work internally until the employer compensated it, there is neither a guarantee of work continuity nor a guarantee of the contractor's obligation to pay subcontractors at the agreed time in this project[377]. All company’s liquidity problems were resolved at the expense of the workers, whose salaries

[374] Project schedule
[375] It means to speed up completion for the tasks without considering the optimal time and cost and new critical path of the project.
[376] Interviewee B5M-A
[377] Interviewees B5M-A & B5M-B

were not paid at the time agreed[378]. The contracting firm, which operated with a high degree of labour, quality, and cost unpredictability[379], also tended to have a high labour turnover rate[380]. Thus, the work rate slowed down or stopped and worker disloyalty, especially among skilled workers, grew[381].

> **[…]** However, there was a delay in paying the workers' wages and other subcontractors' dues beyond the agreed-upon time due to the delay in paying interim project dues and significant delays by the government in paying our dues for the construction projects handed over. […]. The most prolonged period for paying past dues was four months due to reasons beyond our control. Our direct workers have not been absent due to past dues. However, their productivity decreased, and our control over them waned (Interviewee B5M-B).

> […] The shortage of labour, especially skilled labour, has led to high demand for workers, especially skilled ones. Consequently, workers are absent without coordination with the owner or contractor because they know the company cannot dispense with them. After all, there is no alternative. Of course, workers can be encouraged by raising their daily wage and giving them incentives. Nevertheless, the procedure is challenging because of the contract's low prices (Interviewee B5M-C).

On the other hand, interviewee B5M-A indicated no delay in payments from the PECDAR, but the bills were paid if they were not less than 5% of the tender value, and the main problem of this firm was its wrong cost estimations for the project. Even though the breakdown of the prices requested by the PECDAR showed that the price offered was less than the cost, the contracting firm refused the owner's offer to withdraw from the bid without liquidating the bid bond[382].

> […]This company offered us a low tender price and won the bid. So, during the construction stage, the firm tried to cut costs by employing unskilled labour, and thus errors in implementation occurred. Therefore, the quality of the work was inferior because of the unqualified workers and the low quality of the materials

[378] Interviewees B5M-D & B5M-E
[379] Interviewee B5M-A
[380] Interivewees B5M-A & B5M-B
[381] Interviewee B5M-B
[382] Interviewee B5M-A

> supplied to the project. For example, we rejected many material samples, and several activities were reworked due to these issues. Also, we asked the firm to bring in and replace the existing workers with qualified ones (Interviewee B5M-A).

Yet, instead of that, the workers of the contracting firm were required to work 54 hours per week to earn their regular wage[383]. While the subcontractors were paid on an output-based[384], the daily wage for spending nine hours at the construction site for unskilled and skilled workers working directly with the firm was 100 NIS [385] and ranged from 170 to 180 NIS [386], respectively. The number of working days per week is six days[387]. Furthermore, the case study shows that the company's administration applied Taylorist principles. For example, Interviewee B5M-B stated:

> […]The people in the company are not specialists and need direct supervision to carry out a task from the ground up. For example, like all other company workers, the electrician did not graduate from a vocational school, and therefore he has difficulty in implementation. Thus, the electrical engineer and I explained what he should do and asked him to watch a Youtube video about installing electrical boxes or outlets. Also, we showed him practically how to carry out the particular activity, and the rest is carried out under our direct supervision. I targeted workers who did not know much about the profession when hiring. So, I gave them what to do. Moreover, in this project, we asked the tiling assistant to carry out the tiling, but his productivity was lower due to a lack of experience and skill in this field, yet we understand that.

Additionally, the outbreak of the epidemic significantly changed the payment methods for material suppliers and merchants the firm dealt with and led to an unexpected increase in the prices of some materials due to the significant rise in sea freight costs[388], which affected its financial position[389]. As a result, the contractor could not pay in cash for the

[383] Interviewees B5M-B, B5M-D & B5M-E
[384] Interviewees B5M-B & B5M-C
[385] Interviewee B5M-E
[386] Interviewee B5M-D
[387] Interviewees B5M-B & B5M-C
[388] Interviewee B5M-B
[389] Interviewees B5M-A & B5M-B

materials imported, which led to a significant delay in providing these materials on site[390]. To mitigate the considerable expense increase, the contractor attempted to save costs by assigning cheap workers and delaying dues to workers and various subcontractors. The technical department staff assigned to this project should consist of a full-time civil or architectural engineer with at least ten years of work experience, a full-time graduate engineer, a full-time quantity surveyor with experience of at least five years, a full-time work superintendent with a minimum of five years of experience, a part-time mechanical engineer and a part-time electrical engineer[391]. Yet, the firm did not allocate a mechanical engineer, quantity surveyor and workers superintendent for this project[392]. Accordingly, the quality of work was dramatically affected, as shown in ***Photo 9. 9*** and **Photo 9. 10**.

Photo 9. 9: the quality of floor and wall tiling in the project[393]

[390] Interviewees B5M-A & B5M-B
[391] Contract Documents
[392] Interviewee B5M-B
[393] Progress Report

Photo 9. 10: Wall corner protection carried out by the contractor in the project[394]

Photo 9. 9 and **Photo 9. 10** indicate that the quality of the work was poor, and there are many defects in the tiles used in the walls. The commitment and implementation of health and safety regulations on site were fragile (***Photo 9. 11*** to **Photo 9. 13**), and the monthly reports provided by the contracting company did not include any section for reporting safety violations or accidents on the site[395].

[394] Progress Report
[395] Progress Reports

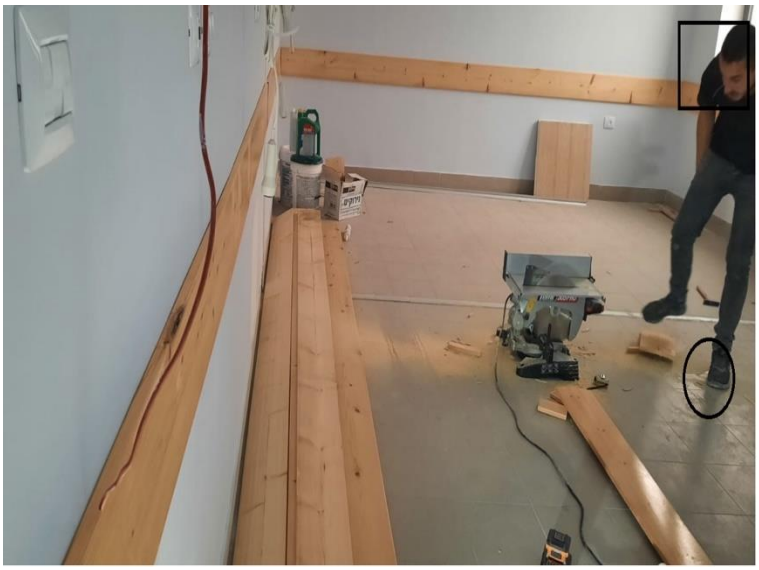

Photo 9. 11: A worker installing wooden cladding panels for walls[396]

Photo 9. 12: Dangerous Scaffold used to install Outdoor Lighting Fixtures for the building[397]

[396] Progress Reports
[397] Progress Reports

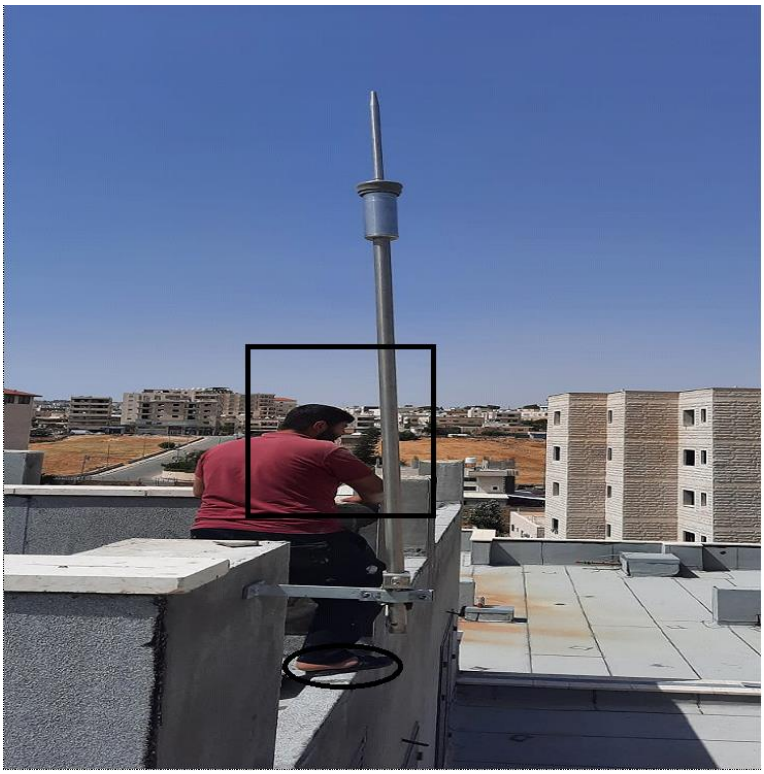

Photo 9. 13: Worker installing the Thunderbolt on the roof of the building[398]

The photos provided for this project showed that neither the owner nor the contractor considered the health and safety of the workers during the construction stage. Like other cases in the other governorates, the project was not visited by the Ministry's inspectors[399]. Furthermore, the project supervision notified the contracting company requesting that workers adhere to PPE without further action[400]. Construction workers were not wearing the required personal protective equipment, such as safety shoes, helmets, and masks (***Photo 9. 11*** and **Photo 9. 13**). Moreover, ***Photo 9. 12*** illustrated that the contractor used a hazardous scaffolding system to install the outdoor lighting fixture for the building. However, the interviewees B5M-B and B5M-C claimed:

> […] Most of the work is interior finishes, so we issued warning signs and brought a first aid kit. Fortunately, only a few minor accidents occurred on the project resulting in minor injuries, such as a worker falling off a ladder. Installing outdoor lighting fixtures was the only hazardous activity in this project. So, we used suitable suspended scaffolding to mount the lighting units about 16 meters off the ground. The work was done under the direct

[398] Progress Reports
[399] Interviewees B5M-B & B5M-C
[400] Interviewees B5M-A & B5M-B

> supervision of the project engineer and site engineer, who were supervising the project workers (Interviewee B5M-B).
>
> […] The workers' recklessness, not using the appropriate machine or tool, and sometimes misuse of equipment were the leading causes of these minor accidents (Interviewee B5M-C).

The workers indicated that they had not received any safety training course[401]. As a result of fierce competition among bidders (10 bidders[402]) and no monetary compensation from the client for compliance and applying safety precautions[403], the contracting firm did not consider this clause while pricing and therefore did not equip personnel with PPE or training.[404] Accordingly, the workers were working under unsafe conditions and insecure employment conditions.

> […]Contracts with all workers were verbal daily labour contracts. There were no written contracts - the company owners refused to write contracts because they did not want any legal document to be used against them by the worker. The worker costs the company: a- 100 shekels per day, b- 45 shekels for transportation and meals, c- insurance against injury. The company does not cover personal health insurance for employees. The current insurances are a-work injuries insurance for workers and employees working in the project, b- site insurance, c- project machinery and equipment insurance (Interviewee B5M-B).
>
> […] There are no rights for workers. […]. There is no job security and no increase in wages. For example, I worked nine hours from 8 to 5 p.m. every day except Friday. Yet, If I work less than 54 hours a week, the difference is deducted from my monthly salary, which does not include Fridays and holidays or disturbances in work due to political unrest (Interviewee B5M-D).

[401] Interviewees B5M-D & B5M-E
[402] Interviewee B5M-A
[403] Interviewee B5M-B
[404] Interviewee B5M-B

9.11.3 Israeli Policies and Labour mobility impacts

Due to the company's poor financial status, it targeted allocating cheap and unqualified blue-collar workers to carry out the work. Thus, the impacts of Israeli policies on labour productivity in this project were of lower severity than most of the Ramallah case study projects. Yet, like the case from Nablus, labour mobility to the Israeli construction market indirectly impacted labour productivity by raising daily wages in the West Bank and increasing the shortage of skilled workers[405]. As a result, their commitment decreased, and absenteeism increased[406].

> […] Before the pandemic, Israeli procedures for obtaining work permits were complicated, and the possibility of entering illegally to Israel was a challenge. After the restrictions were lifted, getting a permit and entering without a permit was very easy. Thus, we are suffering from a shortage of employment in the construction sector. Workers here began comparing themselves to those who work in the Israeli market. For example, an unskilled worker earns between 300 and 350 shekels daily in Israel compared to 100 in the West Bank. […] We cannot pay the same daily wage. […]. The workers became the ones controlling the workflow because they knew we needed them, and so they demanded higher prices for less output (Interviewee B5M-B).

9.12 Conclusions

This chapter addressed the structural and agency factors impacting construction labour productivity in different governorates in the West Bank, drawing on multiple sources that have contributed significantly to its conclusions. First, construction labour mobility to the Israeli construction market is the most significant agency factor impediment to labour productivity in the West Bank. The expenditure or value weight of labour wages and costs expressed as a percentage of all items included to calculate the construction cost index for the building subsectors is over 25% compared to 4% for the equipment (***Table 9. 14***), indicating that the construction sector in the West Bank is labour intensive. Thus the adverse impact of labour mobility on labour productivity in the West Bank was expected. Yet, labour mobility as an agency factor should not be detached from its contexts, such as the working conditions and employment status. Furthermore, restrictions on investment,

[405] Interviewee B5M-B
[406] Interviewee B5M-B & B5M-C

importing of materials and mobility of people within the West Bank resulting from the political situation, together with the deep fiscal crisis in the budget of the Palestinian Authority, have also contributed to slowing down the labour productivity in the West Bank and contributed to increasing labour mobility to Israel.

Category	Relative Importance for Building		
	Residential	Non-residential	Skeleton
Raw Construction Materials	63.6	65.6	69.2
Rental of Equipment	4.2	3.6	4.3
Labour wages and costs	26.3	24.9	23.5
Expenses and other costs	1.2	1.2	0
Engineering and supervision	4.7	4.7	3
Overall CCI	100	100	100

Table 9. 14: Relative distribution of weights used in calculating the construction cost index (CCI) in the West Bank

Source: (PCBS, 2020)

Although labour mobility has impacted labour productivity in the three governorates, its impact was more adverse in the Ramallah governorates cases than in the Nablus and Bethlehem cases. This agency factor has led to skill shortages, especially rebar fixing, tiling, and blockwork, coupled with an increase in the daily wages of skilled workers in the Ramallah governorate. However, this only resulted in higher daily wages for workers in other governorates. The impact of labour mobility to the Israeli construction market on workers' productivity should be linked to the size and intensity of each governorate's construction activities and its proximity from the greenline.

Most of the construction, particularly the megaprojects, took place in the Ramallah governorate, considered Palestine's political capital (Chapter 8). For instance, between 2014 and 2019, the new building construction in the governorate is over 26% of the total building construction projects constructed in the West Bank. Yet, one major problem facing the internal commuter workers, particularly in the events of political instability, is that their presence is not guaranteed because of the internal Israeli checkpoints.

While the mobility of workers led to skill shortages, especially in those working as steel fixers, tilers and bricklayers, all case studies show that there is a skill gap in the administration of the projects regarding the cost estimation and planning, particularly in the financial planning of the projects. Furthermore, analysis of the case studies shows that a significant percentage of the firm staff at senior positions lack different skills, such as

managing projects efficiently and effectively, supervising and controlling employees, and coordinating subcontractors working on the project. According to the Engineering Offices and Companies Authority (2021), the number of engineers working in offices and engineering companies until the end of December 2020 was 3,410, of whom only 13 specialise in construction project management.

In addition, the structure of Palestinian contracting companies varies, but most are small and family-owned, leading to inadequate on-the-job training crucial in developing a skilled labour force. For example, in all the case studies from the three provinces, none of the construction companies offered their workers any training courses and the case studies, except the one in Nablus, show that the contracting firms employ old technology. The working relationship in the sector contributes to the decrease in the number of training courses. In addition, low enrolment in vocational education contributes to skill shortages, particularly in Ramallah, whose enrolment share at TVET is meagre at less than 4%.

Unlike in the other two governorates, with the contracting firm in Nablus, most of the labour input is carried out by the main contractor's direct employees or its direct management. That is, the building company has its productive capacity, directly engaged workers, and equipment, leading its efforts to find the optimal method for increasing production rather than looking for the lowest denominator of quality and cost. Although the work in all cases tends to be more labour-intensive, the firm in Nablus used equipment, such as the tower crane and steel shuttering framework, to increase its productive capacity. However, the skill set in all the case studies is occupationally narrow.

In the Ramallah and Bethlehem case studies, intense competition between contractors to offer the lowest bidding price contributed to the winners being preoccupied with cost rather than production. Employment of cheap labour and failure to implement health and safety requirements in all projects, coupled with the definitions given to the term ‘productivity’, which focuses on output rather than input, are evidence of this preoccupation with cost rather than production. Other features of the working conditions are its dependence on physical effort, long working hours, lack of coordination of different design plans, mainly electrical and mechanical ones, and the persistence of a 'macho' work culture.

Unlike the white-collar workers, most case studies showed that the firm's practice is not to maintain a group of permanent blue-collar workers but favours extensive labour outsourcing. As a result, the contracting firms operate highly unpredictably in terms of labour, quality and cost. The structure of the wages for blue-collar workers, whose daily wages are significantly lower than their counterparts working in Israel, is craft-based (output-based). Furthermore, the fragmented workforce leads to a situation where the same workers can have different wages and benefits based on their agreement with the employer. While there was no wage siphoning or theft, it was reported that in most cases, except for the case study from Nablus, the contracting company failed to pay dues to suppliers, workers and subcontractors at the agreed time.

All data sources show that a tiny percentage of directly employed workers in the three governorates have permanent contracts. However, most do not have contracts but are just recruited word of mouth. Furthermore, except for electromechanical works, subcontracting in all the case studies is unregistered labour-only subcontracting. Accordingly, most workers neither have public or private health insurance nor contribute to pension funds. In the three governorates' construction sector, a tiny percentage of the workers are affiliated with labour or professional unions. All case studies indicated that most of the construction materials were imported, particularly those used during the finishing stage, resulting in higher than necessary costs and potential delays and stopping of work on sites due to supply constraints imposed by the Israeli occupation force.

CHAPTER 10

Reframing Productivity

10.1 Definition of labour productivity

Construction productivity is a multifaceted and complicated concept and difficult to be measured (Chan, 2002). Immense difficulties in defining, measuring and interpreting the concept of productivity in the construction sector are due to comparing inputs and outputs between varying projects, companies, and industry subsectors (Nasir, et al., 2014; National Research Council, 2009) as well as various economic and technical challenges facing the construction industry (Bernstein, 2003). As a result, a complete and universally accepted definition of labour productivity is missing. However, focusing on the dominant productive input in the production system, i.e. labour, that generates the output, i.e. buildings in this thesis, is an excellent approach to solving the dilemma of defining labour productivity in the sector. Although labour productivity cannot cover all aspects of productivity, such as the increase in the cost of energy and raw materials, unemployment and quality of working life (Prokopenko, 1992), using Giddens's structuration theory to look at the whole and the parts of the system and thus understanding how other parts interact with the labour has overcome this weakness (Chapter 5).

The data regarding the building construction in the West Bank used in Chapter 7 to Chapter 9 and **Table 9. 14** illustrate that, unlike the civil engineering construction subsector, the building construction subsectors are labour-intensive. Thus, investigating construction labour productivity, particularly in building construction, could unpack the problems in other inputs, such as technology, materials and equipment, besides the labour. ***Figure 10.1*** summarises how construction labour productivity was treated by previous research covering productivity aspects in the sector in developed and developing countries. While dealing with productivity, researchers could be divided into two broad categories: a) the first did not provide any definition for the term, and b) the second group ignored the debate regarding the definition (***Figure 10.1***). The research under the second category has offered either a broad and vague (e.g., the macro and meso levels definitions for the term as shown in Chapter 2) or a very narrow and mechanical definition (e.g. the definitions of the term at the micro-level illustrated in Chapter 2).

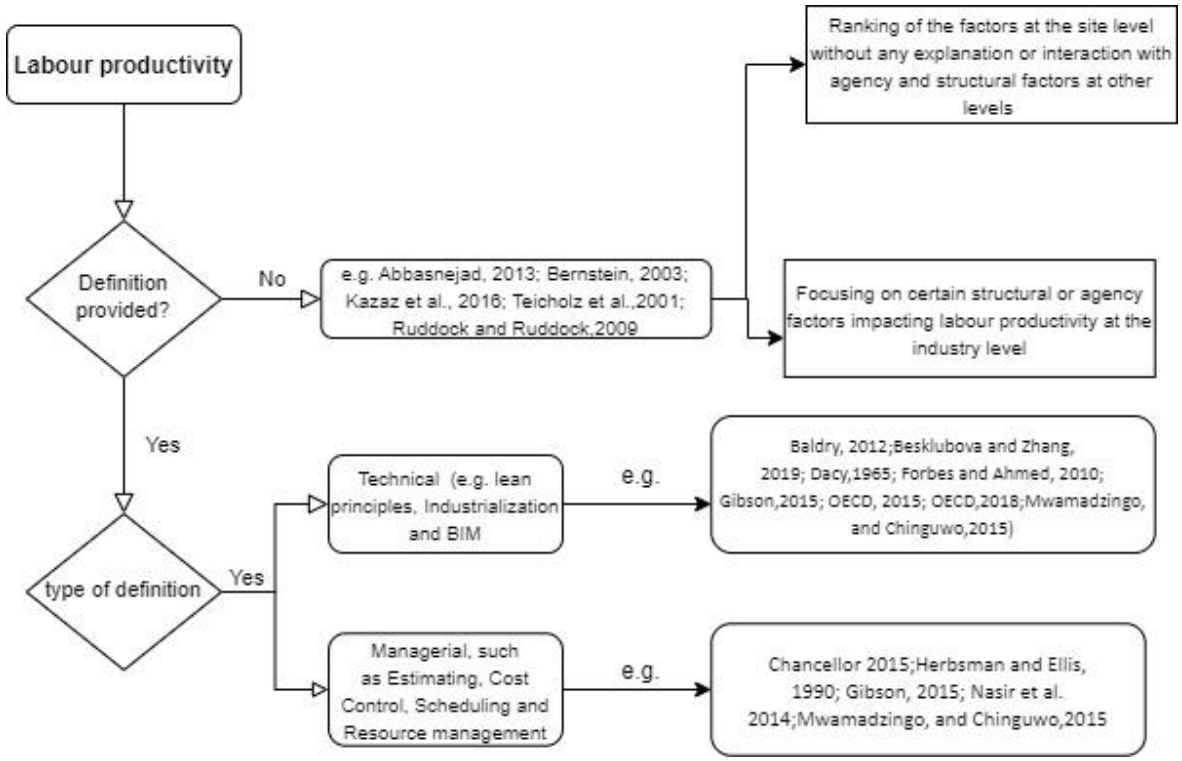

Figure 10.1: Previous Research Approaches in studying Construction Labour Productivity

Most current and previous research concerning construction labour productivity have focused mainly on the term from the perspective of contractors or contracting companies rather than workers. Thus, most notions associated with the term in these publications are managerial or technical, but not social, including secured work and employment conditions, which were underrepresented (Chapter 2). Although the micro-level definitions concern working harder rather than smarter, other authors, who did not provide definitions or the ones who provided definitions at the macro level, had acknowledged the quality and value of labour in their definitions, e.g. Fabricant (1962) and Freeman (2008). Fabricant (1962) and Freeman (2008) emphasised that the differences in the quality of one hour of work against another stem from differences in skills, education, and length of experience.

Notwithstanding, the economist's definition of productivity, i.e. the ratio of output to input (Chapter 2), has been extensively used by several authors. The definition of the term concerns only one dimension of the task: the part related to the physical actions carried out by the construction workers. The mental actions, including skills, experience, education, and construction labour value, are not acknowledged in the definition, indicating that workers' working and employment conditions are at the bottom of the ladder for most

researchers, and the term rests on achieving the TQM objectives of the construction projects.

Clarke & Wall (1998) indicated that the construction training system in the U.K. is led by employers, dominated by qualifications broken into narrow task-related units and confined mainly to the traditional trades. Many construction firms with a relatively low commitment to working towards high standards see training and development as secondary (Chan & Moehler, 2008). Therefore, it was expected that most researchers, who considered the quality of labour working hours while dealing with productivity in the sector, were inspired by the human capital theory regarding the investment in humans to raise the quality of services in the sector (for example, Gruenberg (2019)).

However, this narrow conception of 'skills' inevitably ignores the socialisation of labour into production through structures of employment, wage relations, and training. For example, authors, who posit a link between productivity on one side, and construction cost, unemployment and paucity of skilled and expert workers, on the other, such as Gruneberg (2019), have reduced the worker to a mere stock of capital and end up with one-dimensional analysis whereby work experience and skills, and worker mobility are just regarded as part of the accumulation of capital (Clarke, 2006). Notwithstanding, only a few researchers, such as Clarke (2006), Clarke & Wall (1998) and Dainty et al. (2004), have discussed the workers' value and the causes of skills shortages at the industry level. The purpose of these articles may not be directly related to the discussion about the definition of the term.

The first research question is, ***how can labour productivity be defined in the context of high uncertainty, political instability and complex geography*****?** Thus, this thesis addressed and discussed the productivity of construction workers from a broader standpoint that covered unstable political and economic conditions, such as the situation in the West Bank. In order to build the regression model for the factors impacting labour productivity (Chapter 7), unpack the determinants impacting productivity on the West Bank and compare the three selected governorates (Chapters 8 & 9), two definitions for the term were adopted. Other definitions were extracted by analysing interviews at the macro, meso, and micro levels (Chapters 8 & 9).

10.1.1 Definitions as per the interviewees' standpoints

Figure 8. 1 summarises the concepts associated with the labour productivity term, which professionals define as an output-driven term, and indicates that having a clear and official definition for the term at any level is missing. The definitions provided focused on efficiency and time factor. As other authors, such as Bernstein (2003), Gibson (2015), and Kazaz et al. (2016) have considered, **Figure 8. 1** shows that profitability has been considered a crucial aspect of defining the term. This finding and results from Chapter 8 confirmed that the priority of construction firms and professionals working in the sector is economically driven, reflected in the definitions provided for the term at the meso and micro levels. However, although the two terms are interrelated, higher profitability includes price recovery effects (Prokopenko, 1992; Tangen, 2005) and can be achieved through building claims and change orders (Barbosa, et al., 2017) and thus does not imply higher productivity.

As illustrated in **Figure 8. 1**, political instability and complex geography have added a new layer of complexity to the definition. Having an official definition at the macro level has been hampered by a wide range of political and economic factors influencing the industry's labour market. In addition, Chapters 8 and 9 showed that the median weekly hours for construction workers between 2014 and 2019 were 48. These extended hours represent skill shortages (agency factor) (Clarke, 2006), which have been widely cited as one of the critical causes of time extension and reworking in the building projects in the West Bank (Chapter 9). However, factors such as poor safety records and inconsiderate operational environment (internal structural factor) (Imoisili & Henry, 2004), local labour skills and labour mobility (Chan, et al., 2010) (agency factors) were not considered as a part of the definition, even though these factors have been considered as the main factors impacting on construction labour productivity (See results in Chapters 7,8 &9). Accordingly, the definitions offered for the term only partially described it.

10.1.2 Construction Labour Productivity Proxies

Table 10. 1 shows the different indicators representing construction labour productivity in the West Bank. The Gross Value added (GVA) per labour hour was calculated based on the PCBS labour force and economic reports. This indicator covers works in the operation and maintenance phase and works carried out under the civil engineering sub-sector, and its data are not available at the governorate level. Yet, the results in Chapters 7 to 9 show

that the industry operates differently at the governorate level, and the construction of infrastructure projects in the public sector depends solely on the donor's funds. Thus, this indicator is used in Chapter 4 as a motivation for the study.

Indicator	Chapter	Level of measurement and period
GVA*/ Labour.hr	Chapter 4	Macro-level from 1996 to 2018
T.A**./Labour.hr	Chapters 8 & 9	Macro-level for the West Bank from 2014 to 2018 Macro-level for each of the three governorates from 2014 to 2018 Meso-level for each building project used as a case study, except Nablus
Hourly labour wage	Chapter 7	Micro-level from 2014 to 2019

**GVA=Gross Value Added of the construction industry in U.S. $*

***T.A. =Total New Areas (m2) licensed for residential and non-residential buildings and boundary walls*

Table 10. 1: Summary of the construction labour productivity proxies used in the thesis

At the macro and meso levels, the productivity for building projects has been measured based on built floor area (m^2) per labour hour, used by many researchers, such as Low (2001). Although the areas of the buildings in area C are not included in these calculations, this indicator, which reflects labour productivity in the building subsectors only, is more precise than using the GVA. Additionally, this evidence shows that political instability and complex geography have added a new layer of difficulty to a term defined as complex and multifaceted. Chapter 6 and Chapter 7 results showed a statistically significant difference in labour productivity among the three cities due to different factors affecting labour productivity in each city, such as the volume of construction work and proximity to the Green Line. For instance, in 2020, the total area of engineering plans reviewed by the Engineering Offices and Companies Authority, affiliated with the Palestinian Engineers Syndicate, is 5,386,943 m^2 in the West Bank, of which 21% and 16% were for building projects in Nablus and Ramallah compared to 6% in Bethlehem.

The area of the proposed buildings reviewed by the commission reveals that Bethlehem's proportion of this total area is much lower than the other two governorates. On the other hand, Nablus's proportion of the areas is higher than Ramallah's. The longer distance between Nablus and the Green Line compared to Ramallah and Bethlehem could justify the less detrimental effect of labour mobility on labour productivity in Nablus. The internal movement of construction workers from the southern and northern governorates resulting from higher wages for workers in Ramallah mitigated the impact of skills shortages in Ramallah.

Having different interpretations of productivity, the measurements applied in various sub-sectors and other trades and divisions of these trades in, for instance, m^2 per labour-hour become very complicated. Furthermore, communication skills, information processing speed, strength and endurance, health, self-discipline, flexibility, administrative and strategic capacities, math proficiency, vocabulary size, education, motivation, energy, and job experience are among the main characteristics of individual productivity, which could be described as complex and multidimensional (Chapter 2). Therefore, the indicator used at the micro level is the hourly labour wage (Chapter 7). Primary and secondary data show that this indicator reflects labour productivity in the West Bank. Even though this thesis aims not to measure construction productivity but rather to investigate the factors impacting it, productivity measures at the micro-level tend to be averaged out and do not distinguish between workers based on experience, age, skills, and locality (for example, Enshassi et al. (2011)). However, all of these variables and other factors were considered independent variables in the regression model in Chapter 7, in which the hourly labour wage is used as an indicator of labour productivity. Moreover, the hourly labour wage made it easy to distinguish between different categories working in the field, such as full-time and part-time, skilled and unskilled workers. Thus, the quality of labour hours could be distinguished.

By controlling for these factors using regression analysis, confounding effects can be removed and accordingly, the gap between marginal productivity and an hourly labour wage linked to human capital characteristics can be narrowed (the debate on using hourly wage as a proxy for productivity is discussed and solved in Chapter 7). Chapter 7 shows that labour mobility and Israeli policies have impacted labour productivity. Therefore, all of these determinates should be included in defining the term. Based on Chapters 5 to 7 results, ***Figure 10. 2*** depicts the model adjusted for construction labour productivity.

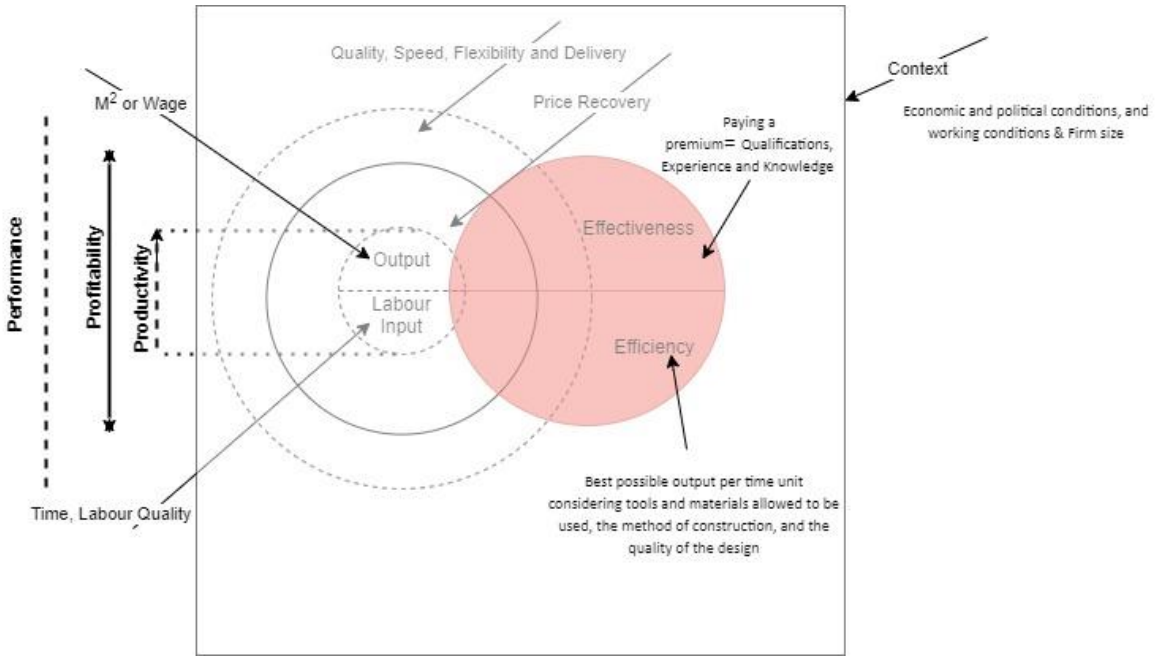

Figure 10. 2: Labour productivity model for building subsector

Adapted from: (Tangen, 2005)

According to the model, construction labour productivity is an output per hour worked without ignoring the differences in the quality of one hour of work against another that stems from differences in skills, education and length of experience. Thus, while efficiency and labour productivity are inextricably linked to achieving the best possible output per time unit, effectiveness, which has a relationship with means and the degree to which desired results are achieved, should utilise a time-saving strategy through paying a premium covering labour qualifications, experience and knowledge (**Figure 9. 1 Error! Reference source not found.**and **Figure 10. 2**). Furthermore, productivity is about working smarter while considering the context, such as the economic and political conditions (external structure) and working conditions (Internal structure).

Figure 10. 2 shows that labour productivity, profitability and performance are interdependent but not synonyms for the same concept. For example, increasing labour productivity does not mean increasing profitability or achieving the aspects of performance. Labour productivity includes the skills, experience, tools and materials allowed to be used, the construction method, and the design's quality. Since labour productivity is about the physical amounts produced and the way and skills used, thus, speed and quality, for instance, are aspects of performance, not labour productivity. Hiring qualified workers will increase labour productivity but not the organisation's profitability.

The definition should be linked to the stage of the construction industry in which the term is used. For example, the execution stage definition is not similar to that used in the operation and maintenance phase. Further, the definition of a consumer will differ from that of a producer because their objectives are different. Yet, According to Tan (2014), individuals act in a particular range limited by their constraints, such as ability, wealth and time. Therefore, all stages' and stakeholders' definitions must relate the term to its context; otherwise, the definition offered will be nothing more than a wish. Perceiving productivity as a technical and managerial problem only (Chapter 2) and not mentioning the quality of labour, which is improved through education and training (Clarke, 2006), seldom yields expected outcomes.

Consequently, special attention should be paid to the potential of workers and their organisations on the quality of work and their productivity (Dankbaar & den Hertog, 1990). The focus of a socio-technical approach, which is not concerned with whether the environment is capitalist or socialist and does not offer a theory of the environment, is on the organisation and how it can survive in a changing environment (Cherns, 1987; Challenger & Clegg, 2011; Christina, et al., 2015; Trist, 1981). Thus, the definition of the term must be linked to both efficiency and effectiveness, not just technical efficiency, in its context since productivity is not just a mechanical process. As shown in **Figure 10. 2**, Construction worker productivity is the art and science process that leads workers to achieve optimum production per hour of work within a context or constraints that determine the limits of that process.

10.2 Structural Determinants impacting labour productivity

The second research question discusses the significant external and internal structures that impact construction labour productivity, summarised in **Figure 10. 3**.

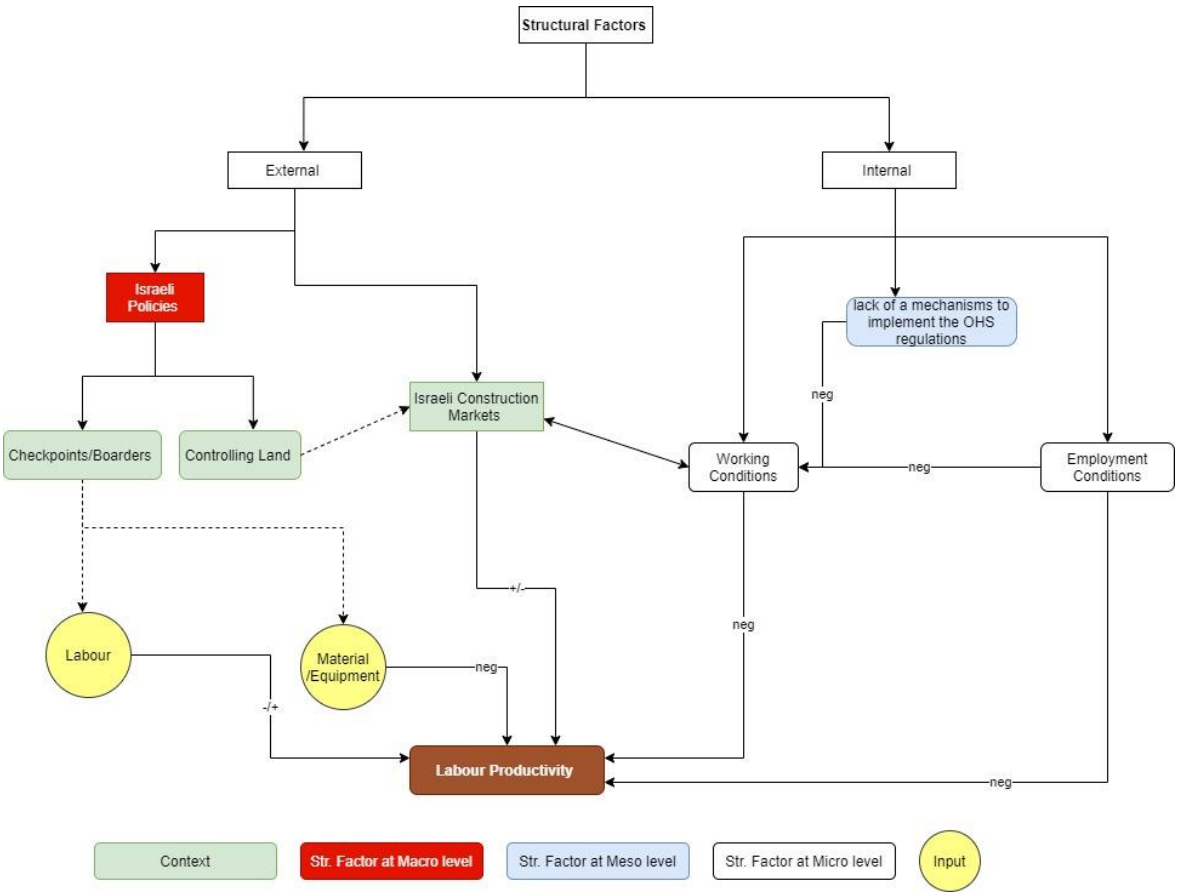

Figure 10. 3: Main External and Internal structure determinants impacting on labour productivity in the West Bank[407]

10.2.1 External Structure determinants

One of the external factors is Israeli policies toward the Palestinians in the West Bank that concern the land, checkpoints and controlling all outlets. Although the mobility of Palestinian people and local and imported construction materials in the West Bank is affected by barriers, checkpoints and movement permits, which have fragmented the West Bank (Roy, 2001; World Bank, 2013), the regression model for the factors impacting productivity (Chapter 7) showed that Israeli policies[408] increase worker productivity by approximately 17%. One possible interpretation of this result is that during the general or total closures[409] (Roy, 2001), Palestinian construction workers working in the Israeli market work locally and improve productivity by applying and transferring the experience gained from Israeli

[407] Researcher's work based on Chapter 7, 8 & 9 results.
[408] They are only limited to the closure of the checkpoints between the West Bank and Israeli markets and strikes in the West Bank because of Israeli occupation force actions.
[409] General closure is the overall restrictions placed on the movement of labour and materials between the West Bank and Gaza and between the OPT and Israel.

construction markets, which are more advanced (Chapter 8). Additionally, due to the restriction of movement between different Palestinian cities and villages in the West Bank, known as an internal closure (Roy, 2001), workers are accommodated in the project's city and are internally commuting weekly (Interview #9 in Chapter 8 & Case study #1 in Chapter 9). The monthly wage of workers from the North and South of the West Bank is about 71% and 80%, respectively, of the monthly salary of their counterparts working in Ramallah[410].

> The northern and southern governorates provide the highest percentage of workers in the construction sector in the West Bank, noting that the wages of subcontractors in Ramallah are higher than in the rest of the West Bank. Thus, the proportion of workers moving from the centre governorate, i.e. Ramallah, to the northern and southern provinces is much lower than the other way around (Interviewee #12).

As the payment in most of the projects is output-based (chapters 8 &9), then mobile workers might work for longer hours and get higher salaries if there is an internal closure. On the other hand, Chapters 8 & 9 show that some workers cannot come to work due to the internal closure, which causes delays in some activities. Thus, Israeli borders and checkpoints have separated the point of production from the point of labour reproduction (Bornstein, 2001), leaving Palestinians uncertain whether they can get to work on any particular day (Hever, 2010). As shown in **Figure 10. 3**, Israeli policies also affect productivity indirectly by facilitating access to Israeli construction markets more than nearby projects in the West Bank or directly by restricting the movement and importation of construction materials. As the West Bank is a de-facto landlocked territory aggravated by Israel's unilateral control of borders and transport facilities, construction materials imported are detained in Israeli ports for long and more unpredictable periods than the time agreed between the supplier factory and the contractor (Chapters 8 &9). The limitation of available construction materials and equipment choices, which are impacted by the Israeli restrictions on so-called dual-use goods, is discussed in Chapter 8.

Although the effect of this factor on productivity can be positive or negative (***Figure 10. 3***), ***Figure 10. 4*** depicts that the negative impact of these policies is more pronounced and significant. As shown in ***Figure 10. 4***, which compared the relative importance of each

[410] Researcher's Calculations based on the PCBS Raw Data

independent variable in the regression model, labour mobility from the West Bank to Israel, age, and experience substantially affect labour productivity more than other independent variables.

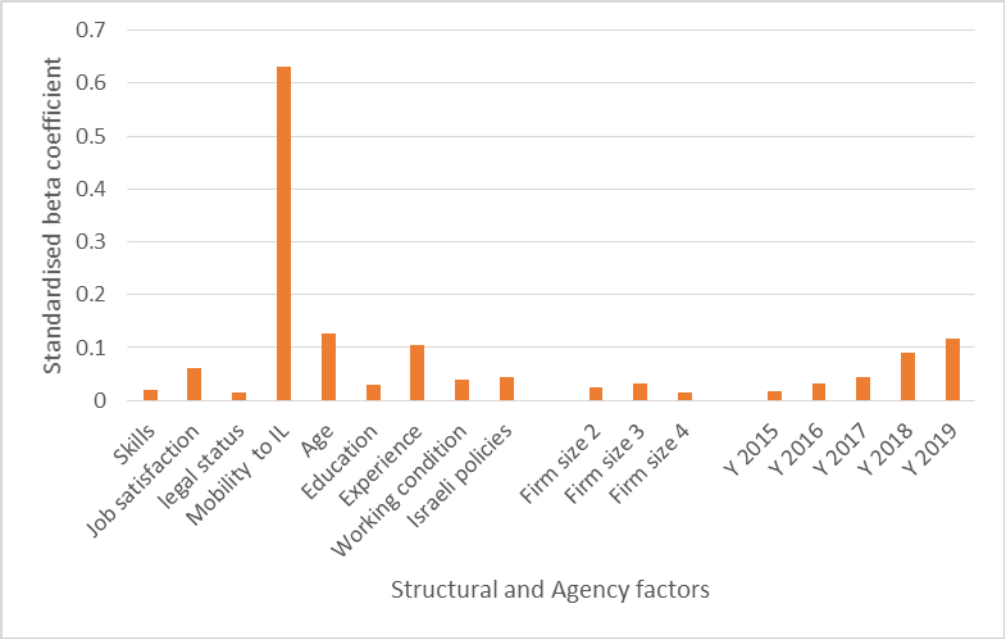

Figure 10. 4: The strength of the effect of each independent factor on the CLP based on standardised beta coefficient[411]

Additionally, the previous research shows the negative impact of Israeli policies on the Palestinian economy, particularly after 2000 (Chapter 4). For instance, since 2000, more tight restrictions on the movement of Palestinian people and goods have been imposed internally and externally using checkpoints and controlling all outlets from and to Palestine (ILO, 2018b; UNCTAD, 2016), turning the freedom of movement into a commodity controlled by Israel (Hever, 2010). Due to these restrictions on the movement of goods and people, travel and shipping costs have rapidly increased, and imported raw materials are delayed (Hever, 2010). The technical part, the second wing for productivity in the West Bank, is constrained and limited by few choices (Chapter 8). Thus, these policies have hindered innovation in the sector (Chapters 8 &9).

10.2.2 Internal Strcutural Factors

The results for **legal status,** which concerns whether the employee has signed a written contract or is included in a collective labour agreement in his/ her primary job, suggest that

[411] Researcher's further Calculations of the regression model in Chapter 7

workers, who have a written contract, are more likely to be less productive by about 2.4% than others who have not signed a contract or have a verbal labour agreement (Chapter 7). These results are similar to findings by Bjuggren (2018), Hopenhayn & Rogerson (1993), Lazear (1990), Mortensen & Pissarides (1994), The OECD (2007), Okudaira et al. (2013) and Saint-Paul (1997). However, the mechanism behind these results is bi-directional. The reason for legal status's negative impact on the Palestinian legal workers working in the Israeli markets is the deductions for tax, pension, and insurance payments (Nathanson, 2017) from Palestinian workers' income, as well as paying a portion of their wages to the brokers [412] as a price to issue a work permit.

Yet, for the workers working locally, the Taylorist differential piece-rate system (Chapter 8) could contribute to this impact, as most labour-only contracts are unit pricing contracts and unauthorised subcontracts signed with domestic rather than nominated subcontractors (Chapter 8). The payment, which is based on output, is made using either a daily system, lump-sum or unit pricing[413], but the employee may pay liquidated damages, which is the amount of money agreed upon by the parties upon signing the contract that the employer will deduct from the contractor or subcontractor if he fails to complete his obligation, that is if there is a time or cost overrun. Most of these agreements mention the condition of the penalty due to time overrun (Chapter 8). Yet, a tiny percentage of Palestinian construction workers working locally have a written contract (less than 3%), indicating the informality of the building construction sector in the West Bank[414], insecure employment conditions and no protection for workers from exploitation[415].

The results in Chapter 7 show that individuals working under secure employment conditions, such as sick leave and pension funds, are more likely to have higher productivity by approximately 9%. These results are similar to findings by Clarke (2006), Fabricant (1981), Hamouda & Abu-Shaaban (2014), Javed et al. (2018), Maloney (1983) and National Research Council (2009). Unfortunately, as most studies are based on cross-sectional surveys or qualitative data, the coefficient estimated can not be compared to other studies. Yet, although construction workers in the West Bank earn a higher income than

[412] PCBS raw data for 2019
[413] Interviews #4, #5, #8, #11
[414] Interviews #4, #5, #8, #11
[415] Interview #8

others in other sectors[416], employment conditions are insecure. Most workers working in the West Bank have no access to health or accident insurance and do not contribute to pension funds, which provide income after retirement (Chapters 8 &9), and they experience high vulnerability to social risks (lack of job security). The construction sector in the West Bank shares many of the characteristics of North African and middle east economies in terms of poor working conditions, such as running at risk of losing their job and delaying/ not paying their dues, and workers bearing personal responsibility for their safety and the costs of their medical care (Chapters 4,8 &9). Case studies in Chapter 9 demonstrate, for instance, that all financial challenges of contracting enterprises were resolved at the expense of workers' financial rights, which led to an increase in the rate of labour mobility to Israeli markets (agency factor) and disloyalty, and their health and safety (***Figure 10. 5***, Chapters 8 &9).

The Palestinian worker moves from one site to another until he reaches 60 years and cannot work. Since the workers in the sector are not embedded within an institution that preserves their rights and works to solve having more than one employer for workers, there will be no other source of financing for workers except their savings after leaving this sector. Due to this employment relationship, on-the-job training does not exist (Chapters 8 and 9). For example, in the West Bank, only 2% of workers have received training courses during the first period at work (Chapter 8). Additionally, The situation of workers becomes at risk, and their rights are squandered, particularly after the Social Security Law was banned (Chapter 8).

Furthermore, Chapters 8 and 9 show that workers' financial and other rights, such as vacations, are not subject to oversight and scrutiny by government agencies, neither the MOL nor the courts, due to the nature of temporary contracts on construction projects in the West Bank. Therefore the workers were exploited by their employers, as most construction workers are not members of any labour union, and thus no one defends their rights (Chapters 8 &9). The construction site's working conditions are the third internal structural impacting labour productivity. As shown in Chapters 8 & 9, the construction labour process of the West Bank governorates is based on rigid trade divisions, low levels of training and output-based pay.

[416] The PCBS Raw Data and the PCBS Labour Survey Reports

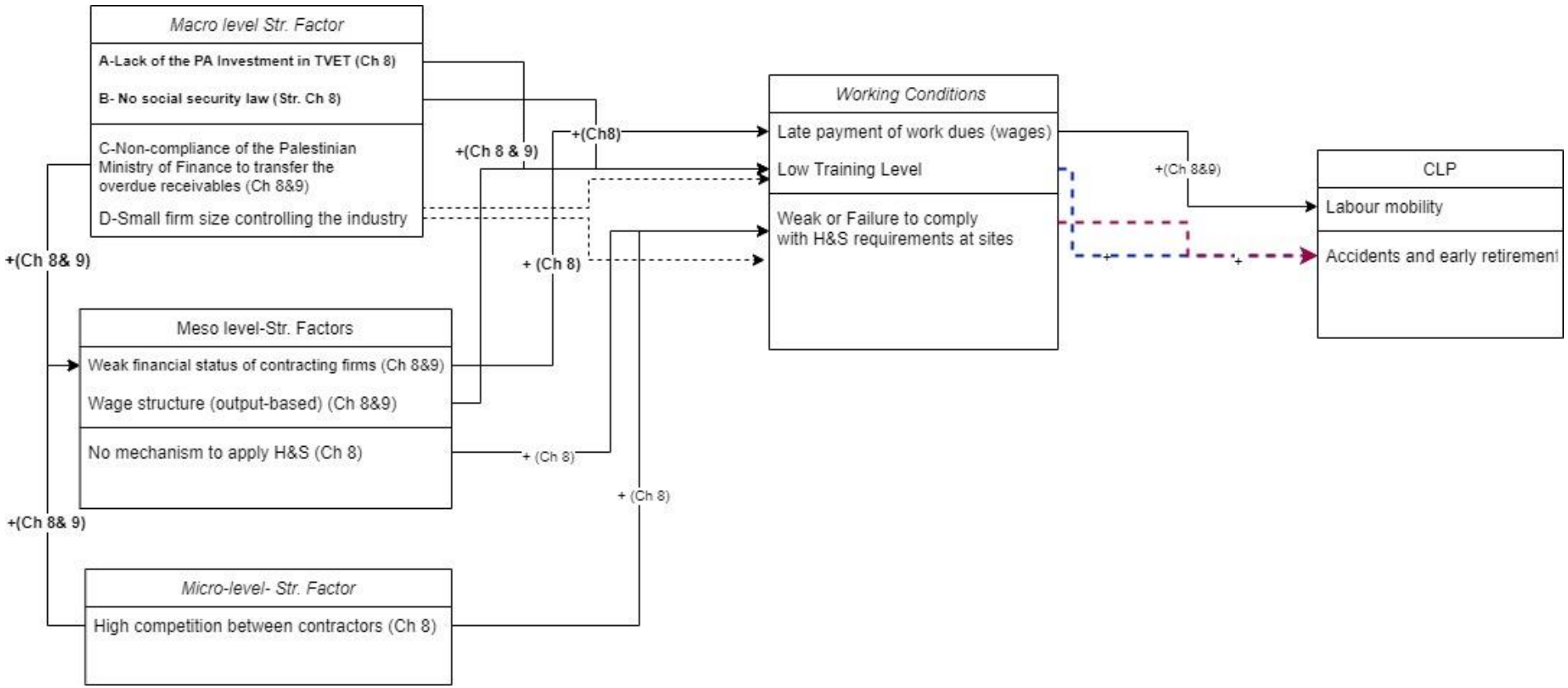

Figure 10. 5:Interactions of internal structure determinants on different levels with the working conditions and construction labour productivity

More than 55% of the construction firms working in the construction of buildings and Specialised construction activities subsectors are micro-enterprises (Chapters 7 &8). The reports of the PCU in 2019 and 2020 argue that the construction sector, particularly the private sector, is controlled by hundreds of unauthorised construction companies and contractors in the West Bank, which implement 95% of construction building projects in that sector (PCU, 2020; PCU, 2019). Nevertheless, these companies are not more than labour agencies or contractors (Chapter 8). Accordingly, as shown in ***Figure 10. 5***, the vast number of micro-firms in the West Bank could affect the ability to train and develop their workers (Dainty, et al., 2017).

As shown in Chapter 7, results for firm size suggest that workers working for larger construction firms in the West Bank are more likely to be productive. Compared to the reference category Firm size 1, workers in category 2 are 5.5% more productive, whilst workers in category 3 are almost 15.4% more productive. The more productive workers in category four have a productivity increase of almost 19.4% compared to workers in category 1(Chapter 7). While researchers, including Dainty et al. (2017), Myers (2013), and Teicholz (2013), argue that small and medium-sized construction firms might be unable to train and improve labour and thus negatively impact on productivity, various researchers, such as Masters (1969), Serneels (2005); Strobl & Thornton (2004) and Söderbom & Teal (2001), indicate that large firms pay workers more.

Yet, most contracting enterprises, which become indebted to the banks and are on the verge of collapse, in the West Bank have been impacted by the PA's political and financial constraints (Chapters 8 &9). The number of projects offered by the formal public and private sectors is not commensurate with the number of contracting companies, which has led to intense competition (**Figure 10. 5**) and prevented these firms from improving, attracting, and retaining labour (Chapter 8). Consequently, Chapter 8 results and ***Figure 10. 5*** show that workers in large firms have not received better and more specialised training that increases their stock of human capital, which increases their productivity. Conversely, Chapters 8 & 9 results demonstrate that the element of selection for workers, whereby larger firms are engaged in more complex construction projects requiring specialised workers hired on the open market without additional training but instead under direct and close supervision, leads to these results. Additionally, larger contracting firms are still better off than smaller ones working on construction projects in the West Bank

regarding hiring skilled workers or finding an alternative for workers moving to Israel due to the diversity of the projects that the larger firms are engaged in (Interview #9 in Chapter 7 and Case study #3).

Due to high competition between construction firms, they offer lower prices than the projects' estimated costs by sacrificing the cost of implementing health and safety requirements on all projects except those funded by USAID (Chapters 8 & 9). The inappropriate application of health and safety leads to a dramatic decrease in labour productivity by increasing the number of accidents on construction sites (***Figure 10. 5***). Additionally, case studies #4 and #5 demonstrate that the main contractors have cut down the number of white-collar staff, such as the superintendents and mechanical and electrical engineers. Accordingly, the consequences of these issues are fatal accidents on the construction sites and sometimes partial or complete collapse of the whole structure, as shown in ***Photo 10. 1*** and ***Photo 10. 2***.

Photo 10. 1: A Building in Tulkarm Before and after the collapse[417]

[417] https://alfajertv.com/news/palnews/525825.html

Photo 10. 2:Failure in one of the structural elements of the Building[418]

At the macro level, the PA development budget is only related to implementing projects, and there is no item covering the issues of training workers. The failure to focus on technical education, which was not among the priorities of successive Palestinian governments (Chapter 8 and **Figure 10. 5**) and society's view of the construction profession as an inferior profession (Chapter 8), led to the fragile People's demand for vocational education. Furthermore, the attributes of the contracting companies (Chapter 8) impose restrictions on the proper application of health and safety regulations on sites (structural factor), which increases the risk of accidents; that is, the working conditions are unsafe. ***Figure 10. 5*** shows that the governmental procedures through the MOL to apply the safety measures are practically insufficient due to the lack of the appropriate number of staff from the ministry to follow up and monitor the application of the requirements in all private and public construction projects. Additionally, the mechanisms for implementing these laws on the ground are missing. For example, municipalities lack a municipal police presence (Chapter 8), and accordingly, accidents and failures in construction projects,

[418] Contracting Firm in Ramallah

especially those without engineering supervision, such as the one depicted in ***Photo 10. 1*** & ***Photo 10. 2***, are expected.

The photographs in chapters 6 and 7, the workforce age (Chapters 8 and 9), and the non-linear regression results affirm the low applicability of health and safety regulations at the construction sites in the West Bank. The effects of the workforce age structure on productivity are statistically significant, positive and concave since, at some point (49 years), the squared effect will overtake the linear effect (Chapter 7). Chapter 7 results, similar to the previous literature, such as Dostie (2011), Johnson & Andorka (1993), Serneels (2005) and Skirbekk (2004), conclude that middle-aged workers earn more than young adults and older and are more productive. On the one hand, the turning point of the age-productivity profile might be shifted up or down depending on the physical efforts and equipment used (Chapter 8).

On the other hand, the turning point of the age-productivity profile could be related to compliance with health and safety regulations at the construction site. For instance, the results show that the highest productivity occurred in an experience period of approximately 23 years in the West Bank compared to 41 years in the baseline results (Chapter 7). These results indicate that the construction sector in the West Bank is labour-intensive rather than machine-based (Chapters 8 &9). The results also indicate that whilst workers do not commit to using the PPE on construction sites in the West Bank, their compliance with safety requirements is much higher when they move to work in Israel (Chapter 8).

Photographs in chapters 8 and 9 show that construction workers are not wearing the required personal protective equipment, such as safety shoes, helmets and masks. They also show that the steel bars are not covered, and there are no sheet piles for the excavated areas in most of the construction sites on the West Bank. While the workers are wearing just helmets and vests, none are wearing appropriate personal protective equipment, such as goggles, face shields, gloves, earmuffs, and safety shoes (Chapters 8 & 9 photographs). The photographs also show that the workers in the construction sites are not in a satisfactory zone regarding exposure to the temperature and light (Nablus and Bethlehem case studies- Chapter 9), noise, handling hazardous materials, parts and products, and manual handling of heavy items (Chapter 9- Ramallah Case). Additionally, almost 3.5% of blue-collar workers have been exposed to injury at the construction sites on the West Bank

yearly. While less than 15% of injured workers get paid during their absence, more than 91% of wounded workers are absent from work until they recover[419].

The building workers working in the West Bank are exposed to risky and harsh working conditions, inadequate enforcement of health and safety laws, and a lack of commitment to supplying the required PPE on construction sites(Chapters 8 &9), which may lead to early retirement[420]. The average age among blue-collar workers from the West Bank is slightly over 34 years, 25% of the workforce is 24 years old or below, three quarters are between the ages of 16 and 43, and less than 10 % are over 51, reflecting a low retirement age in the Palestinian sector (See Chapter 8). Labour productivity for the building construction sector in the West Bank is anathema inasmuch as it neither leads to job security nor provides safe and secure working conditions, such as ensuring occupational health and safety at the sites and paying the workers decent wages on time. Lastly, in the next section, the impacts of harsh working conditions, insecure employment conditions (endogenous structure factors), and political and economic instability (External structure factors) on agency factors are discussed in light of Gidden's structuration theory. Structuration theory explores the effects of the interactions of specific agency and structure factors on labour productivity in a politically unstable environment and the existence of a dependent economy using the terminologies of labour power and resources and constraining the freedom of labour.

10.3 Agency Factors and Labour productivity

It is important to concede that, whilst unpacking factors impacting labour productivity is understood as an essential mechanism for learning and improving the sector's productivity, much of previous research (Chapter 2), particularly evaluating factors in developing countries, tends to be a destructive game for blaming labour. Previous researchers, such as Gruenberg (2019), who have tended to treat construction labour as an extension of the machine rather than as complementary, treat construction workers as passive victims rather than actors to improve productivity. For example, several authors, such as Mahamid (2013 a; 2013 b), have viewed workers as a factor that delays productivity and do not attribute responsibility to employers and other structure elements beyond labour control, including the education system. It might be that less powerful actors' perspectives (labour) are

[419] The PCBS Raw Data

[420] The median age of blue-collar workers in the West Bank and the three case studies demonstrate the absence of an ageing workforce at the site (Chapters 8 & 9).

suppressed, or at least particular voices, such as contractors and project managers, are privileged.

Indeed, the absence of the labour perspective in these studies is surprising. Thus, the neglect of the worker involvement aspect by most current research on construction productivity (Dolage & Chan, 2013) could explain why the policies and recommendations of previous research have significantly failed to deliver on their aspirations (Dainty, et al., 2017; Dainty, et al., 2004). However, instead of focusing on particular voices and structural or agency factors impacting productivity, structuration theory has been adopted to resolve the tension between these factors by seeing them as dynamic and interacting. Therefore, agency and structural determinants at the macro, meso and micro levels are investigated within their context using structuration theory, which is used to answer the third research question: What are agency factors that influence construction labour productivity at macro, meso and micro levels?

10.3.1 Skill shortages

Too many factors contribute to skill shortages that have been repeatedly cited as a central agency factor impacting construction labour productivity in developing and developed countries (Chapter 2). For instance, the most important factors that influence the shortfall in construction skills are reduction in commitment and investment in training within the industry due to the growth of self-employment and the use of labour-only subcontractors (agency factor) (Dainty, et al., 2004; Harvey, 2001) and the poor image of the sector (Dainty, et al., 2000). Failure to develop multi-skilling as a route to overcoming an overwhelming shortage of skills (structure factor) (Scott & Cockrill, 1997), reduction in the number of people entering the construction labour market due to demographic downturn (agency factor) (Druker & White, 1996), and the introduction of new technologies that have reconstituted the skills required (structural factor) (Agapiou, et al., 1995) have been considered as factors that lead to skill shortages at the macro level.

Due to the fact that political, economic, and educational systems vary from nation to nation, some elements that contribute to skill shortages either do not apply in particular contexts or are not recognised by other researchers. Consequently, the impact of an agency element, such as skill shortages, on construction productivity should be addressed within the context of the industry (internal structure) and the state (external structure), including economic and political situations. A comparison of **Figure 10. 4** to ***Figure 10. 6*** shows the

importance of not having decontextualised factors when studying labour productivity. ***Figure 10. 4*** reveals that labour mobility from the West Bank to Israel substantially affects labour productivity more than other independent variables; however, ***Figure 10. 6***, which depicts the strength of the effect of each independent factor on construction labour productivity for workers working in the West Bank only, illustrates other factors frequently cited in previous research.

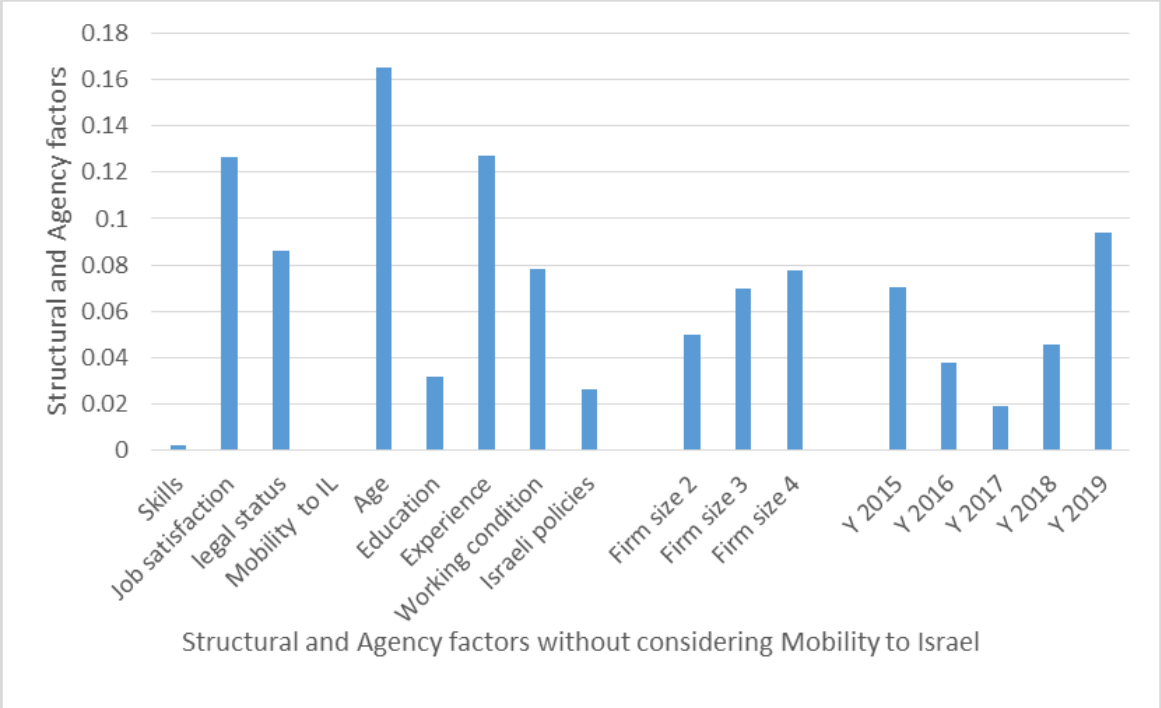

Figure 10. 6: the strength of the effect of each independent factor on the CLP based on a standardised beta coefficient excluding the Labour mobility factor[421]

The comparison between ***Figure 10. 4*** and ***Figure 10. 6*** and the results of the regression models[422] (Chapter 7) show that the adjusted R-squared is dramatically dropped from 0.543 to 0.165, indicating that a crucial independent variable is dropped or neglected from the model that is labour mobility to Israeli construction markets. This factor is confirmed as a crucial factor affecting labour productivity in the West Bank in chapters 8 and 9. ***Figure 10. 7*** illustrates the agency and structural factors leading to a shortfall in construction labour skills and thus impacting construction labour productivity in the West Bank.

[421] Researcher's further Calculations of the regression model in Chapter 7
[422] The baseline and the one for workers working locally

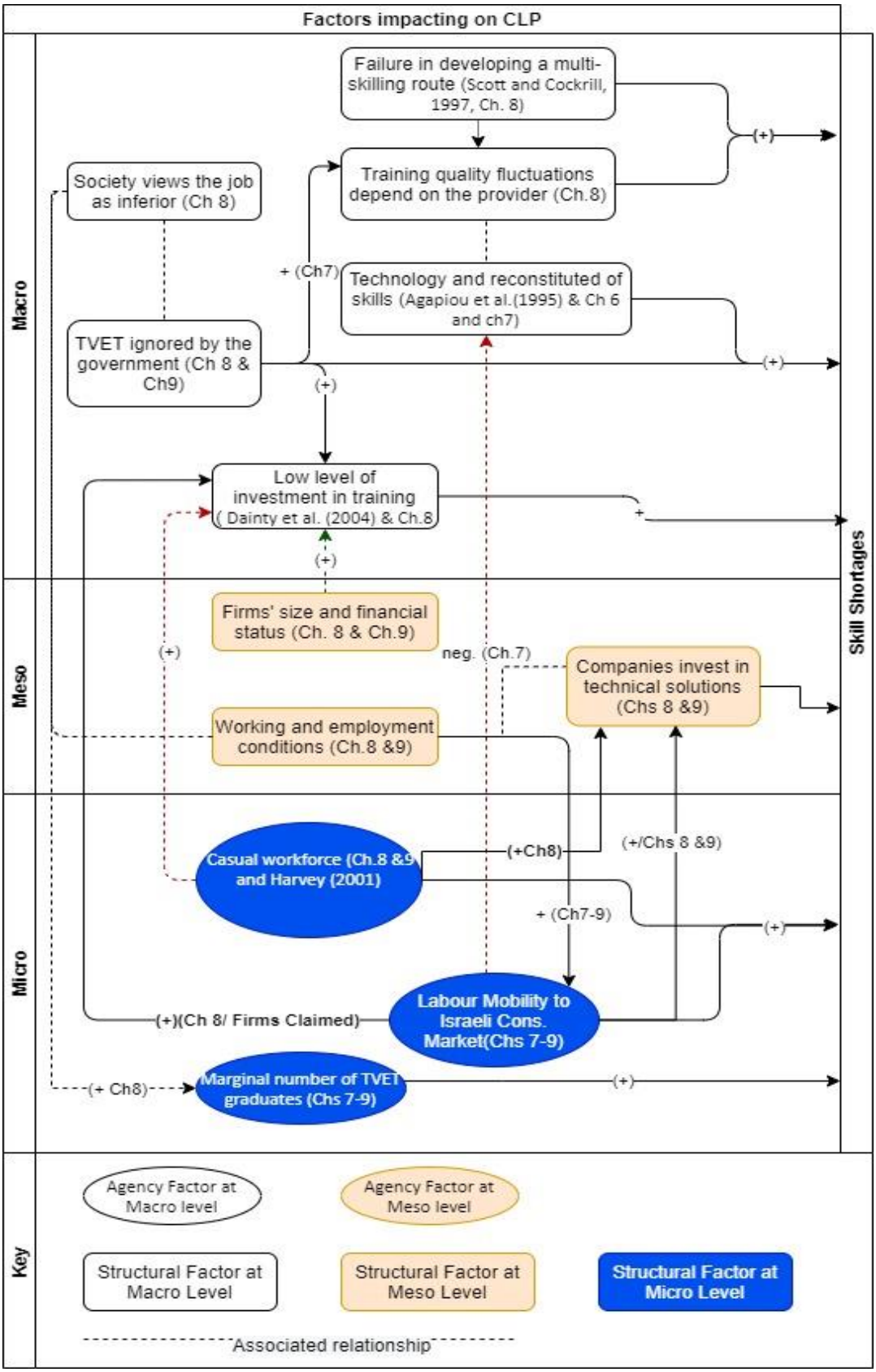

Figure 10. 7: Structure and Agency Determinants at Different Levels lead to Skill Shortages in the West Bank

The previous research's reliance on cross-sectional data might cause this crucial factor to be ignored while discussing skill shortages at various levels. For instance, Abdullah (2018), Enshassi et al. (2007), and Mahamid (2013 a) regard labour mobility and skill shortages to be two independent factors influencing labour productivity and have not highlighted labour mobility as one of the primary causes that lead to skill shortages. Some of these factors are repetitively cited in previous literature. Nevertheless, as shown in ***Figure 10. 7***, other factors, such as labour mobility and the social perception of construction jobs, have been added based on the findings in chapters 7 to 9. While discussing the skill shortages, the previous research (Chapter 2) focuses only on structural factors, such as low investment in training and the failure to adopt a multi-skills route to be the training route accredited (***Figure 10. 7***).

The solutions suggested to mitigate the impacts of skills shortages on labour productivity in the West Bank are either technical (Chapters 8 &9), such as the industrialisation of construction (Barbosa, et al., 2017; Gibson, 2015), or unsustainable (Chapter 8), such as importing the necessary skilled labour (Egan, 2004; Pearce, 2003; Prais & Steedman, 1986; Winch, 1998). The PCU proposes importing necessary skilled construction labour from the Gaza Strip (Chapter 8). The striking features of these suggested solutions are not focusing on employment regulation and a comprehensive industry-wide training scheme (Chan, et al., 2010; Clarke, 2006) and placing labour at the bottom of the ladder in improving labour productivity.

However, **Figure 10. *7*** and Chapters 8 and 9 findings illustrate that quality of working life, labour exploitation and power imbalance between workers and managers are among the main reasons for skill shortages through labour mobility from the West Bank to Israel. **Figure 10. *7*** also depicts that skill shortages (agency factor) should be linked to the educational system (Internal structure). Although having a training course could be considered a qualification factor rather than a skill, qualifications have been widely used as proxies for skills (McGowan & Andrews, 2015). Thus, the use of having a training course as a proxy for labour skills indicates that a worker with a qualification degree is at least 5% more productive than a worker who does not have the qualification required to carry out the task. This finding implies that the amount of human capital the construction worker in the West Bank possesses is reflected in the ability of workers to carry out a skilled task. The result aligns with Brookes et al. (2018), who found that workers with higher skill

levels, either by qualifications or experience, receive higher wages because their productivity is greater.

Nevertheless, 7% of the blue-collar workers working in building subsectors have attended training courses, of whom **almost 59% work in the Israeli construction markets**[423]. The graduates are granted a partially recognised certificate. As a result, there is no distinction between workers affiliated with professional centres and those not in terms of wages and priority of work, which leads to the cancellation and neglect of the importance of vocational training in Palestine by most construction workers, and the PA and the contracting companies do not value the workers' quality and skills (Chapter 8). The skills of construction workers are acquired through experience accumulated through trial and error and passed down from the older generation to the younger generation. Some technicians are not highly skilled in their crafts, and therefore the new workers will learn the job or craft but will never master it. New workers who are by nature capable of mastering a profession if they study it at a specialised institute or school will be technicians with less competence due to learning from technicians who are not highly skilled in the profession (Chapter 8). Additionally, **almost 99% of blue-collar workers** started working in the construction sector **without receiving any on-the-job training** from their employers[424].

In chapter 8, the interviewees also raised that the sector is still fragile in terms of the number of centres and their equipment, the training of cadres, and the budgets allocated to provide them with the materials needed for training (Abdullah, 2018). The MOL-VTCs offer various vocational programmes in its 11 centres on the West Bank. The programmes offered for the year 2020-2021 are as follows: electrical installation, electrical installation and solar panel units installation, Architectural Drawing and Quantity Surveying, Painting and decorating, Air conditioning and refrigeration, Carpentry, aluminium works, blacksmith welding and services, Sanitary installations and central heating, tiling and Interior design and decoration (MOL, 2021). The sector also remains dispersed in terms of legal affiliation and poor coordination between the various authorities, the PA development budget does not cover the issues of training workers in any sector, and

[423] The PCBS Raw Data
[424] The PCBS Raw Data

technical education has not been among the priorities of successive Palestinian governments and thus has led to a shortage of skills in the construction market (Chapter 8).

Although working within an enabling structure facilitates the development of agentic capabilities to work creatively, leading to a change in that structure (Sewell, 1992), constraining internal and external structures prevents the agency from developing its capabilities to work creatively and thus, the TVET system does not improve. Accordingly, the marginal number of governmental vocational training centre graduates compared to the number of new entrants to the sector's labour market, as found in the construction process in the West Bank's reliance on low levels of vocational training and education, is a reflection of these restrictive structures, including the cultural and social aspect of society's view of the construction profession (**Figure 10. 7**). Thus, labour productivity is detrimentally affected by the low level of skills and narrow qualifications of many employed in the industry[425] and the lack of initial and further training.

10.3.2 Labour mobility

Most workers possess the skill through experience and work with experienced workers, as most are not graduates of vocational or technical training institutes. Most capable and skilled workers are mobile to the Israeli construction markets due to agency factors, such as the daily wage and employment conditions, as shown in ***Figure 10. 8***, which elucidates the structural and agency factors that lead to labour mobility from the West Bank to Israel. Workers available in the sector are second-class workers in terms of skill and experience, as reflected in the quality of construction projects delivered on the West Bank (Chapters 8 & 9). Accordingly, close, strict and direct supervision is mandatory on construction sites (Chapter 8). However, qualified supervision is lacking (Abdallah, 2015; Abdullah, 2018), particularly in the informal building sectors (Chapters 8 & 9).

As shown in Chapter 7, individuals of higher age or higher experience are more likely to be more productive. For instance, a forty-year-old construction worker would have 14% more productivity than a twenty-year-old worker, which is in line with related literature and findings by Altonji &Williams (2005), Brown (1989) and Topel (1991).

[425] Construction labour productivity rates for several trades in building subsectors in Chapter 4

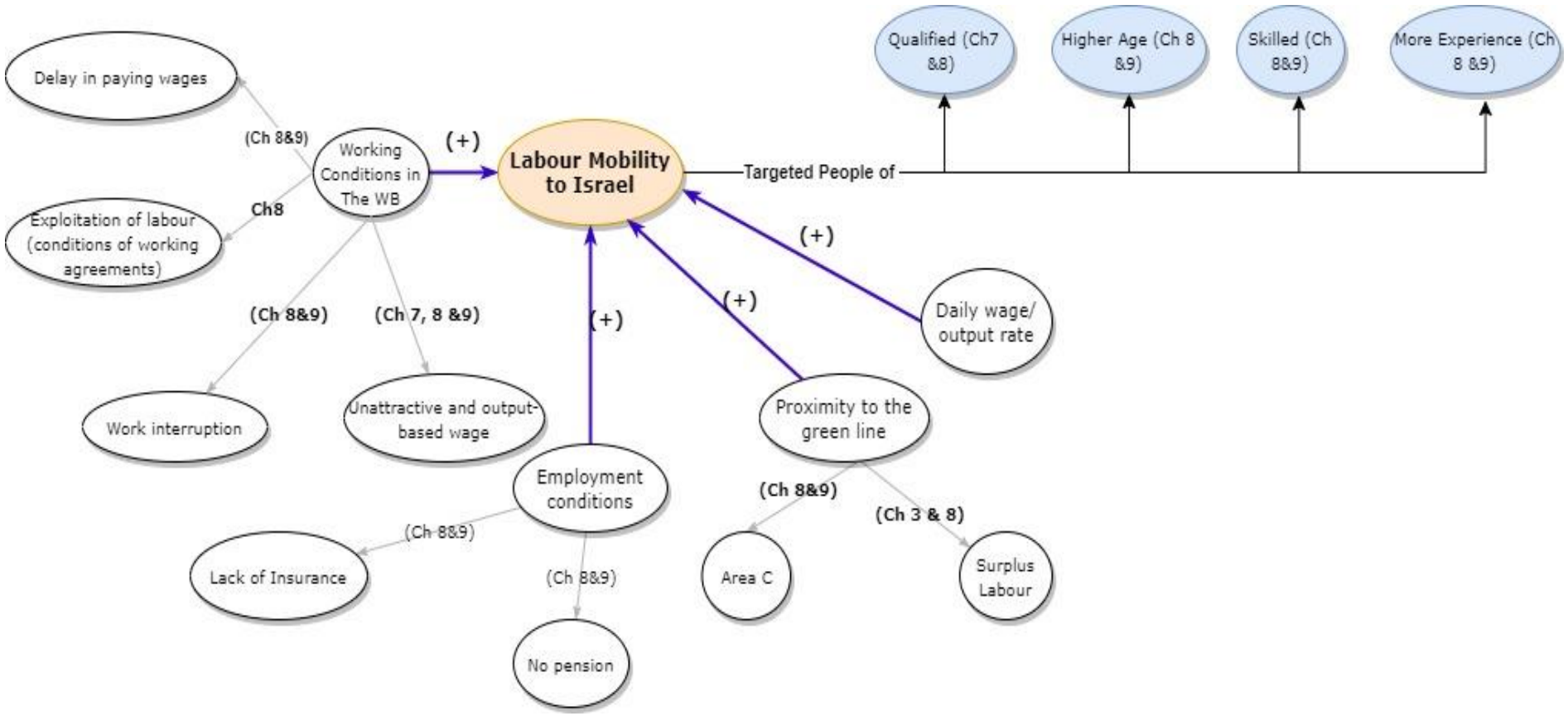

Figure 10. 8: Agency and structural factors lead to Labour Mobility from the West Bank to Israeli Construction Markets

Additionally, a construction worker with 15 years of experience would have 7% more productivity than somebody with five years, which is in line with related literature and findings by McDaniel et al. (1988), McEnrue (1988), Quińones et al. (1995), Serneels (2005) and Tesluk & Jacobs (1998). These results suggest that older workers have better skills and more experience than younger workers, which leads to an accumulation of human capital that increases individuals' innate productivity. However, ***Figure 10. 8*** shows that the more labour qualifications and experience, the more labour can find jobs quickly in the Israeli construction market, reflecting the adverse impact of the Israeli construction markets that have targeted skilled blue-collar workers from the West Bank.

The number of Palestinian workers from the West Bank working in the two construction building sub-sectors is about 142,700, of whom 73,800 work in the Israeli construction markets, equivalent to 52% (Chapter 8). Labour mobility from the West Bank to the Israeli market is statistically significantly higher for Craft and Related Trade workers than those under the Elementary Occupation group by more than 13% ($p<0.05$) (Chapter 8). Additionally, the results show that the average age of workers working in Israeli markets is almost 37 years, six years greater than workers working locally. The experience for workers working in the Israeli market is almost ten years compared to almost seven years for those working locally (Chapter 8). The construction sector in Israel is more targeted towards skilled blue-collar workers than unskilled ones (***Figure 10. 8***), bearing in mind that the productivity of workers from the West Bank between 30 to 45 years old is the best in terms of quantity and quality (Chapters 7-9). The labour mobility from the West Bank to the Israeli construction markets has led to skill shortages in the construction market on the West Bank, particularly of tilers, steel fixers, bricklayers, carpenters and plasterers (Chapters 8 & 9).

The main underlying factor contributing to the increase in the rate of labour mobility to the Israeli construction market is the significant difference in the daily wage between workers working in the West Bank and their counterparts working in Israel. The average monthly wage for skilled workers working in the West Bank (ILS 2,363.70) is almost 47% of that of the workers working in the Israeli construction market (ILS 4,998.48). For unskilled workers, the average monthly wage in the West Bank (1,441.54 ILS) is 39% of that for the

workers in the Israeli market (3,660.03 ILS)[426]. The regression model in Chapter 7 illustrates that construction workers working in the Israeli construction markets are about 127% more productive than others working in the Palestinian construction market in the West Bank and earn more than those working in the West Bank, as productivity is measured as an hourly wage. These results are similar to Jayachandran's (2006) and Van Biesebroeck's (2014) findings. As illustrated in ***Figure 10. 8***, other factors, such as technology, domestic demand (Downes, et al., 1990), political instability (Farsakh, 2005), employment and working conditions (DeFreitas & Marshall, 1998; Farsakh, 2005) and proximity to the green line, explain the positive influence of labour mobility on the worker's productivity at the micro-level.

Nevertheless, voluntarist labour action, which overemphasises the ability of the actor/ worker to act according to his/her own will (Giddens, 1979; 1984), contradicts the findings of this research. The power of mobility forms an additional and vital source of leverage, especially for workers who find employment in a flexible work arrangement (Smith, 2006). The construction workers in the West Bank who do not settle down in particular places and regularly commute between contracts and worksites are thus relatively tolerant of inferior terms of employment and hesitant to resist their employers individually or collectively (Greer, et al., 2013) as the opportunities for effective action are often limited (Berntsen & Lillie, 2016) due to high supply compared to demand in the labour market and high rate of unemployment in the West Bank[427]. Therefore, the type of power used by the workers working in the West Bank is resilience, which is the changes or small acts that help individuals and groups cope with every day realities without altering the existing work relationships; thus, their space for manoeuvre is limited (Berntsen, 2016).

The important sources of workers' labour power are labour effort, knowledge, skills and competencies (Clarke, et al., 2013; Hagan, et al., 2011; Iskander, et al., 2013; Smith, 2006). Palestinian workers use their labour power (mobility in this case), which is neither possession nor total but rather the outcome of the actors' position in the industry (den Hond, et al., 2012), as relational and property of interaction within pre-existing structures (den Hond, et al., 2012; Giddens, 1979) to act otherwise, for instance, to bargain for enhancing their working and employment conditions. Chapters 8 and 9 illustrate that

[426] Chapter 8 based on the PCBS Raw Data
[427] PCBS Raw Data and interview #12

moving from one country to another (one industry to another) could be considered by migrant (mobile in this case) labour as an act to resist oppressive structures and to stop the exploitation of employers in the home country (Coyle, 2007) or as a conscious strategy to improve migrant workers' lives (Datta, et al., 2007). The results also reflect the efforts of people to improve their conditions of existence by recalibrating power relations and redistributing resources (Coe & Jordhus-Lier, 2011).

As shown in Chapter 8, other structural factors, such as insecure employment conditions and harsh working conditions, contribute to the decision of workers to commute, seeking to improve their living and working conditions. For instance, the working conditions of Palestinian workers working in Israel in terms of continuity of work and no delay in the payment of labour dues are better compared to the conditions of their counterparts working in the West Bank[428], and the percentage of job security factors for workers in the Israeli market is higher than for those in the West Bank[429]. Almost 17% and 22.5% of workers from the West Bank employed in Israeli construction markets have private health insurance and are covered against accidents on construction sites, respectively, compared to less than 3% and approximately 5% of their West Bank counterparts[430].

Workers' lack of job security, including lack of the right to retirement and health insurance since the workers work under the day-based system, the non-competitive wage, and lack of written employment contracts (internal structure factors) are the main reasons for labour absenteeism and disloyalty, motivating them to move to Israeli construction markets particularly skilled workers (Chapters 8 & 9). Thus, these factors have led to labour absenteeism, disloyalty and mobility, either internally to other Palestinian employers within the West Bank or the Israeli construction markets. These agency factors have impacted productivity in several ways. For instance, shortages in skilled workers due to work for more than one contractor simultaneously causes delays in different projects (Chapter 9), rework due to poor workmanship has dramatically increased, and direct and close supervision of workers has dramatically increased to reduce the reworking of projects leading to an increase in overhead costs (Chapters 8 &9).

[428] Chapter 8
[429] Chapters 8 & 9
[430] PCBS Raw Data

10.3.3 External Structural factors and Labour mobility

External structural power transcends and precedes individual action and is relatively permanent (Layder, 1985); thus, the political and economic context is essential to understanding labour mobility. Israeli policies regarding the Palestinian lands in the West Bank are beyond Palestinian agentic control. Therefore, the morphogenetic approach proposed by Archer (1995), which assumes that structures are pre-existing before individuals and reproduced through their actions, is appropriate for studying labour mobility within this context. Although the higher valuing accorded to construction workers working in Israel than their counterparts in the West Bank in terms of salary and having more secure employment conditions has led to labour mobility, Israeli policies towards the Palestinian lands and economy contribute considerably to labour mobility, particularly in area C. A Kruskal-Wallis H test conducted to determine if labour mobility to the Israeli construction market for workers from the West Bank differs based on locality type shows a statistically significant difference in mobility between urban, camps and rural areas groups, $\chi 2(2) = 342.138$, $p = 0.0001$[431]. The difference could be linked to these localities' size, the size of building projects in these localities and their proximity to the green line.

Due to the limited land and the high demand, as Israel controls over 60% of the area of the West Bank, mainly in the rural areas, construction prices have skyrocketed, and construction is limited to areas A and B in all provinces, with residential or non-residential building projects concentrated in city centres. Accordingly, 56% and 62% of blue-collar construction workers from urban and rural areas work in the Israeli construction markets compared to approximately 32% of those living in refugee camps (Chapter 8). The growth of the Palestinian economy is transitional rather than sustainable (AIDA, 2017; Farsakh, 2005). Israeli policies have caused a significant structural change in the whole economy, particularly in the construction sector in the West Bank, in terms of shifts in production patterns and employment. The long-term dependency of the Palestinian economy on the Israeli one and land confiscation have distorted the structure of the construction sector (Sabra, 2015), and the OPT's unstable political and economic conditions have adversely affected the opportunities for investment in the sector. The domestic construction sector absorbed 61% of the employed workforce in 1995 and 44% in 2018[432]. The figures reflect

[431] Based on PCBS Raw Data

[432] Researcher's Calculations based on the PCBS Labour survey reports

what Roy (2001) calls ‘the externalisation’ of the Palestinian construction sector in the West Bank.

The impact of Israeli policies in terms of settlement expansion, property destruction, and exploitation of natural resources has exacerbated Palestinians' social and economic conditions (AIDA, 2017; UNCTAD, 2016). Palestinians cannot enjoy their natural resources, such as building materials, marble and stone, exploited by Israeli settlers and corporations (World Bank, 2013). Accordingly, a political-economic approach, which defines the relation between Israel and the OPT as based on Israel's exploitation of Palestinian resources and not on the inequality of resources between the two economies, can describe the relationship between the two economies, i.e. the occupied and the colonial ones. Most Palestinian researchers[433], who have supported the political approach, are inspired by the conceptual and methodological of Marxist dependency theory (Farsakh, 2005). Nevertheless, this approach's deficiencies are that: a) it focuses on relations of exchange rather than production, and b) the perspective of researchers regarding surplus labour or value perceives labour mobility has occurred due to unequal trade relations without linking it to the consequence of the political, social and economic transformations in the OPT on the structure of the Palestinian economy (Farsakh, 2005).

Israeli policies or sabotage led to the erosion of the economic base of the OPT, particularly in the West Bank (Hever, 2010). Policies used by the occupying power, such as the confiscation of Palestinian land and natural resources, the restrictions on importing, exporting, travelling and issuing building permits and the crushing of unions, have trapped the Palestinian economy in a vicious cycle of underdevelopment and reliance on international aid to survive (AIDA, 2017; Bornstein, 2001; Hever, 2010; ILO, 2018a; World Bank, 2017). The ‘de-development[434]’ of the Palestinian economy since 1967 is due to Israel's military and economic power, which allows it to confiscate land, expropriate material, and build illegal settlements, creating surplus labour with no choice but to work in the Israeli market (ILO, 2018b; Roy, 2016; World Bank, 2017) or increase in

[433] For example, (Abu-Ayyash, 1981; Mansour, 1988; Samara, 1988)

[434] Roy (2001; 2016) defines the de-development as the systematic destruction of an indigenous economy (Palestinian economy) carried out by a dominant power (Israel) since 1967.

unemployment as the number of job opportunities in the local market is insufficient (Frech, et al., 2019; ILO, 2018b).

The five factors of production of the Palestinian construction industry - land, labour, capital, materials, and equipment - have been affected by Israeli occupation policies and political instability in the West Bank. The construction sector in the West Bank is connected with the land and other natural resources controlled by Israel. As shown in Chapters 8 & 9, the Israeli requirements at checkpoints and the procedures that control the transportation process, i.e. "back-to-back", which requires the rental of two trucks, lead to delayed delivery of materials and high cost of the final product (MAS, 2018). Although some basic construction materials in the OPT are produced locally, most items are imported from or through Israel (Abdulhadi, 1994; Makhool & Atyani, 2002), including cement, steel, and glass. Due to the Israeli control of all outlets, only certain construction materials and equipment are allowed to be imported (Chapters 8 &9), leading to using building technologies that are traditional and contribute significantly to the increase in construction waste and labour intensity (Abdallah, 2015), as also shown in photos in Chapters 8& 9. The traditional method is labour-intensive and depends entirely on a highly trained expert's professional skill and experience (Heller, 1987). Additionally, prices of imported building materials are high due to customs duties and taxes imposed on these products (Chapters 8 & 9). Therefore, the price increase is estimated at 50% compared to their price in the global market (Abu Hantash & Salah, 2009; Makhool & Atyani, 2002).

Furthermore, the Israeli construction market poaches skilled workers from the West Bank (Chapters 7-9) by offering wages that Palestinian employers cannot afford. The high unemployment in the West Bank and wage discrepancies between the two economies have made Palestinian workers ideal candidates for the Israeli secondary market[435] (AIDA, 2017; Rosenhek, 2003). The two powerful competitors for the Palestinian construction industry, the illegal settlements and Israeli construction markets (external structure), add new challenges to the Palestinian construction sector as more than 60% of West Bank workers working in Israel and the illegal settlements belong to the construction sector (Chapter 8). Thus, inflating wage rates have occurred due to labour mobility (Chapters 8 & 9). The inflating of wage rates is one of the main reasons for higher costs and lower

[435] The Israeli government and employers have offered the least desirable occupations to Palestinian workers in the secondary labour market (Rosenhek, 2003).

productivity (Dainty, et al., 2004; Prais & Steedman, 1986; Winch, 1998). Therefore, these mechanisms obstruct the sector's productivity growth and the Palestinian economy. For example, the construction of a personal residential building in the West Bank exceeds 42 months as it is being implemented under personal supervision and personal financing (Abdel Razeq, 2015).

The industry's core interface consists of the relationship between a human and a non-human system. The joint operation of two independent but interconnected systems, social and technical, is required to enhance labour productivity (Heller, 1987; Howcroft & Wilson, 2003; Trist, 1981). Yet, the Israeli policies lead to skill shortages and limited construction methods, and the internal structure factors do not contribute to job satisfaction and employee empowerment. Thus, the Israeli policies, the employment conditions in the Palestinian construction sector and other internal structure factors have decreased the popularity of the socio-technical approach (Howcroft & Wilson, 2003).

10.4 Complex Geography and Labour Productivity

Figure 10. 9 provides a breakdown of the construction workforce in the West Bank and the three selected governorates by work locality and shows the average labour productivity for the building subsectors at the macro-level (m^2/labour.hour) from 2014 to 2019. For instance, executing a 150m^2 building requires 5,357 labour hours in the West Bank, 3713 labour hours in Nablus, 4545 labour hours in Ramallah and 5000 labour hours in Bethlehem. While Kruskal-Wallis H test results show a statistically significant difference in the productivity of building workers working in the three selected governorates (see Chapter 6), the test results for construction workers in the building construction subsectors working in Nablus and Ramallah are statistically insignificant (Chapter 8). As shown in Chapter 7, the regression model results for the three provinces show similarities and differences in the factors that influence the productivity of construction workers at the micro-level. In this section, the effect of locality and complex geography on construction labour productivity is discussed through the answer to the research question: Based on the interaction between structural and agency factors, what are the determinants of construction labour productivity in the West Bank? How similar or different are these determinants according to the project locality?

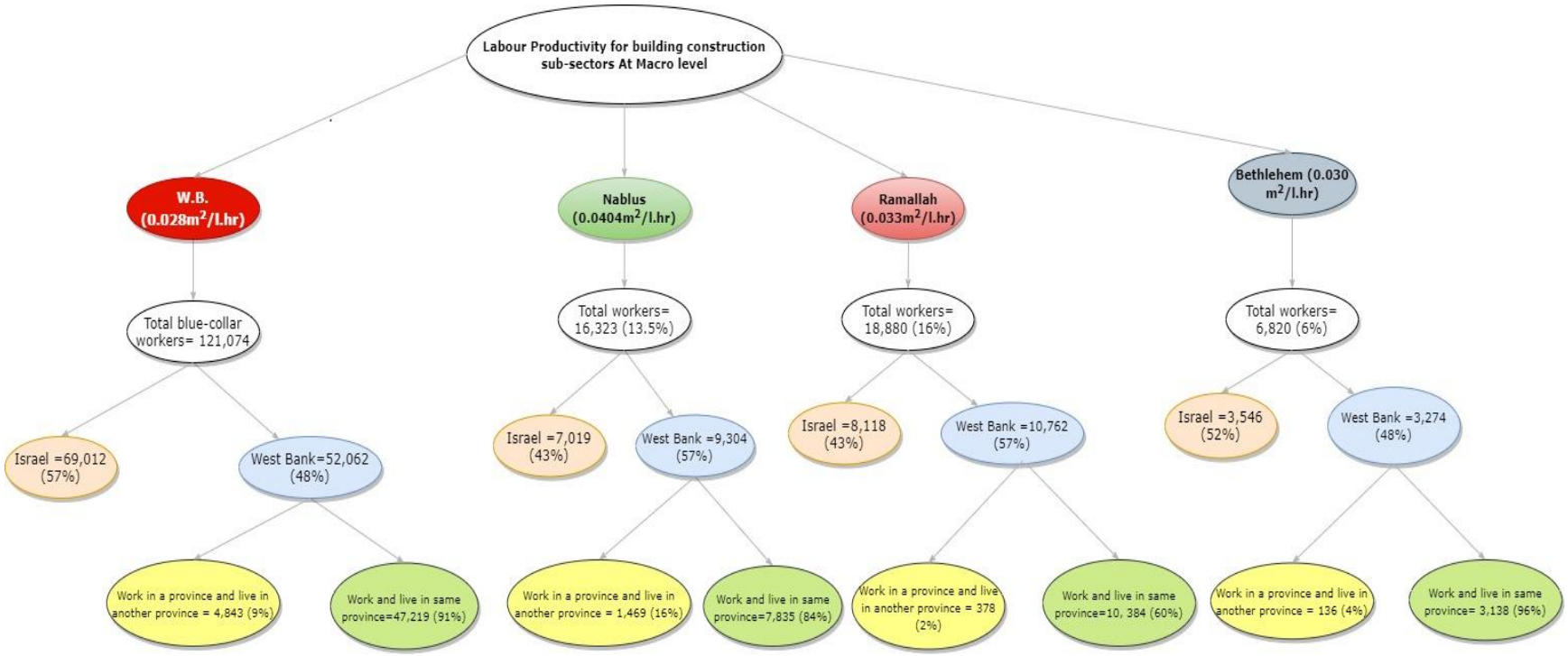

Figure 10. 9: Construction Labour Productivity at the Macro level and summary of the construction workforce in the West Bank and the three Governorates selected

10.4.1 Deterimintes of Labour productivity in three governorates: Similarities

Small firms dominate the construction sector in the three governorates. While 91% of construction workers work for companies employing fewer than ten workers in Ramallah and Nablus, nearly 88% work for firms with up to 9 workers in Bethlehem (Chapter 9). Accordingly, a lower level of on-the-job training and insufficient investment in technology use is expected; most companies are labour-only contractors (Chapters 8 & 9). Firm size reflects the exact situation of high occupational divisions on construction sites. Thus, moving towards multi-skilled labour and creating more sophisticated training needs is challenging for these firms (Dainty, et al., 2017), which perceive labour qualifications and skills as the property of individual workers and associated only with the work processes of particular firms (Marsden, 1999). In addition, they view training as part of VET as a state or government responsibility[436]. Chapter 9 results indicate that less than 2% of blue-collar workers receive **on-the-job training** from employers at the start of their employment in the construction sector in Ramallah and that nearly all blue-collar workers begin working in the construction sector without receiving any on-the-job training from employers in the rest of the governorates.

The percentages of the blue-collar workers working in building subsectors who attended formal and informal training courses are 4% in Ramallah, 7% in Nablus and 12% in Bethlehem and over 50% of these institutes' graduates work in the Israeli construction market[437], reflecting that the construction labour process in the three governorates rests on low levels of training (Clarke & Wall, 1998; Clarke & Wall, 1996). However, the workforce is well educated as the **average number of years of schooling** among blue-collar workers is almost 10[438]. Thus, they are capable of mastering their occupations quickly and by observing.

The construction sector in the three governorates shares many of the characteristics of North African and middle east economies in terms **of poor working conditions**, such as running the risk of losing their job and delaying/ not paying their dues, and workers bearing personal responsibility for their safety and the costs of their medical care. For instance, three-quarters of the blue-collar workforce is between the ages of 15 and 42, and

[436] Interviews with N6M-A, N6M-B, B5M-B, R4S-B &R4S-D
[437] PCBS Raw Data
[438] PCBS Raw Data

less than 10 % are over 52, reflecting early retirement due to harsh working conditions (Chapter 9). In addition, most of the workers working in the three governorates have no access to health or accident insurance and do not contribute to pension funds, which provide income after retirement (Chapter 9). As most construction workers are not members of any labour union[439], no one is defending their rights, and they experience high vulnerability to social risks (lack of job security).

While the unsecured employment conditions and harsh working conditions, as internal structural factors, contribute to labour mobility from the West Bank to Israel (Chapters 8 & 9), the main reason for mobility is the wage discrepancies between the two markets (Chapter 9). **Figure 10. 9** elucidates that the percentage of blue-collar workers from the West Bank who work in the construction of buildings and specialised construction activities subsectors in the Israeli construction markets is 57%. The percentage of the workers from the Nablus and Ramallah governorates working in building sub-sectors in Israeli construction markets is 43% each, compared to 52% for Bethlehem workers.

In Ramallah, the total number of self-employed blue-collar workers is 1,871, 4% of whom work in the Israeli construction markets, compared to 16,496 wage employees, 46% of whom work in the Israeli construction markets. However, about 17% of the 1,190 self-employed workers in Israel work compared to 47% of 14,090 wage employees from Nablus Nablus, and more than 9% of the 305 self-employed workers work in the Israeli construction markets, compared to 55% of 6,460 wage employees from Bethlehem[440]. These numbers could reflect the intensity of construction activities in Ramallah compared to the two governorates.

As shown in ***Figure 10.10***, which compares each independent variable's relative importance in the regression model, labour mobility from each West Bank governorate to Israel substantially affects labour productivity more than other independent variables in the three governorates. However, the impact of labour mobility from Bethlehem on construction labour productivity is lesser than in the other governorates, as other independent variables related to labour, such as age and legal status, have higher

[439] PCBS Raw Data
[440] PCBS Raw Data

significant effects on productivity in this governorate compared to Ramallah and Nablus (***Figure 10.10*** and Chapter 7).

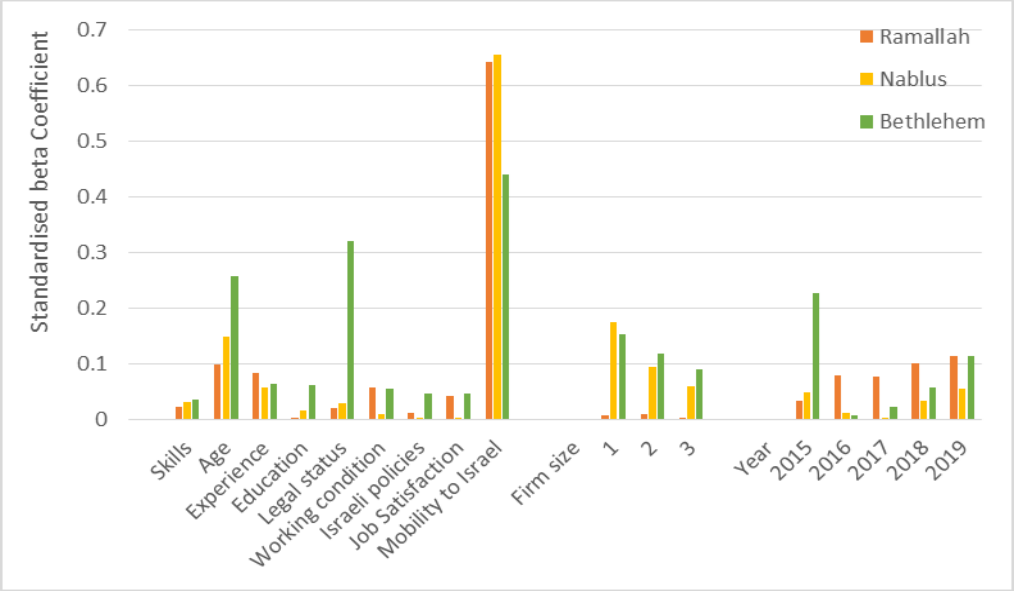

Figure 10.10: The strength of the effect of each independent factor on the CLP based on standardised beta coefficient[441]

Additionally, ***Figure 10.11*** and the results of the regression models for each of the three governorates show that the adjusted R-squared is dramatically dropped when labour mobility withdraws from the models of Ramallah and Nablus, indicating that a crucial independent variable is dropped or neglected from the models. However, the withdrawal of the labour mobility factor has led to a drop in the value of the adjusted R-squared by 0.1. Accordingly, labour mobility from Bethlehem to Israeli construction markets is an important factor impacting productivity but has no relative importance than in the other two governorates.

[441] Researcher's further analysis of the three governorates regression models in Chapter 7

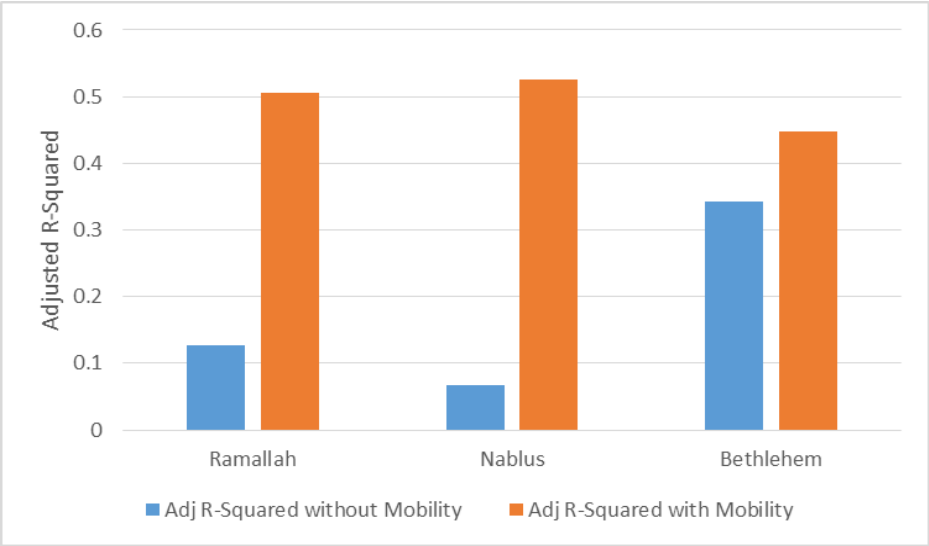

Figure 10.11: Adjusted R-squared for the governorates regression models with and without labour mobility factor[442]

The results in Chapter 7 show that construction workers from Nablus working in the Israeli construction markets are more productive by about 174 % compared to others working in the Palestinian construction market in Nablus. Workers from Ramallah and Bethlehem who work in the Israeli construction markets are 103% and 64% more productive than other workers in Ramallah and Bethlehem, respectively, indicating the higher impact of labour mobility in Nablus and Ramallah compared to Bethlehem.

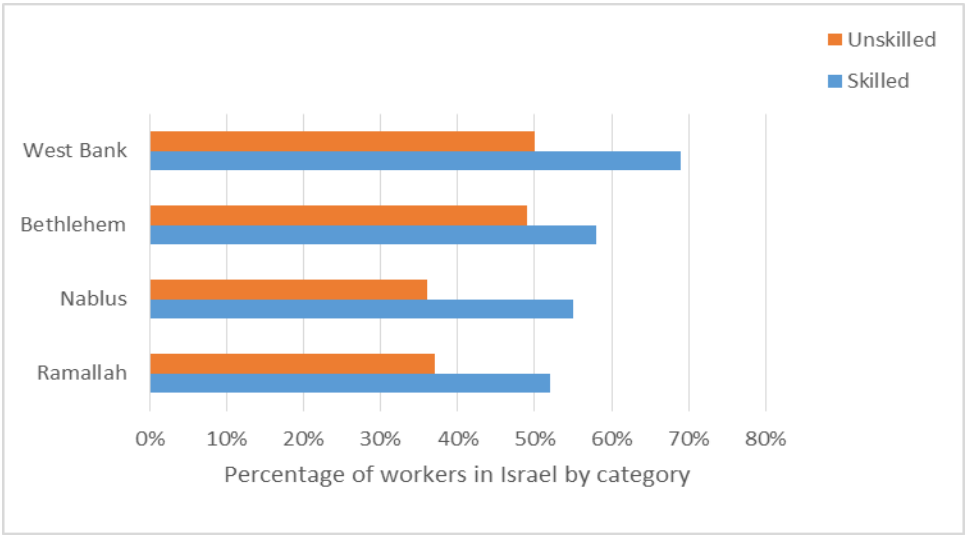

Figure 10.12: Percentage of blue-collar workers from the West Bank and the three governorates employed in Israel by skill category[443]

[442] Researcher's further analysis of the three governorates regression models in Chapter 7
[443] Researcher's Calculation using PCBS Raw Data

The difference in the importance of labour mobility in the three governorates is explained by the percentages of mobile skilled and unskilled workers in the three governorates. As shown in **Figure 10.12**, compared to the remaining governorates, the percentage of unskilled workers from Bethlehem who work in the Israeli market is the highest, indicating that the wage disparity compared to workers in Bethlehem is high but not as in the other two governorates. The wage of the skilled worker for the three governorates is not valued according to the knowledge they incorporate, but according to outputs rather than inputs, that is, according to a worker's ability to fulfil the task at hand (Chapter 8 and Chapter 9). The average monthly wage for skilled workers working in Ramallah or within the West Bank is less than 50% of that of the workers working in the Israeli construction market, specifically, ILS 2,572.98 in Ramallah compared to ILS 5,197 in the Israeli markets.

Furthermore, the average monthly wage for skilled workers working in Nablus or Bethlehem is less than 40% and 35%, respectively, that of workers working in the Israeli construction markets, more specifically, ILS 1,954.07 in Nablus compared to ILS 4,484.75 in the Israeli markets and ILS 2,178.44 compared to ILS 3,343.53 in the Israeli markets for workers from Bethlehem[444]. The salary of Bethlehem skilled workers working in Israel is the lowest compared to the other governorates, indicating that the workers work in illegal settlements in the West Bank or are semi-skilled labour.

For the unskilled workers, the average monthly wage in Ramallah (1830.8 ILS) is almost 45% of that of the workers in the Israeli market (4079.61 ILS), in Nablus (1,143.53 ILS) is almost 35% of the workers in the Israeli market (3,289.66 ILS) and the average monthly wage in Bethelem (1,295.64 ILS) is almost 60% of the one for workers in the Israeli market (2,173.74 ILS)[445]. Additionally, compared to Ramallah and Nablus, the average weekly hours for craft building workers working in Bethlehem and the number of working days monthly indicate low demand for construction workers. For instance, the average weekly hours for skilled workers working in Bethlehem is less than 42, and less than 25% work weekly for more than 48 hours. Yet, the average weekly hours for craft building

[444] Researcher's Calculation using PCBS Raw Data
[445] Researcher's Calculation using PCBS Raw Data

workers working in Nablus and Ramallah is 45 and 46, respectively, and 50% of the workers work weekly for more than 48 hours[446].

The average monthly working days for skilled workers from Bethlehem who work locally or within the West Bank is 14 days compared to 19 for building workers from other West Bank governorates who work locally[447]. In addition, for unskilled workers, the average monthly working days in Bethlehem (12 days) are also approximately five days less than the average monthly working days for workers from other governorates who work locally[448].

Just in Ramallah, the proximity of the green line plays a crucial role in the workers' decisions to work internally or in the Israeli construction markets. As shown in Chapter 9, most of the rural communities in Ramallah are located in area C, from which 50% of the construction workers work in the Israeli construction market compared to 35% and 27% of the urban and camp localities. Most Palestinian rural areas in Nablus are considered areas B, surrounded by many illegal settlements. However, the lack of investment by the Palestinian Authority or local developers in Nablus compared to Ramallah may result in fewer construction activities in these areas. Thus, the city witnessed the highest internal mobility compared to Ramallah and Bethlehem (Figure 10. 9), and over 52% of the construction workers from rural areas work in the Israeli construction markets compared to almost 37% and 15% of the urban and camp localities[449].

The Bethlehem Governorate area represents 12% of the total area of the West Bank; the areas that Palestinians can use to carry out their construction works are about 14% of the governorate area, reflecting the scarcity of construction projects implemented in the governorate, as there is a shortage of available land. The area of new buildings licensed in the governorate between 2014 and 2018 is 1,544,900 m^2, representing 9% of the total licensed building area in the West Bank, less than 42%, and almost 34% of the area of the new buildings licenced in Nablus and Ramallah governorates, respectively[450]. Additionally, Bethlehem is close to the Green line and Jerusalem (Chapter 9). Bethlehem faces a lack of

[446] Researcher's Calculation using PCBS Raw Data
[447] Researcher's Calculation using PCBS Raw Data
[448] Researcher's Calculation using PCBS Raw Data
[449] Researcher's Calculation using PCBS Raw Data
[450] Researcher's Calculation using Engineering Offices and Companies Authority (2021) data

investment compared to Ramallah and is closer to the green line than Nablus. Thus, the rate of labour mobility to the Israeli construction markets in Bethlehem is higher compared to the other two governorates (***Figure 10. 9***). In Bethlehem, almost 56% and approximately 52% of the construction workers from urban and rural areas work in the Israeli construction markets compared to 21% of those living in refugee camps[451].

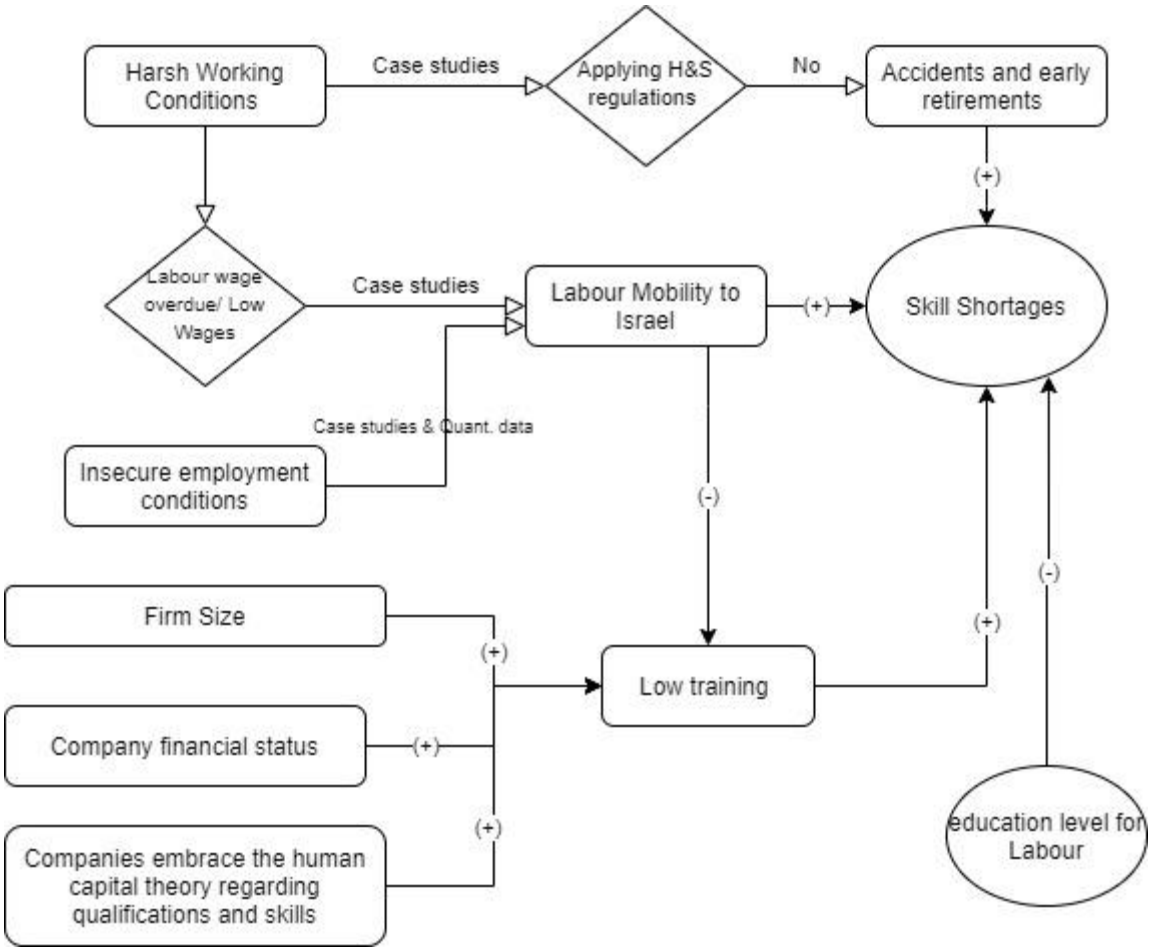

Figure 10.13: Common Agency and Structural Determinants leading to Skill Shortages in the governorates

The common reasons for labour mobility and its impacts on labour productivity in the three case studies governorates are depicted in ***Figure 10.13***, which shows that low training levels and labour mobility from these governorates to the Israeli construction markets contribute to skill shortages. The Bonferroni posthoc test revealed that labour mobility to the Israeli market was statistically significantly higher for skilled workers than unskilled workers by almost 8% (p=0.011) in Ramallah and Bethlehem and by over 14%

[451] Researcher's Calculation using PCBS Raw Data

(p=0.0000) in Nablus[452]. The average age of workers from Ramallah and Nablus working in Israeli markets is 38 years, six years higher than the average age of workers working locally. However, for workers from Bethlehem, the working experience for those working in the Israeli market is slightly over eleven years compared to 9.5 years for those working locally[453]. Although the results indicate that the construction sector in Israel targets skilled blue-collar workers more than unskilled ones, the construction industry in Nablus and Bethlehem is not expected to face severe skill-shortage problems compared to Ramallah[454].

As shown in ***Figure 10.13***, the non-competitive daily wages compared to the salaries paid by Israeli employers are the main reason for labour mobility. For instance, Case study #1 in Ramallah, implemented between 2005 and 2007, shows that the average daily wage for blue-collar workers is almost similar to those paid between 2014 and 2019. All case studies indicate that the second main reason for mobility is the casual and insecure employment conditions, with extensive use of 'labour-only' subcontractors working to tight output targets and prices (Chapter 9). As shown in ***Figure 10.13***, the unsafe workplace (internal structure factor) and casual and insecure employment(agency factor) lead to skill shortages either by increasing mobility to Israel or increasing the number of injuries and deaths of these workers. Furthermore, in all the case studies, except for the Nablus project and one project in Ramallah, the contracting companies are in poor financial conditions, which leads to disloyalty and absenteeism of workers and delays in the provision of construction materials on the construction sites.

Labour mobility to Israeli construction markets has mitigated the impact of low training levels, as construction workers working in the Israeli market are highly skilled and highly qualified and have transferred their knowledge and experience to the workers in the West Bank (Chapters 8 &9). Yet, labour mobility's cons are higher than its pros. For instance, the skill shortages have led to increased project overhead by increasing the close and direct supervision through the labour superintendents, have led to reworks due to poor workmanship in most projects, and are associated with most projects getting out of phase (***Table 10. 2***).

[452] Researcher's Calculation using PCBS Raw Data
[453] PCBS Raw Data
[454] Case studies projects

Case study No./ year	Governorate	Delay in completion	Main reasons for the delay in completion
#1/2007	Ramallah	50%	The political instability and change orders requests
#2/2018	Ramallah	190%	Skill shortages due to labour mobility, political instability, and poor financial status of the firm.
#3/2021	Ramallah	91%	Covid 19 restrictions and Variation orders
#4/2021	Ramallah	28%	Skill shortages due to labour mobility, Covid 19 restrictions and poor financial status of the firm.
#5/2019	Nablus	0%	The project was extended as a new floor was added
#6/2021	Bethlehem	157%	The poor financial status of the firm, the poor workmanship of the workers, and Covid 19 restrictions

Table 10. 2: The main reasons for case studies project delay and the amount of delay in each project[455]

Finally, ***Table 10. 2*** shows the emergence of a new crucial reason for the delay, particularly in Ramallah and Bethlehem, such as the national shutdown and change in accepted methods of purchasing building materials, which leads to a worsening of the financial status of the contracting firms (Chapters 8& 9). The outbreak of the epidemic significantly changed the payment methods for material suppliers and merchants the firm dealt with, which affected its financial position. Additionally, most contractors cannot pay in cash for the imported materials, which has led to a significant delay in providing these materials on sites. Since most of the materials used for finishing are imported from or through Israel, an unexpected increase in the prices of some materials occurred due to the significant rise in sea freight costs.

10.4.2 Deterimintes of Labour productivity in three governorates: Dissimilarities

One striking feature of all case studies is that the contracting firms tend to have a high labour turnover rate and therefore operate with a high degree of unpredictability in terms of labour, quality and cost. Labour mobility is the main factor leading to skills shortages in the construction industry in the West Bank. Yet, due to the massive construction activities in Ramallah governorate compared to other governorates, labour mobility leads to a scarcity of blue-collar workers (Chapter 9). Although labour mobility has impacted labour productivity in the three governorates, it was more adverse in Ramallah governorates cases than in Nablus and Bethlehem cases. This agency factor has led to skill shortages, especially rebar fixing, tiling, and blockwork, coupled with an increase in the daily wages of skilled workers in the Ramallah governorate. However, the internal movement of

[455] Researcher's Analysis for the six case study projects

construction workers from the southern and northern governorates resulting from higher wages for workers in Ramallah mitigated the impact of skills shortages in Ramallah.

To mitigate the considerable increase in expenses due to coronavirus implications and the rise in labour wage due to high demand, the contractor attempted to save costs by assigning work to cheap workers and delaying dues to various subcontractors in Ramallah (Chapter 9). Notwithstanding, the firms offer low tender prices to win bids. Thus, during the construction stage, the firms cut costs by employing unskilled labour, and thus errors in implementation occur. In addition, as the materials supplied to the project in Bethlehem are of low quality, the quality of the work is inferior, and several activities were reworked in Bethlehem and case studies #2 and #4 in Ramallah (***Figure 10.14***).

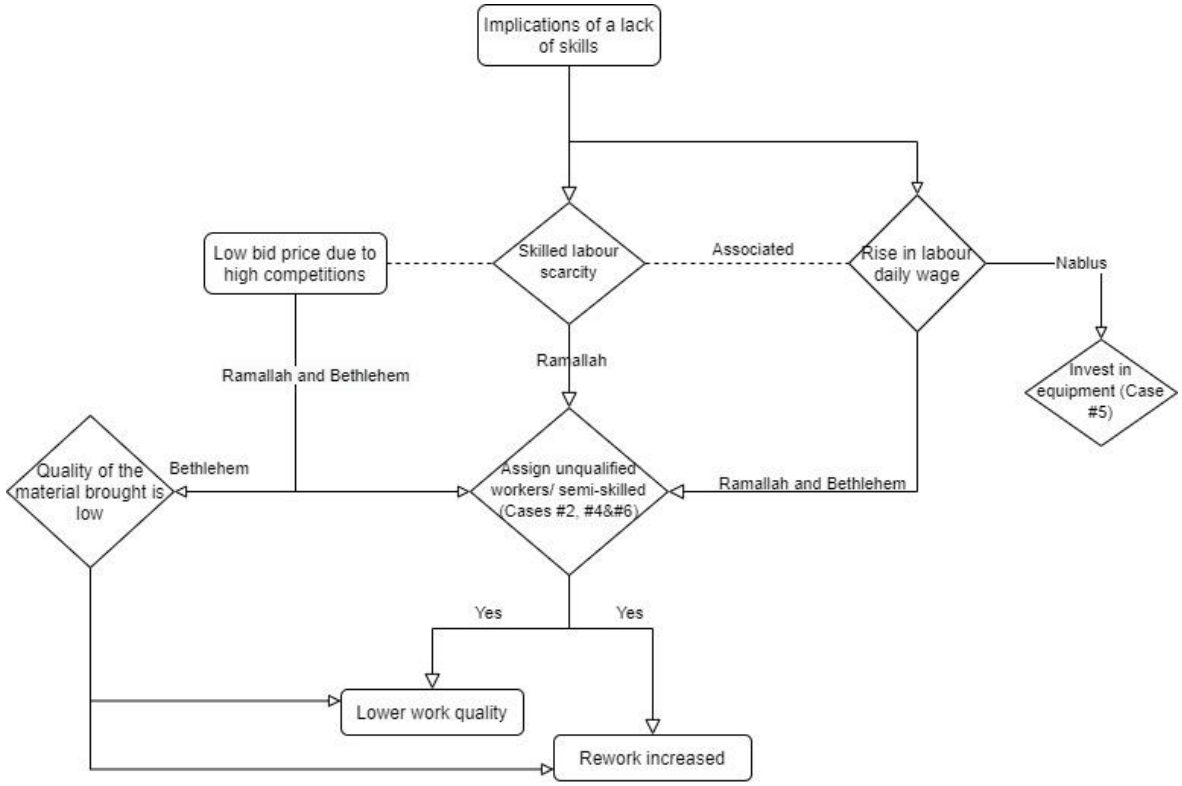

Figure 10.14: Implications of skill shortages and solutions adopted by contracting firms in three governorates

The fragmented workforce led to a situation where the same workers could have different wages and benefits based on their agreement with the employer (Chapter 9). While there is no wage siphoning or theft, it is reported that in most cases, except for the case study from Nablus, the contracting company failed to pay dues to suppliers, workers and subcontractors at the agreed time (Chapter 9). Therefore, disloyalty and absenteeism are

higher in these two governorates compared to the Nablus case study project, where workers' salaries are paid at the agreed time. Most of the workers who worked on the Nablus project were from the same governorate. Thus, workers' commitment is higher than in Ramallah and Bethlehem; as the workers live far from the Green Line, the project is close to their place of residence and workers' wages are not overdue. Accordingly, the main contractor in Nablus does not suffer from a skills shortage due to labour mobility to the Israeli markets (Chapter 9).

On the other hand, due to the increase in labour wages and their scarcity, the contracting company in Nablus adopted a socio-technical approach to compensate for delays during the construction phase and mitigate the impact of skills shortages in the industry by using new construction systems such as the modular steel formwork system (Chapter 9). In addition, the contracting company used a tower crane to speed up the construction process in this case study. Unlike in the cases of Ramallah and Bethlehem, the contracting firm focuses on improving its productivity, not cutting off costs (***Figure 10.14***). Some activities in the Nablus project were implemented in the shift system, and others by increasing working hours from 8 to 10 hours per day. However, employers' new exploitation of labour in the three governorates is that overtime hours are paid as a normal hour and that the night shift in Nablus is paid along the lines of the daily shift[456]. Finally, labour mobility and skills shortage problems have occurred due to an interaction between internal and external structure factors. Yet, the impact of external structure factors through the checkpoints and availability of competitive construction markets is higher than internal structure factors.

[456] Interviewees N6M-B, N6M-C &N6M-D

11 CHAPTER 11

Conclusions and Recommendations

The thesis draws from the ongoing debate on definitions of labour productivity and the factors impacting it that have been studied from a broader level, adding the political and economic conditions to this dilemma. The thesis aims to identify the critical social, economic, and political structure determinants and agency determinants and their impact on construction labour productivity in a colonisation setting, such as the West Bank in Palestine. Through all the empirical studies conducted, the thesis shows that labour productivity is the outcome of an interaction between macro, meso and micro levels of labour agency and structural determinants, which are two ontological dimensions that reciprocally constitute each other within a context. Political instability and complex geography have added a new layer of complexity to the definition of the term ‘‘Productivity’’. Developing an appropriate official definition at the macro level has been hampered by a wide range of political and economic factors influencing the industry's labour market. Construction labour productivity is defined as the output per hour worked, ignoring the differences in the quality of one hour of work against another that stems from differences in skills, education and length of experience. Productivity is about working ‘effectively’ or ‘to the best of one’s ability’ within a particular context, such as the economic and political conditions (External structure) and working conditions (Internal structure). The definition of the term must be linked to both efficiency and effectiveness, not just to technical efficiency, and set within its social context since productivity is not just a mechanical process. The following sections show the thesis's contribution to knowledge and its novelty in the field of construction labour productivity, followed by a summary of the main findings of the thesis, and conclude with policy implications and future research.

11.1 Contribution to Knowledge

This thesis has unpacked the current conditions underlying construction productivity in the West Bank as a case study. Although the situation in the West Bank is unique, the findings of this thesis add to the literature by providing a clear definition of construction productivity and a model of factors impacting construction productivity under such extreme conditions. The thesis

contributes to knowledge by defining the term driven by the involvement of blue-collar and white-collar perspectives and the factors influencing productivity. Furthermore, the framework of this thesis may be adopted by other countries seeking to find the factors impacting construction productivity; however, it will undoubtedly require testing and transfer of context for adaptation. The research contributes to knowledge through its originality and generalisation by mapping the complexity of social factors and providing a definition of construction productivity appropriate to colonisation.

It adds to the literature by studying and unpacking the factors impacting labour productivity in a small, volatile and dependent economy controlled by a more developed and robust economy within a colonisation context. It contributes to knowledge by adopting structuration theory to understand labour productivity and assess the interactions between so-called agency and structural factors within a specific context. In addition, by revealing the interconnected nature of the relationship between construction workers' hourly wage and labour productivity and the lengthy debates concerning this relationship, Chapter 7 presents a new perspective for adopting the hourly labour wage as a proxy for labour productivity in the construction industry. However, the epistemological paradigm, which is a constructivist approach, has helped in presenting this new perspective regarding the hourly labour wage.

To the researcher's knowledge, this is the first research that tests the factors impacting building labour productivity using the OLS regression model in construction. All previous literature was based on qualitative or cross-sectional data (e.g. (Chan, 2002; Durdyev & Mbachu, 2017; Hamouda & Abu-Shaaban, 2014), which does not allow for building such a regression model. Moreover, the regression model enhances the literature by adding two new structural factors impacting labour productivity: political instability and colonisation. The thesis contributes to the literature through its unique methodology that combines secondary quantitative data and twofold primary qualitative data that consist of semi-structured interviews and multiple-case studies. Thus, having results open to debate or assuming causal relationships is reduced by collecting explanatory data in Chapters 8 & 9. Finally, the thesis, which aims to unpack the current conditions underlying construction productivity in the context of the West Bank, will contribute to knowledge through its originality. Mapping the factors and providing a definition of construction productivity that fits within the unique context of the West Bank in terms of its

uncertainty, complex geography, and 'statelessness' and the existence of two robust Israeli construction markets is unique and has never been previously examined in Palestine. Unlike most previous research in this field, this thesis will pay attention to the social dimension of construction productivity and its interaction within the unique context of the West Bank.

11.2 Summary of the main findings

Additionally, judging the impact of labour agency or structural determinants at one level of analysis on labour productivity without considering other agencies or structural determinants at other levels is misleading. The impact of an agency element, such as skill shortages, on construction productivity should be addressed within the context of the industry (internal structure) and the state (external structure), including, at the same time, economic and political factors. For example, at a micro-level of analysis, the regression model in Chapter 7 illustrates that construction workers working in the Israeli construction markets are about 127% more productive than others working in the Palestinian construction market in the West Bank and earn more than those working in the West Bank, as productivity is measured as an hourly wage. Yet, the meso analysis shows that the construction sector in Israel is more targeted towards skilled blue-collar workers than unskilled ones (***Figure 10. 8***), bearing in mind that the productivity of workers from the West Bank between 30 to 45 years old is the best in terms of quantity and quality (Chapters 7-9). At the meso level, labour mobility from the West Bank to the Israeli construction markets has been considered the primary contributor to skill shortages in the construction market of the West Bank, particularly shortages of tilers, steel fixers, bricklayers, carpenters and plasterers (Chapter 9). Shortages of skilled workers cause delays in different projects (Chapter 9), dramatically increasing reworking due to poor workmanship, and the direct and close supervision of workers required in order to reduce reworking of projects, leading in turn to an increase in overhead costs (Chapter 8 & Chapter 9).

The macro-level analysis (Chapter 8) illustrates that the construction labour process of the West Bank governorates is based on rigid trade divisions, low levels of training and output-based pay. The skills of construction workers are acquired through experience accumulated through learning by doing and passed down from the older generation to the younger generation. The sector is still weak in terms of the number of training centres and their equipment, the training of cadres, and the budgets allocated to provide them with the materials needed for training. The P.A.

development budget is only related to implementing projects, and no item covers the training of workers. The failure to focus on technical education, which was not among the priorities of successive Palestinian governments (Chapter 8 and **Figure 10. 5**), and society's view of construction as an inferior profession (Chapter 8) have led to the weak nature of people's demands for vocational education. Furthermore, most construction companies in the West Bank are not more than labour agencies or contractors (Chapter 8). Accordingly, the vast number of micro-firms, which is reflected in the high occupational divisions on construction sites in the West Bank, affects the ability to train and develop their workers (Dainty, et al., 2017). Thus, labour productivity is detrimentally affected by the low level of skills and narrow qualifications of many employed in the industry[457] and the lack of initial and further training.

Interestingly, the solutions suggested to mitigate the impacts of skills shortages on labour productivity in the West Bank are either technical (Chapters 8 &9), such as the greater prefabrication and mechanisation of construction processes (Barbosa, et al., 2017; Gibson, 2015), or unsustainable (Chapter 8), such as importing the necessary skilled labour (Egan, 2004; Pearce, 2003; Prais & Steedman, 1986; Winch, 1998); indeed the P.C.U proposes importing necessary skilled construction labour from the Gaza Strip (Chapter 8). The striking features of these proposed solutions are that they do not focus on employment regulation and introducing a comprehensive industry-wide training scheme (Chan, et al., 2010; Clarke, 2006), but place labour at the bottom of the ladder in improving labour productivity and ignore the fact that Israel controls all the boarders between the West Bank and Gaza. **Figure 10. *7*** and Chapters 8 and 9 findings illustrate that the quality of working life, labour exploitation and power imbalance between workers and managers are among the main reasons for skill shortages through labour mobility from the West Bank to Israel.

Another important finding is that Israeli policies[458] increase worker productivity by approximately 17% at the micro level. One possible interpretation of this result is that, during the general or total closures[459] (Roy, 2001), Palestinian construction workers working in the Israeli

[457] Construction labour productivity rates for several trades in building subsectors in Chapter 4
[458] Israeli policies, as defined in Chapter 7, are only limited to a- the closure of the checkpoints between the West Bank and Israeli markets and b- the strikes in the West Bank because of the actions of the Israeli occupation force.
[459] General closure is the overall restrictions placed on the movement of labour and materials between the West Bank and Gaza and between the OPT and Israel.

market worked locally and improved productivity by applying and transferring the experience gained from Israeli construction markets, which are more advanced (Chapter 8). Additionally, due to the restriction of movement between different Palestinian cities and villages in the West Bank, known as an internal closure (Roy, 2001), workers were accommodated in the project's city and were commuting weekly internally (Interview #9 in Chapter 8 & Case study #1 in Chapter 9). Yet, the meso and macro levels analysis shows that Israeli borders and checkpoints have separated the point of production from the point of labour reproduction (Bornstein, 2001), leaving Palestinians uncertain whether they can get to work on any particular day (Hever, 2010). Israeli policies also affect productivity indirectly by facilitating access to Israeli construction markets more than to nearby projects in the West Bank or directly by restricting the movement and importation of construction materials (Chapter 8 & Chapter 9).

The construction sector in the West Bank shares many of the characteristics of North African and middle east economies in terms of poor working conditions, such as running at risk of losing employment and delaying/ not paying dues, and workers bearing personal responsibility for their safety and the costs of their medical care (Chapters 4,8 &9). Case studies in Chapter 9 demonstrate, for instance, that all financial challenges of contracting enterprises are resolved at the expense of workers' health and safety and financial rights, which leads to an increase in the rate of labour mobility to Israeli markets (agency factor) and hence disloyalty (**Figure 10. 5**, Chapters 8 &9). The thesis illustrates that labour should be placed at the centre of the process to improve labour productivity and provides a definition for labour productivity.

11.3 Academic Conclusions

Although labour productivity cannot cover all aspects of productivity, such as the increase in the cost of energy and raw materials, unemployment and quality of working life (Prokopenko, 1992), using Giddens's structuration theory to look at the whole and the parts of the system and thus understand how other parts interact with labour has helped to overcome this weakness of ignoring the interactions of these aspects. As shown in Chapter 4, measuring or assessing labour productivity using GDP per labour hour (Barbosa, et al., 2017; OECD, 2007) is misleading due to paring-down (Forbes & Ahmed, 2010), whereby GDP and the amount of labour are decreasing, but the latter is at a faster rate. Additionally, Chapter 8 demonstrates the heterogeneity of labour inputs in civil engineering and building projects due to the extensive use

of machines rather than labour. Thus, an abstract productivity rate using this proxy is inappropriate when discussing the factors impacting labour productivity at the macro or meso levels.

As the differences in the quality of one hour of work against another stem from differences in skills, education, and length of experience (Dozzi & AbouRizk, 1993; Fabricant, 1962), labour effectiveness and efficiency are the concepts that should be used to define the term within its context. Construction labour productivity is the output per hour worked without ignoring the differences in the quality of one hour of work against another that stems from differences in skills, education and length of experience. Labour productivity is not just a mechanical process. Thus, while efficiency and labour productivity are inextricably linked to achieving the best possible output per time unit, effectiveness, which has a relationship with means and the degree to which desired results are achieved, should utilise a time-saving strategy through paying a premium covering labour qualifications, experience and knowledge, indicating that labour productivity is a socio-technical concept.

The built floor area (m^2) per labour hour (Low, 2001), used as a proxy to represent labour productivity for building projects at the macro and meso levels, demonstrates the impact of political instability and complex geography in defining the term. The output at the construction site is the vessel by which labour is transferred; the materialised labour comprises the object of remuneration (Biernacki, 1995). Thus, at the micro level, hourly labour wage could be used as a proxy for labour productivity while controlling for the place of work and human capital characteristics, including age, experience, education and skills. Accordingly, the gap between marginal productivity and an hourly labour wage linked to human capital characteristics can be narrowed.

Furthermore, the context-specific factors added to the model have solved the dilemma related to experimental and real-world evidence suggesting that firms have monopsony power that they can use in principle to pay employees below their marginal productivity. Consequently, Israeli construction markets have removed these confounding effects by leading to a low recruitment elasticity in the Palestinian construction sector and limiting employers' ability to depress wages. Since the regression models have considered worker mobility from the West Bank to the Israeli

market and some Israeli policies, the hourly wage is a strong indicator of the productivity of construction workers in the West Bank.

The regression model has confirmed all agency and structural factors from the previous literature at the micro-level and found that labour mobility has the highest positive significant coefficient. Comparing the impact of each independent variable on the model using a command known as Eta squared shows that labour mobility as a predetermined and explanatory variable has the highest impact on the productivity of the building workers in the West Bank with (η^2) of 0.42. This agency factor has led to skill shortages and wage inflation in the sender country (Coyle, 2007; Datta, et al., 2007). Yet, it is used by the workers as a means of labour power to enhance their working conditions in a sector that sees employment as the appropriation of workers' materialised labour via its products and where workers receive wages for the expenditure of their labour power.

Additionally, while the results in Chapter 7 indicate that education increases labour productivity, Chapters 8 & 9 findings show that almost 7% of the blue-collar workers in the West Bank are considered graduates in non-graduate occupations (GRINGOs) (Blenkinsopp & Scurry, 2007). Since external and internal structural factors influence labour productivity factors, the human capital theory would be unable to explain and link agency factors, such as mobility and competencies, with other structural factors, such as political instability and construction firm size, yet structuration theory can do. The conceptual framework, which follows a multilayer analysis of the determinants impacting labour productivity, provides a dynamic picture of these determinants impacting on productivity by assuming that both agency and structural determinants are changing over time and space (Giddens, 1979; Sewell, 1992) and interact with each other.

11.4 Policy and Practice conclusions

Despite the positive impact of labour mobility from the West Bank to the Israeli construction market on the productivity of the sector in the West Bank through transferring some of the techniques used in constructing buildings in Israel, especially insulation and finishing materials, it is considered among the main reasons for skills shortages in the West Bank. In addition, the results indicate that the construction sector in Israel is more targeted towards skilled blue-collar

workers than unskilled ones, with a higher rate of labour mobility for the workers living in rural areas to Israeli construction markets than in other places of residence.

On the other hand, the primary data analysis generated by in-depth interviews shows that the PA bears part of the skills shortage problem due to the absence of qualified vocational education institutions in Palestine and the low investment in the TVET sector. The construction labour process in the West Bank rests on low levels of vocational education and training. The number of graduates from government vocational training centres compared to the number of entrants new to the sector's labour market is marginal. Only 7% of the blue-collar workers working in building subsectors have attended training courses, such as those managed by the Ministry of labour or run by the UNRWA, such as the Qalandia institute. The number of industrial schools in the West Bank is only 12[460] -yet none offer much related to the construction sector, as they cover only a tiny part of the construction market. The low absorptive capacity of the West Bank vocational schools is associated with the comparatively low percentage of secondary students enrolled in vocational education, at 8 per cent in the West Bank, despite workers' high salaries compared to other sectors in the Palestinian economy. Additionally, the market-oriented training courses offered in the West Bank have not considered the multi-skilling route for training labour.

11 TVET institutions operate in the West Bank under the supervision of the MOL, and there are 230 private training centres, which also offer a limited number of programmes concerning construction occupations. These programmes are considered part of informal education and training programmes, which can be described as unintended and sometimes unstructured education and training in terms of goals, time, and technical support, arising through individual training in the workplace (Abdullah, 2018; ETF, 2020). The TVET structure is thus fragmented concerning the institutional type and objectives and the supervisory and responsible parties. On-the-job training is almost non-existent in the sector due to hundreds of small construction companies and contractors, whose financial status is fragile, controlling the construction sector in the West Bank.

The cultural and social aspects related to society's view of the construction profession as inferior, lack of career perspective and lifelong learning, insecure employment conditions and output-

[460] Al Nayzak Organization for Supportive Education and Scientific Innovation (2011) and WAFA (2022)

based payment are among the main drawbacks to vocational training in the industry. The P.A. and the contracting companies do not value the workers' quality and skills but evaluate according to outputs, that is, according to a worker's ability to fulfil the task at hand that serves as a sign of abstract labour. There is no distinction between workers affiliated with professional centres and those not in terms of wages and priority of work, which leads to the cancellation and neglect of the importance of vocational training in Palestine by most construction workers. Consequently, skill shortages are not surprising, considering that the Israeli construction markets have also targeted skilled workers from the West Bank.

The health and safety of blue-collar workers working in the West Bank are not prioritised by the contracting firms and the clients of the construction projects. At the macro level, the enforcement and implementation of health and safety regulations in the construction sites are weak due to the lack of specific mechanisms and methods and the lack of the appropriate number of staff from the ministry to follow up and monitor the application of the requirements in all private and public construction projects. In addition, the political division of the West Bank into Areas A, B, and C reduce the ability to enforce compliance with health and safety laws and regulations, especially in the areas outside the PA's control.

Health and safety are not seriously taken when pricing the project at the firm level, nor considered while allocating the projects' budget except the ones funded by USAID. Some contractors evade insurance for their workers to reduce what they have to pay insurance companies for construction projects. Due to high competition and the disproportionate number of projects relative to the number of contracting firms, others try to reduce their tender prices to win the bid by ignoring the cost of complying with health and safety. Also, at the micro-level, the data show that inadequate working conditions at worksites cause 60% of injuries, whilst 16% are caused by machinery. Most of the injuries in this sector are to the youngest age group, i.e., less than 30 years old, due to meagre experience and lack of training to work on construction projects. Accordingly, the results confirm that disloyalty and absenteeism are related to mobility from the West Bank to the Israeli construction markets and the harsh and unsafe working conditions at construction sites in the West Bank.

While cost savings made by ignoring training or assigning cheap labour as well as lowering health and safety standards may have resulted in short-term productivity gains, the consequences

of these issues, such as the long-term costs associated with injuries and building failure (Photos in Chapter 8& Chapter 9), are not justifiable and reduce productivity. The contracting firms are inspired by Taylor's principles of scientific management, which are: [a] a clear division of tasks and responsibilities between management and workers; [b] use of scientific methods to determine the best way of doing a job; [c] scientific selection of the person to do the newly designed job; [d] the training of the worker to perform the job in the way specified; [e] surveillance of workers through the use of hierarchies of authority and close supervision (Taylor, 1919).

Wage disparity between workers in Israel and their counterparts in the West Bank is the most fundamental cause of labour mobility of construction workers from the West Bank to the Israeli construction markets. However, other significant internal structural factors include insecure employment conditions, casual employment relationships, job insecurity, and harsh and unsafe working conditions for construction workers working in the West Bank compared to their counterparts working legally in Israeli construction are among the leading causes of labour mobility. For instance, the construction labour market in the West Bank depends on a casual workforce (agency factor), which includes high levels of self-employment and extensive subcontracting. In addition, less than 3% of the blue-collar building workers working in the West Bank have a written contract, whether, for a limited or unlimited period, over 64% of the workers do not have any work agreement with their employers, and the remaining percentage of workers only have verbal agreements with their employers.

The construction sector in the West Bank, which is considered an informal sector, shares many of the characteristics of North African and Middle East economies in terms of poor working conditions, such as workers being at risk of losing their job and delays/ non-payment of their dues and bearing personal responsibility for their safety and the costs of their medical care. The employment conditions are unsecured. Due to the nature of temporary contracts on construction projects, workers' financial and other rights, such as vacations, are not subject to oversight and scrutiny by government agencies and the courts. As a result, workers' rights are squandered, particularly after the Social Security Law was suspended. Thus, the sector remains dispersed in legal affiliation and lacks coordination between authorities.

Furthermore, labour unions in the West Bank and the three main cities remain weak as many construction workers do not realise their advantages. Thus, construction workers are not protected from being exploited by their employers. This has resulted in second-tier workforce in the sector in terms of the skill and experience of those working in the West Bank and of having 50% of craft building workers working weekly for more than 48 hours in building sub-sectors in the West Bank, indicating skill shortages. Thus, rework due to bad quality of work have dramatically increased, and thus, strict, close and direct supervision has been imposed on labour.

Yet, labour mobility has different impacts on different governorates. For instance, the movement of labour from the West Bank to Israel has a more significant negative impact on labour productivity in the case of Ramallah governorate than in Nablus and Bethlehem, leading to a shortage of skills, especially steel fixing, tiling, and blockwork, coupled with an increase in the daily wages of skilled workers in the Ramallah governorate. Nevertheless, commuting increases the daily wages of workers in other provinces. These findings indicate that most construction is carried out in the Ramallah governorate, considered Palestine's political capital. Between 2014 and 2019, new building construction in the governorate was over 26% of the total building projects constructed in the West Bank. Therefore, the results show that the internal movement of construction workers from the southern and northern governorates is mainly towards Ramallah due to the higher daily wage offered.

Nevertheless, Israeli policies have detrimental impacts on labour productivity in the West Bank that go beyond its partial positive impact, which is evaluated in Chapter 7. The restriction of internal movement, particularly in the event of political instability, is imposed by the Israeli occupation through over 300 checkpoints in the West Bank. Therefore, Israeli checkpoints have separated the point of production from the point of labour's reproduction. As a result, the productivity of labour has decreased, and working hours have also decreased. Although construction workers are fairly educated and can learn and work in an advanced construction market, such as the Israeli ones, 1 m^2 requires 4.5 person-days to be executed in the West Bank overall, compared to 3.1 in Nablus, 3.8 in Ramallah, and 4.2 in Bethlehem, indicating low labour productivity. For instance, 1.8 person days were required to produce 1m^2 in the United Kingdom in the 1990s, where roughly twice as much labour was needed for structural trades compared to the Netherlands (Clarke & Wall, 1996).

Through controlling 60% of the West Bank area and the movement of labour and construction materials, Israeli policies play a crucial role in the structural and agency factors impacting labour productivity. The Israeli occupation has strangled the unrestricted use of building materials through the Paris Protocol and its control of all Palestinian outlets. Therefore, the construction sector in the West Bank is limited to a specific set of building materials and equipment that are allowed to be imported into the West Bank. Consequently, the working conditions on building projects become more complicated as these policies have directly impacted on the planning of construction projects and added new grounds for change orders, which is due to Israel's refusal to bring certain construction materials and equipment necessary for each project into the West Bank. Thus, there has been no significant change or development in the use of new technology in construction, in which workers remain the mainstay of enterprise productivity.

Finally, although the work in all cases tends to be more labour-intensive, the firm in Nablus has used equipment, such as the tower crane and shuttering steel framework, to increase its productive capacity. However, the skill set in all case studies is occupationally narrow and divided into more roles than in Germany (Clarke, 2006; Clarke & Wall, 1996). Thus, the socio-technical system is not considered an approach to improving labour productivity in the West Bank, indicating that productivity continues to be regarded as a technical issue.

11.5 Methodological Implications

Due to the interrelationship between construction workers' hourly wage, labour productivity, and lengthy disputes, a constructivist approach was adopted as this could assist in presenting and exploring the relationship between the hourly wage and productivity. Labour characteristics and other context-specific relevant factors were accounted for in the regression model, in which the hourly labour wage was utilised as a proxy for labour productivity at the micro level for the industry, thus using output as an abstract sign of productivity.

Adopting a mixed-methods methodology within this thesis, comprising a combination of both deductive and inductive reasoning, has helped the author to see how different realities are constituted. Conducting unbiased research with the potential to have an impact and lead to applicable recommendations requires maintaining a critical and objective perspective on the relationship between management and workers while unpacking the determinants impacting on labour productivity. Multiple case studies that focus on going beyond the individual case to

broader phenomena of interest have served as an approach to understanding the relationships between factors impacting on labour productivity.

11.6 Theoretical Implications

The thesis attempts to open the black box of the term' labour productivity' by framing it as the interplay between agency and structural determinants of the production process and treating construction labour as complementary to the machine rather than as an extension of it. The approach thus adopted is to treat construction workers not as passive victims but rather as actors to improve productivity, representing an approach that has been overlooked when, for instance, adopting technical or digital solutions to improve labour productivity.

Labour productivity stems from the interaction between labour agency and structural conditions, two ontological dimensions that reciprocally constitute each other. The thesis illustrates that labour needs to be put at the centre of the process of improving labour productivity. It is necessary to emphasise the inputs rather than just the outputs to improving labour productivity and to show how differences in the abilities of the workers account for differences in productivity levels.

Finding a novel definition and proxies for the term labour productivity should be context specific. Factors impacting labour effectiveness, including motivation, job safety, environmental factors, and physical limitations, should be taken into account when considering labour efficiency. Labour efficiency is controlled by extraneous constraints, including governmental regulations, climatic conditions, management practices, and Israeli policies. Structure and agency, as defined in Structuration theory, whose methodology is not individualistic (Hodgson, 2004), have been used to explain some of Chapter 7's findings and solve the open debate regarding the bi-directional mechanism of some results that human capital theory could not explain. Additionally, labour-power in structuration theory and technical solutions, including BIM, need to be studied in this context. Thus, as labour productivity in the sector has social, technical and economic aspects, there is a need to use theories from different human and non-human sciences.

Furthermore, labour productivity for the building construction sector in the West Bank is an anathema inasmuch as it neither leads to job security nor provides safe and secure working

conditions, such as ensuring occupational health and safety on sites and paying the workers decent wages on time. The high competition between construction firms leads to offering lower prices than the projects' estimated costs; so sacrificing the cost of implementing health and safety requirements, and thus contributing to a dramatic decrease in labour productivity by increasing the number of accidents on construction sites and early retirement of construction workers. Accordingly, health and safety should be considered as part of the effectiveness when defining labour productivity. Labour mobility, the weak legal status of labour, poor coordination between the various authorities, and inappropriate technical education, leading to a shortage of skills in the construction market, show the need for building a theory that clearly identifies productivity in the construction sector in a fragmented market.

11.7 Policy and Practice Implications

When discussing construction labour productivity, policymakers need to realise the informality of the sector and the structure and situation of its labour force. Productivity can only be improved through the efforts of people working in the industry, who ultimately determine practice and performance. The thesis shows that the strength of the employer is superior, and only a tiny percentage of Palestinian construction workers working in the West Bank are employed with a contract, contribute to the pension fund and have annual paid vacation. Therefore, improving the enforcement of labour legislation is an urgent need in the sector, particularly social security schemes.

Furthermore, fluctuations in the volume of the labour force in the sector are a direct consequence of the Israeli occupation and its policies. Although some of the economic policy responsibilities have been transferred to the PA, the restrictions imposed by Israel and the mismanagement by the PA have not led to an independent and robust Palestinian economy. As a result, the Palestinian economy is heavily distorted and fails to generate the jobs and incomes needed to improve living standards, resulting in a dramatic increase in the number of Palestinians employed in Israel and the illegal settlements (over 65% of the total workforce are working in the construction sector). Thus, the expected consequences are skill shortages in the sector as most construction workers from the West Bank do not have any formal training or technical and vocational education. Unfortunately, the industry is notorious for its low level of training and thus needs improving. Therefore, there is an urgent need to focus on vocational training and

attract students to this educational stream to solve the skill shortages in the construction labour market.

Additionally, investment by construction firms is needed to develop the existing labour force skills through on-the-job training. One possible way to reap the benefits of this investment is to implement an experienced employee retention system, which is beneficial for improving productivity over time through increased job security. Yet, the thesis shows that firms take little responsibility for resolving skill shortages and cannot establish or invest in on-the-job training schemes due to their size and financial status. Consequently, In the short term, the PA is recommended to control labour mobility from the West Bank to the Israeli construction markets. Moreover, geographical access to the TVET system, particularly the distribution of TVET institutions throughout the West Bank, needs to be improved to serve the many people living in rural areas and marginalised governorates.

On the other hand, in the long run, making skills certification obligatory and having an institutionalised industrial training system coordinated by the PA would facilitate moving from craft to occupational labour markets and solve the skill shortages problem. Formal apprenticeship training programmes are recommended to be mandated and supported by the government sector in partnership with the private sector and unions. Without these internal reforms, allowing additional Palestinian construction workers in Israel will negatively affect labour productivity as the supply of skilled Palestinian labour in the sector is reduced, and thus, skills shortages increase. Additionally, the thesis demonstrates that the obligation to implement health and safety regulations on construction sites is almost missing. Thus, the PA is recommended to take further action to guarantee optimal implementation and have realistic and feasible mechanisms to implement the regulations, such as the municipality police. Additionally, the PA could impose a clause appearing in the contract documents, which must be priced by all contracting companies submitting the bid. Expenditure for implementing health and safety requirements also needs to be factored into the budget for each construction project. It is recommended to study the economic impact of building construction accidents in the West Bank, including the direct and indirect economic damage and its impact on the financial stability of insurance companies, firms and PA budgets.

Furthermore, policymakers need to recognise that Israeli policies affect labour productivity through restrictions on the movement of labour and materials within the West Bank and their constraints and requirements on importing construction equipment and materials. Thus, the construction projects' objectives regarding time, cost, and quality should be within the boundaries of the sector's capability on the West Bank.

11.8 Limitations of the thesis

The author encountered several obstacles, which were time-consuming, during data collection at the macro level. The greatest obstacle was the lack of essential data from 1993; for instance, the Palestinian Central Bureau of Statistics (PCBS) did not begin collecting cement import data until 2006. Furthermore, sector-specific data are unavailable. To obtain the data for a particular variable, the author needed to download the reports in PDF format and read through them. Another obstacle was that most construction industry data was supplied in abstract form. The PCBS website does not have all the information required for this research, such as labour skills and labour wages by subsector. Consequently, the researcher wrote multiple emails to the PCBS requesting raw data between 2014 and 2019, which were delayed due to the coronavirus pandemic.

Due to the pandemic's lockdown and travel restrictions, the researcher could not travel to Palestine to collect primary data. Thus, the author used Zoom to conduct semi-structured interviews with responsible parties at the macro and meso levels in the West Bank. In addition, all case study data were gathered via Zoom and the researcher's email. Finally, a contingency plan to achieve the thesis aim and objectives was also made to mitigate the consequences of the pandemic.

11.9 Recommendations for future studies

This thesis intends to integrate the burgeoning political, social, and economic literature into mainstream construction industry studies, particularly those focusing on worker productivity, and to stimulate additional study and debate among academics and practitioners. Much more research and debate are needed about how the concept of labour productivity is used under similar political and economic conditions, but labour has no bargaining power through mobility to Israeli construction markets.

Future research in the area of labour productivity is recommended to focus on the definition and determinates of construction labour productivity in small, volatile and dependent economies controlled or governed by a robust economy of the occupation country:

- in the context of colonialism, for building subsectors where labour mobility is not allowed, such as the case of the Gaza strip;
- in civil and infrastructure engineering projects, such as the West Bank.
- in the context of political instability but without colonialism, as in the case of Lebanon.

In all of the research proposed above, it is recommended to test whether the hourly labour wage could be used as a proxy for productivity and to build a model using Structural Equation modelling that measures labour productivity and shows the causal relationships between variables. Research could also compare the labour markets in the West Bank and the illegal settlements and the impact of labour mobility from the West Bank to the illegal settlements on the productivity of labour in the West Bank. Research that reframes construction labour productivity and determines the factors impacting labour productivity in the informal sector within the colonisation context is also suggested.

It is further recommended to study:

- the factors impacting the productivity of mobile workers who work in the Israeli construction markets;
- the impact of Israeli policies on innovation, modular construction and adopting technical solutions to improve productivity in the sector;
- challenges that prevent applying the lean principle under the colonisation context
- the factors impacting construction productivity for other inputs, including materials, equipment and technology;
- the housing situation in Palestine and the challenges of constructing green buildings;
- the reasons for cost and time overrun in the construction projects and their link with the classification of contracting firms in Palestine;
- the link between vocational education and training and the productivity of construction labour, as well as the challenges and prospects in the context of colonialism;

- the effects of construction site accidents on labour productivity in building subsectors and the industry;
- the effects of land pricing, its registration process, and developer and investor decisions on construction productivity;
- the impact of government legislation, including labour laws, health and safety regulations, and the mechanisms suggested to enforce these, on labour productivity in Palestine;
- the factors that impact on the productivity of white-collar workers working in the building construction subsector in Palestine and how their productivity is assessed.
- the definition of the skills, their proxies, and skills gap and shortages for white and blue-collar workers in Palestine;
- the influence of contract types, procurement procedures, and supply chain strategies on labour productivity.

12 Appendices for the whole thesis

Appendices for Chapter 1

Year	Event	Impact	References
1922-1948	British Mandate	1. The British civil administration in Palestine ruled over the West Bank, the Gaza strip and the other part of Palestinian lands, currently known as the State of Israel. 2. Many construction activities were carried out in several cities such as Haifa.	Bshara, 2019; Mansour, 2006
1947	1947 UN Partition Plan (Map A-1)	3. According to Resolution 181 (II), the British mandate should terminate no later than October 1, 1948, and Arab and Jewish states should be created. 4. Neither of these two new states was to administer Jerusalem city, which according to the agreed resolution came under the administration of the United Nations Trusteeship Council. 5. However, this resolution was never implemented	United Nations Department of Public Information, 2003
1948	Nakba	6. During the first Arab and Jewish war in 1948 and 1949, much of the territory allotted to the Arab state according to Resolution 181 (II) was occupied and controlled by this new state, including the western part of Jerusalem 7. Establishment of a new state known as state of Israel 8. The dramatic transformation in building construction in Historical Palestine suddenly ended 9. Influx of Palestinian refugees have been transferred to the OPT.	Bshara, 2019; Mansour, 2006; Nathanson, 2017; United Nations Department of Public Information, 2003
1949	1949 cease-fire agreement	10. The border between the West Bank and Gaza Strip and the newly established state of Israel was called the Green Line	United Nations Department of Public Information, 2003
1948-1967	Jordanian West Bank (Map A-2)	11. The landscape of the West Bank and the Gaza strip have been affected by the influx of Palestinian refugees. 12. Jordan and Egypt ruled the West Bank, including the eastern part of Jerusalem, and the Gaza Strip, respectively 13. Different buildings and parks constructed between 1948 and 1967 in many large cities and villages in the West Bank, such as	Abdulhadi 1994; Bshara, 2019; Nathanson, 2017; United Nations Department of Public Information, 2003

Year	Event	Impact	References
		Jerusalem, Nablus and Ramallah used western architectural forms	
1967-1993	The six-days war	14. The Israeli occupation authorities totally controlled the West Bank and the Gaza strip 15. Most efforts to introduce new western architectural styles ceased 16. Many illegal Israeli settlements, by-pass roads and huge road networks were constructed in the OPT	Bshara, 2019; Nathanson, 2017
1993	The Oslo I Accords	17. Signing the peace accords known as Oslo Agreement	
1995	The Oslo II	18. Signing the 1995 Israeli-Palestinian Interim Agreement, which divides the lands of the West Bank were divided into Areas A, B and C (See Map A-3).	MAS, 2013; Roy, 2001; World Bank, 2013
2000	Second intifada	19. More tight restrictions on the movement of Palestinian people and goods internally using the checkpoints and externally via controlling all the borders. 20. Expansion of the Israeli settlements	ILO, 2018; UNCTAD, 2016
2002	Reoccupation of the West Bank	21. Reoccupation of the West Bank 22. Building the separation wall have imposed a new division for the lands on the West Bank- A, B, C, J1, H1, H2 and no-man lands (See Table A-1 and Map A-4)	Amnesty International,2019; Hanafi, 2009; ILO, 2018; UNCTAD 2016
2007	The Battle of Gaza	23. The tension between Fatah and Hamas increased after the latter won the election. The consequence of this tension was having two Palestinian governments in the OPT. Since 2007, Hamas has ruled the Gaza strip and Fatah has ruled areas A and B in the West Bank.	
2020	The Trump Peace Plan	24. It is refused by Palestinian 25. It gives Israel control over more than 50% of the West Bank lands	

Table 1A. 2: Major Events occurred in Palestine

Appendices for Chapter 6

Ch 6: Secondary

License Agreement for the Use of Micro Data
License No. (PLN2020-08-42)
Between

Palestinian Central Bureau of Statistics (First Party)	**&**	**Mr. Mustafa AbedMousa (Second Party)**

- Whereas the Palestinian Central Bureau of Statistics (Referred to hereinafter as the "First Party") is willing to allow researchers, scholars and concerned parties to derive statistical tables (from the data made available by the first party) for pure scientific studies that will be dedicated for serving the Palestinian economy and society as well as for arriving at conclusions and inferences that have significant contributions in developing the socioeconomic conditions of the Palestinian people.

- Whereas the second party, represented by:

Name:	**Mr. Mustafa AbedMousa**
Address:	**PhD Student** **University of Westminster** **35 Marylabone Road** **London NWI 5LS**
Telephone:	+(44) 7394 7092 59
Fax:	—
Email:	**w1702229@my.westminster.ac.uk**

Agreed to use raw "data" treated by the first party for purposes consistent with the data confidentiality provisions as herein detailed and pledged to work as follows:

- All individual information and data submitted to the Bureau for statistical purposes shall be treated as confidential and shall not be divulged, in whole or in part, to any individual or to a public or private body, or used for any purpose other than for preparing statistical tables.

- The Bureau shall endeavor to issue official statistical publications in aggregate tables, which do not disclose individual data, in conformity with the confidentiality of statistical data. "and whereas the second party expressed its commitment to use these data for pure scientific purposes through mere statistical processing and pledged to use available data (referred to hereinafter as "Data") only for the derivation of gross statistical tables by using the original indicators or new indicators derived from the original ones.

- Whereas the second party declared and expressed his commitment to use "data" to carry out the following tasks:

  a- Descriptive studies
  b- Modeling and Statistical Inference
  c- Secondary Analysis
  d- Feasibility studies

- Whereas the second party expressed its commitment to make the findings resulted from "data" utilization (studies, reports researches, etc) available for public use anywhere.

Thus, both parties agreed as follows:

1. The preamble to this agreement and the attached Annexes constitute an integral part hereof and shall always be read and construed as a whole for the purposes of its interpretation and implementation.

2. The first party grants the second party **Personal / Individual license** to use data described in article no. 7.

3. Data referred to in this agreement refer to any data compiled in accordance with protocol along with the various processing they were subjected to which is presented in the attached link (URL) . Included in this agreement also are the variables lists, which involves an additional limitation on data.

4. The second party is entitled according to the provisions of the license to receive the requested data as a link (URL).

5. The second party shall pay the first party an amount of (USD 000) Zero American dollar in return for the license fee, the materials listed in article no. 8 and the technical support mentioned in article no. 16.

6. The second party pledges that the utilization of "data" or any copies thereof shall be limited to the purposes agreed upon including not granting any third parties any access to these data. Restrictions applies to any data duplication or transformed setting for purposes other than meeting the requirements of the statistical programs used in data analysis.

7. Utilization of "data" or any copies thereof is limited to personal computers normally used by the second party.

8. The second party pledges not to alter the value of any observation in the original "data"; nevertheless, this does not apply on subjecting data to any processes or procedures aiming to derive new variables. The first party does not bear any professional, administrative or financial responsibility for any losses incurred as a result of changes in the variables values.

9. This license can not be assigned, ceded or transferred to another party in terms of data use or expanding use of data described in this agreement. Nevertheless, the first party may grant the second party a written approval to assign, cede or transfer the rights stipulated in the license including expansion in data use upon a request of the second party, in conformity with the requirements of public interest.

10. The second party is committed to make reference to "data" sources in all reports developed using the licensed "data". The citation shall be made as follows:
"The Palestinian Central Bureau of Statistics granted the researchers access to relevant data in accordance with license no. **PLN2020-08-42,** after subjecting data to processing aiming to preserve the confidentiality of individual data in accordance with the General Statistics Law – 2000. The researchers are solely responsible for the conclusions and inferences drawn upon available data."

11. The first party is committed to provide the second party with technical support through the electronic mail including explanations and answers to inquiries on reading or downloading data or use of related dictionaries and glossaries. This commitment is valid for two months from the date of data delivery to the second party. Inquiries and correspondence shall be directed to the first party at the following address: diwan@pcbs.gov.ps . The first party shall not process any inquiries and correspondences lacking licensee identification data and license number.

12. The first party pledges to provide the second party with an additional copy of the material described in article no. (8) for own use and upon demand. The second party shall get a 25% discount on the licensing fees for another copy. The licensing conditions and provisions stipulated herein shall apply to the additional copy license, too.

13. The first party pledges to issue the second party a license to use any similar raw data that might be compiled through services or censuses conducted by the first party within three years of the date of signing this agreement by both parties. The second party shall get a 25% discount of the cost associated with the data utilization license at that time.

14. The second party pledges to provide the library of the first party five copies of any report the second party might be issued using the data described in the license. The first party shall pay the second party for these copies based to the price prevailing in the local market.

15. The license shall automatically be null and void if the second party violates any of the conditions stipulated in this agreement. The second party pledges to return to the first party all materials received from the latter as well as to damage any additional copies (printed or electronic copies) that might be available to this party. The second party shall not be compensated for any payments he made to the first party in return for the canceled license.

16. This agreement is intended to grant the second party a license to use data described in article (7) above by the first party; without prejudice to the first party's right to issue an additional number of licenses to other parties for using data described in this agreement.

17. In cases of dispute, both parties agreed to seek a tripartite tribunal headed by a statistician accepted by both parties. The agreement is valid for five years as of the date of its signing by both parties. The first party may assure the compliance of the second party with the provisions and conditions stipulated in this agreement.

18. This agreement becomes valid upon signing it by both parties.

19. This agreement is valid for five years as of the signing date. The first party is entitled to assure the compliance of the second party with the provisions and conditions stipulated in this agreement.

First Party	Second Party
Name: Mr. Amjad Harb	**Name: Mr. Mustafa AbedMousa**
Signature:	Signature:
Date: 09/08/2020	Date: 9/8/2020

الجهاز المركزي للإحصاء الفلسطيني
الإدارة العامة لأنظمة المعلومات والحاسوب
Palestinian Central Bureau of Statistics

LFS 2014-2019

Annex No. (1)
License for Data Set

In accordance with the provision of the License Agreement for the Use of Micro Data License No. **PLN2020-08-42**, the Palestinian Central Bureau of Statistics grants the second partya permission to use data group explained in the received link while taking into account the following conditions:

1. The second party is not allowed to use data provided by the first party under this license in disclosing any private information relating to any individual. If the second party discovers by chance any private information relating to any individual, the second party should refrain from using such data and immediately inform the first party about it in writing and acts in accordance with the instructions that will be issued by the first party in this regard.

2. The second party is committed to abide by the conditions and the classification of the Personal/Individual **License**.

Ch6: Primary

A. Themes, sub-themes and potential interview questions at the Macro-level

a. **Demographic factors:** Personal and work-related characteristics (Gender, Age, Level of Education, Career / Occupation, Experience in the Construction Industry).

b. **Macro-level (External structural and Agency Factors): (30-45 mins)**

Theme	Sub-themes	Questions to be asked during the interview
1. **Defining productivity** (what is missing in the definitions)	a) Efficiency and effectiveness or other aspects (example)	i. How do you use/ measure construction productivity? ii. Do you think that the traditional definition, i.e. Output/ Input, is sufficient to define the term? Why? Why not? iii. What is the best word to define productivity?
	b) Context	i. Do the complex geography (land fragmentation, checkpoints, etc.) and political instability affect productivity? ii. Why not are these terms not reflected in the definition of the term?
	c) Sustainability and low-energy construction	i. What about other aspects related to sustainability and low-energy construction?
	d) Statistical data	i. Are you aware of the statistical data collected by the PCBS regarding the construction industry? ii. If yes, how efficient is this data for measuring, define and extract the factors impacting productivity at the macro-level? iii. What do you think is missing in the statistical data? i.e. (**What are the weaknesses of the data?)**
	e) Historical data for productivity (if any)	i. Do you have historical data for construction labour productivity? ii. If yes, how do you use these data? iii. If no, why?
2. Israeli policies and factors of production	a) Land-seize, price and infrastructure	i. How does land fragmentation, according to Oslo Accords and land-seize by Israel, affect the land's price and local construction materials?

Theme	Sub-themes	Questions to be asked during the interview
(land, labour, equipment and material)		ii. What is the effect of land fragmentation, i.e. A, B & C, on the infrastructure projects? iii. What are the effects of cost and delays in infrastructure projects on the number of building projects and investment in the construction sector? (**Some infrastructure projects need approval from the Israeli government, i.e. those that will pass through Area C but serve Areas A and B**). iv. Are the political instability and Israeli policies towards Palestinian lands in the West Bank affecting the Palestinian Authority's ability and the construction firms to carry out training courses for labour? How?
	b) local material and importing (price, availability, delivery)	i. What are the effects of Israeli policies toward lands in the West Bank on construction materials' prices? ii. Is the fragmentation of lands affecting the availability of local construction material? iii. What are the impacts of this fragmentation on the productivity of construction labour? iv. What are the effects of the Oslo Accords' economic side on the importing of construction materials? What are the effects of these Accords on the productivity of labour at the macro level?
	c) importing and investment in equipment (political instability or other reasons?)	v. What is the impact of political instability and Israeli policies on the productivity of construction labour in the West Bank regarding investment in equipment?
	d) Labour (mobility within the West Bank and into the Israeli market)	i. Is the labour mobility to Israeli markets connected to the lack of investment in construction in the West Bank? How? ii. What are the other factors that could make the labour work in Israeli construction markets? iii. What is the effect of labour mobility on Israel and illegal settlements on firms' decisions to develop construction labour?

Theme	Sub-themes	Questions to be asked during the interview
		iv. What are the effects of labour mobility on the productivity of the construction sector in the West Bank? v. How could these effects be mitigated? vi. How could the infrastructure and checkpoints impact the mobility of construction labour within different West Bank cities? vii. What are the effects of Israeli policies, checkpoints and political instability on construction workers' productivity in the West Bank?
3. Economic conditions	a. Unemployment rate	i. What are the effects of the high unemployment rate on labour development, i.e. on-job training? ii. What are the effects of the unemployment rate on investment in equipment? (The availability of cheapest labour vs investment on equipment). iii. What are the other impacts of the unemployment rate on labour productivity? (Mobility, skills of labour, employment relations).
	b. Sustainability and low-energy construction	i. What is the effect of economic conditions in the West Bank on the possibility of implementing sustainable and low-energy construction projects?

Table 6A. 3: Themes, sub-themes and potential interview questions at the Macro-level

B. Macro-level (Internal structural and Agency Factors) (30-45 mins)

Theme	Sub-themes	Questions to be asked during the interview
1. Health and safety requirements	a) Government regulations and enforcement	I. Based on your experience, are the government H&S regulations able to be implemented in the West Bank? II. What are the weaknesses of these regulations? III. How have these weaknesses affected labour productivity? IV. Does the government enforce these regulations?
	b) Accidents and their impact	I. The records show that the number of fatal deaths in the West Bank is 15per year; what are the impacts of these deaths on construction sector productivity? II. What are the main reasons for the construction accident? III. How could these numbers be decreased?
	c) Training and Personal Protection Equipment(PPE) regulations	I. Is there any training course, which covers personal and protection equipment regulations and implementation? II. How do you see construction contractors and labour responses regarding attending and implementing these regulations on sites? III. Is there any best practice? Where? IV. Who is responsible for verifying that contractors and workers comply with implementing the PPE Regulation on sites?
	d) Supervision and contract commitments	I. Is there any condition in the contract that covers the contractor's responsibilities or supervisor to apply PPE regulations on-site?
2. Formal training and education	a) Skill shortages	I. What are the effects of labour mobility on Israeli markets on the skills shortages? How could this affect the productivity of construction labour? II. What are the effects of job security of workers on skill shortages and productivity? (Direct and indirect employment relations). III. To what extent do you think that the types of contracts in the West Bank have led to skill shortages? (For example, the

Theme	Sub-themes	Questions to be asked during the interview
		contract has clauses and sub-clauses for material and final product. Is there any clause that covers the requirements of construction workers?) IV. Are the VET institutes and their facilities efficient in solving skill shortages in the West Bank? V. What are the weaknesses of these institutes? VI. How have these weaknesses affected productivity in the sector?
	b) Construction firm size	I. The statistics show that over 80% of the construction firms in the West Bank are small size. So how could the firm size affect its ability to perform training courses for its workers? II. How could the turnover from the firms and causal employment relations impacting on the training of workers? III. What are the factors that prevent construction firms from doing training courses for their employees? Is it the mobility to Israeli markets or/ and the casual employment relations?
	c) Project procurement methods and high competition	I. What are the effects of contract types and selected methods of the winner on the construction firm's ability to perform the training course? (it could be financial barriers, time barriers or both).
	d) Actions were taken to mitigate the skill shortages	I. Can on-job training be the solution to mitigate the effects of skills shortages in the sector? II. What are the constraints that could be preventing construction firms from carrying out on-job training? How could be solved? (Time, Money, employment relations).
	e) Sub-contracting	I. What are the effects of extensive sub-contracting on carrying out training courses for labour? II. What is the impact of sub-contracting on the productivity of construction labour?
3. Ageing	a) Experience	I. What is the effect of age on labour productivity in terms of experience?

Theme	Sub-themes	Questions to be asked during the interview
		II. Are the workers who have good experience able to train new entrants? How efficient will this train be? III. In different articles and reports, it has been mentioned that one of the main problems of construction productivity is ageing. Yet, other reports state that experience will improve the productivity of labour. How do we benefit from the experience without suffering from ageing problems?
	b) Ability to work and learn	I. What is the impact of age on the ability of workers to learn new things and to work? II. What are the effects of these issues on labour productivity?
4. Innovation	a) new technology	I. How could new technology improve labour productivity? II. Locally, what are the factors preventing innovation in the construction sector in the West Bank? III. What is the impact of these factors on the productivity of the sector?

Table 6A. 4: Internal Themes, sub-themes and potential interview questions at the Macro-level

C. Themes, sub-themes and potential interview questions at the Meso-level: (construction firms and municipalities)

a. **Demographic factors:** Personal and work-related characteristics (Gender, Age, Level of Education, Career / Occupation, Experience in the Construction Industry).

b. Factors at Meso-level (60-90 min)

Theme	Sub-themes	Questions to be asked during the interview
1. Defining productivity (what is missing in the definitions)	A. Efficiency and effectiveness or other aspects (example)	I. How do you use/ measure construction productivity? II. Do you think that the traditional definition, i.e. Output/ Input, is sufficient to define the term? Why? Why not? III. What is the best word to define productivity?
	B. Context	I. Do the complex geography (land fragmentation, checkpoints, etc.) and political instability affect productivity? II. Why not are these terms not reflected in the definition of the word?
	C. Sustainability and low-energy construction	I. What about other aspects related to sustainability and low-energy construction?
	D. Statistical data	I. Are you aware of the statistical data collected by the PCBS regarding the construction industry? II. If yes, how efficient is this data for measuring, defining and extracting the factors impacting productivity? III. What do you think is missing in the statistical data? i.e. (What are the weaknesses of the data?)
	E. Historical data for productivity (if any)	I. Do you have historical data for construction labour productivity? II. If yes, how do you use these data? III. If not, why?

Theme	Sub-themes	Questions to be asked during the interview
2. Health and Safety	A. Government regulations and enforcement	I. Based on your experience, are the government H&S regulations able to be implemented in the West Bank? II. What are the weaknesses of these regulations? III. How have these weaknesses affected labour productivity? IV. Does the government enforce these regulations?
	B. Accidents and their impact	I. How have you ever faced any accident on a construction site? II. What was the impact of a construction accident on the productivity of construction labour? III. What are the main reasons for the construction accident? IV. What are you doing to decrease or prevent construction accidents on sites? V. Are the formal sector better than the informal one in dealing with construction site accidents?
	C. Supervision and contract commitments	I. What are the differences between the formal and informal sectors regarding implementing H&S regulations? II. Is there any contract condition that covers a contractor or supervisor's responsibilities to apply PPE regulations on-site?
	D. Training and Personal Protection Equipment(PPE) regulations	I. Does your firm/ institute provide any training course covering personal and protection equipment regulations and implementation? II. If yes, how do you see labour responses regarding attending and implementing these regulations on sites? III. If not, what are the constraints that are preventing your firm from providing such a training course?

Theme	Sub-themes	Questions to be asked during the interview
		IV. Who is responsible for verifying that contractors and workers comply with implementing the PPE Regulation on sites? V. What are the impacts of a lack of training courses related to H&S on the productivity of labour?
3. Formal and On-job Training and Education	A. Skill shortages	I. What are the effects of labour mobility on Israeli markets on the skills shortages? How could this affect the productivity of construction labour? II. What are the effects of job security of workers on skill shortages and productivity? (Direct and indirect employment relations). III. To what extent do you think that the types of contracts in the West Bank have led to skill shortages? (For example, the contract has clauses and sub-clauses for material and final product. Is there any clause that covers the requirements of construction workers?) IV. Are the VET institutes and their facilities efficient in solving skill shortages in the West Bank? V. What are the weaknesses of these institutes? VI. How have these weaknesses affected productivity in the sector? VII. What are the factors that prevent construction firms from doing training courses for their employees? Is it the mobility to Israeli markets or/ and the casual employment relations? VIII. Is on-job training can be the solution to mitigate the effects of skills shortages in the sector? IX. What are the constraints that could prevent construction firms from carrying out on-job training? How could it be solved? (Time, Money, employment relations, Israeli

Theme	Sub-themes	Questions to be asked during the interview
		policies, investment in construction by the owner, size of the firms).
	B. Firm size	I. How could the firm size affect its ability to perform training courses for its workers? II. How could the turnover from the firms and causal employment relations impacting on the training of workers?
	C. Project procurement methods and high competition	I. What are the effects of contract types and selected methods of the winner on the construction firm's ability to perform the training course? (it could be financial barriers, time barriers or both)
	D. Sub-contracting	I. What are the effects of extensive sub-contracting on training courses for labour? II. What is the impact of sub-contracting on the productivity of construction labour?
4. Ageing	A. Experience	I. What is the mean of your workers' age? II. Do the construction sector in the West Bank suffer from ageing problems? III. How do you see the relation between productivity and experience? IV. How do we benefit from the experience without suffering from ageing problems?
5. Buildability and Design Quality	A. Quality of Design	I. Do you ever have to stop work/ wait or move to other work areas because of design problems? II. How many days per year do you lose because of that? III. What are the impacts of design quality on labour productivity? IV. What do you think can be done to reduce or eliminate the design-related problems?

Theme	Sub-themes	Questions to be asked during the interview
	B. Communication and participation in design (Teamwork)	I. How could we have better communication between the owner, designer and contractors? II. Do you think that the contractor should participate in the design? Why? III. How could contractor participation improve productivity? IV. Are you aware of different software (such as BIM)? V. Do you think such software could improve design quality and communication? VI. Is this software able to be used on sites? VII. What are the constraints that prevent your firm from using such software?
	C. Project delivery methods	I. What are the impacts of project delivery methods on design quality? II. How are delivery methods impacted by labour productivity?
6. Innovation and investment or assigning labour	A. Investment equipment	I. Do your firm invest in equipment? Why? Why not? II. What are the effects of political instability and economic conditions on your firm's decisions regarding investment in labour? III. Is it more feasible to assign a worker? Why? IV. Could we mitigate the skill shortages by investing in equipment? How? V. What are the effects of lack of investment in equipment on productivity?
	B. Construction methods	I. Are you using traditional or modern construction methods? Why? II. What are the impacts of construction methods on the productivity of labour?

Theme	Sub-themes	Questions to be asked during the interview
	C. Change in technology	I. What is the impact of changes in technology on labour productivity?
	D. Sustainable and low energy construction	I. Do you have the experience to build a green building?
7. Project size and complexity	A. Scheduling	I. Do you prepare a schedule for your projects? If not, why? II. If yes, do you follow your schedule? If not, why? III. How do you calculate the duration of each activity or project? IV. Do you think the duration assigned by the designer or PM is sufficient to complete your project? If not, why? V. To what extent do you think that the project's duration considers the project size and complexity? VI. Do you consider the availability of labour, material and equipment when you prepare your schedule? If yes, how? If not, why? VII. Do you update your plan/ schedule regularly? If not, why? VIII. When you prepare your schedule, do you consider the availability of skilled labour? If not, why? IX. How do you order the importance of time, cost, quality, and health and safety in your plan? X. Do you discuss your schedule with your employees? Why? Why not?
	B. Project financing and cash flow (how could affect labour payment)	I. Do you prepare a financial plan for your project? Why not? II. If yes, how do you assign the cost of each activity? III. Do you prepare a cash flow for your projects? If not, why?

Theme	Sub-themes	Questions to be asked during the interview
		IV. Do your workers stop work or move to other places because of late payment? V. If yes, how many days do you lose because of this? VI. If not, how do you manage to pay your labour their wages on time? VII. What are the factors impacting project financing? VIII. What are the effects of these factors on the productivity of construction workers?
	C. Working conditions and infrastructure	I. Do you ever work at a construction site with a lack of infrastructure (internet, electricity, water)? II. Do you follow the health and safety requirements when you prepare the construction sites? Why not? III. What is the effect of working conditions on the productivity of labour?
	D. Material and equipment availability	I. Do you ever have to stop work, wait or move to other work areas because you cannot get the necessary equipment for your work? For how long? II. What are the effects of this on your employees' productivity? II. If the availability of equipment is a problem, why do you think it is? (Is it a planning, financial, or political instability problem?) V. What do you think can be done to eliminate the equipment-related problems? V. Do you ever have to stop work, wait or move to other work areas because you cannot get the material needed for your work? For how long? VI. What are the effects of this on your employees' productivity?

Theme	Sub-themes	Questions to be asked during the interview
		II. If the availability of material is a problem, why do you think it is? (Is it a planning, financial, or political instability problem?) II. What do you think can be done to eliminate the material-related problems?
8. Labour disloyalty and absenteeism	A. Valuing labour (Payment for labour (output or based on qualification), Training of Labour (seminars, training and on-job training), Job security (insurance and contract)	I. Do your employees have a contract? If no, why? II. Do you pay your labour based on their output or qualification? Why not on their capability? III. What are the effects of paying labour based on their output on mobility to Israel? IV. What are the effects of having/ not having a contract on labour productivity? V. Does your worker have any insurance? Why not? VI. What is the effect of job security on the productivity of labour? VII. Is formal/ on-job training given to employees? If not, why? VIII. If yes, what is the percentage of managerial/ supervision staff who have undergone a training course? What is the percentage of non-managerial staff? IX. What are the aspects that are covered by this training? X. Do you ever give your employees on-job training? Why not?
	B. Labour mobility and Direct relation or sub-contracting and employment relations (Labour only	I. Do you ever have to stop work or wait because you can not get the skilled labour you need for your work? How long? II. How did you manage to get skilled labour?

Theme	Sub-themes	Questions to be asked during the interview
	contract and subcontracting))	III. Do you give part of your work to other subcontractors? What is the percentage of your work that you always give to other subcontractors? IV. Based on your experience, what is the effect of having extensive subcontracting on labour productivity? V. As you might be aware, if there is no contract between you and labour, he/ she might leave your firm to Israel or other firms; how do you manage to make sure that your labour will not leave you? VI. What are the effects of labour-only contracts and sub-contracting and subcontracting on labour mobility? VII. What are the effects of labour mobility on Israel on productivity in the West Bank? VIII. If labour mobility is a problem, how could its effects be mitigated?
	C. Absenteeism	I. For how many hours do your labour work daily? II. If they work more than 8 hours or during the weekend, do you pay them overtime? III. What are the main reasons that make labour absent? Is it working conditions or working at other sites? IV. How do you manage to reduce the absenteeism problem?
9. Other factors		I. What are the other factors that affect labour productivity in the West Bank?

Table 6A. 5: Themes, sub-themes and potential interview questions at the Meso-level

D. Case studies: Themes, sub-themes and potential interview questions at the Micro-level: (Workers, supervisors, contractors and project managers at construction sites)

a. Demographic information

i. Personal and work-related characteristics (Gender, Age, Level of Education, Career / Occupation, Experience in the Construction Industry, the city you live in, cost and time to get to your job)

ii. Having a contract, type of contract (If applicable), having insurance, type of insurance, Experience in the present organisation, working hour per day, Overtime per day, Salary per day, Salary per day for overtime, and type of employment.

iii. Their productivity per day is paid based on output or qualification.

b. Factors at the micro-level (60-90 min)

Theme	Sub-themes	Questions to be asked during the interview
1. Israeli policies and political instability	A. Change the place of work	I. Do you ever have to stop your work, wait or move to other work areas because you cannot get into your worksite? II. How many hours a week do you lose because you cannot reach your work site? III. What are the reasons that are preventing you from reaching your work on time? IV. Do you ever have to leave your work earlier to go back to your home because of checkpoints? V. Do you ever consider changing your work or its location because of the checkpoints?
	B. Mobility within West Bank cities	I. Have you ever worked out of your city? Why? Which city? II. Do you change your place of residence? If yes, why? III. If not, how many hours and how much does it cost you to get into your job? IV. Have you refused to work out of your city? Why?

Theme	Sub-themes	Questions to be asked during the interview
2. Health and Safety	A. Regulations implemented	I. In your worksite, are the Health and safety regulations implemented? If not, why? II. Who inspects the implementation of these regulations? III. Has a government inspector ever visited any construction site you worked? If yes, when and why?
	B. Accident and stopping work	I. Do you ever have to stop work because of an accident at the site? For how long? II. What are the impacts of the construction accident on your productivity? III. Does your firm provide the workers with PPE? If not, why? IV. What are the main reasons for the construction accident? V. What are you doing to decrease or prevent construction accidents on sites?
	C. Personal Protection Equipment (PPE) and worksite safety training provides	I. Do you ever attend a training course related to health and safety? II. If yes, who will organise that training? III. Does the construction firm provide you and your colleagues with any training related to personal protection equipment? IV. How do you order the importance of time, cost, quality, and health and safety? (Are you willing to put health and safety first, even if that means longer workdays) V. Safety is fundamentally vital on all construction sites. How do you ensure that the areas you work on are secure for you and your colleagues? VI. Are there any restrictions on accessing the construction sites? VII. Do you notice any change in health and safety requirements at the site because of the Coronavirus? If yes, what?
3. Availability of materials and equipment	A. Material and equipment availability	I. Do you ever have to stop work, wait or move to other work areas because you cannot get the necessary equipment for your work? For how long? II. What are the effects of this on your productivity? What are the impacts of this issue on wages?

Theme	Sub-themes	Questions to be asked during the interview
		III. If the availability of equipment is a problem, why do you think it is? (Is it a planning, financial, or political instability problem?) IV. What do you think can be done to eliminate the equipment-related problems? V. Do you ever have to stop work, wait or move to other work areas because you cannot get the material needed for your work? For how long? VI. What are the effects of this on your productivity? VII. If the availability of material is a problem, why do you think it is? (Is it a planning, financial, or political instability problem?) VIII. What do you think can be done to eliminate the material-related problems?
	B. Israeli policies and Internal issues	I. What are the effects of checkpoints and Israeli closure on the availability of material and equipment on-site? II. What are the main reasons for the lack of material and equipment? Is it a planning problem, financial problem or political instability problem? Why?
	C. Investment in equipment	I. Are construction firms investing in equipment? Why? II. What are the impacts of investment in equipment on the productivity of construction labour?
4. Labour Disloyalty and absenteeism	A. Labour mobility	I. Have you ever worked in Israeli markets? Why? II. If the answer is Yes, could you please let me know for how long did you work in the Israeli construction market? Where did you work, Israel or Illegal settlements? What was the last wage you got while you were working there? III. Have you ever left the construction company you work for another company? Why?
	B. Job security	I. Do you sign a contract with your employer? If not, why? II. What is the type of this contract? III. Do you have any insurance? Why not? IV. What are the effects of having / not having a contract that is related to output on labour productivity?

Theme	Sub-themes	Questions to be asked during the interview
		V. What is the impact of job security on labour performance? VI. Is there any relation between labour mobility and job security? How?
	C. Valuing labour	I. How much do you get paid per day? II. Is the payment differ with gaining more experience or attending training courses with a certificate? III. If you work overtime or during the weekends, does your employer pay you any overtime?
	D. Absenteeism	I. Have you ever been absent from your work? If yes, for how long? II. What are the main reasons for being absent? III. What can an employer do to reduce absenteeism?
	E. Participation in decision making	I. Are you empowered to make significant changes to construction methods or design? If yes, how II. If not, why not?
5. Labour qualifications and skill	A. Skills required	I. What skills and knowledge that you need to work in the construction sector? II. How did you gain these skills?
	B. Training	I. Do you ever attend seminars or have access to company-sponsored training? If not, why? II. If yes, when? III. What are the skills gained in this training? IV. Does the employer offer you a training course? If yes, is it on a regular basis? If not, when was the last training course you attended? How long was the training course? V. Does the employer offer you on-job training? When? VI. Does the employer pay any leave, such as sick leave and vacation? VII. Do you ever attend on-job training? VIII. Are you able to transfer your skills to others? How?
	A. leadership qualities of the supervisor	I. Are the supervisors supporting workers on site? How?

Theme	Sub-themes	Questions to be asked during the interview
6. Supervision and communication		II. Does the supervisor give clear directions for the job to be performed? III. What are the main strengths and weaknesses of the supervisors?
	B. Communication	I. Do the supervisors involve workers in decision-making? How?
7. Planning	A. Time Scheduling for the project	I. Are you allowed enough time to complete the work allocated?' If not, how did you manage to finish on time? II. Do you prepare a schedule for your projects? If not, why? III. If yes, do you follow your schedule? If not, why? IV. How do you order the importance of time, cost, quality, and health and safety in your plan? V. Does the supervisor /contractor discuss the schedule with labour? VI. If yes, are you empowered to make significant changes in planning and method of construction?
	B. Integration and team working	I. There will be several subcontractors and labour in the construction project. Do you communicate with them before starting your work? II. If there is a problem that might affect your work, how do you communicate with other participants? III. Are you aware of software that could facilitate communication within the team and with other participants?
8. Buildability and design quality	A. Ability to understand drawings (Complexity and Clarity of drawings)	I. How familiar are you with reading and interpreting blueprints and construction drawings? II. Does the supervisor discuss with you the drawings before starting the activity? III. Are the drawings clear and easy to be followed? IV. Do you ever have to stop your work/ wait or move to other work areas because you cannot understand the drawings? For how long?
	B. Rework	I. Do you ever have to stop your work/ wait or move to other work areas because of the drawings' errors?

Theme	Sub-themes	Questions to be asked during the interview
		II. How many hours a week do you lose because of errors in design? III. Do you ever have to stop your work/ wait or move to other work areas because of the owner's changing orders? IV. How many hours a week do you lose because of the changing orders in design? V. Is there any reworking? If yes, how could 'rework' be reduced or eliminated? VI. Do you think labour and contractor should be involved in the design stage? VII. What is the other reason for rework? VIII. What are the impacts of rework on the productivity of construction labour?
	C. Method of construction	I. Do you ever participate in choosing the method of construction? II. What are the effects of the methods of construction used in this project on your productivity?
9. Working conditions	A. Weather condition	I. What are the impacts of weather on your productivity? II. Do you ever have to stop work because of the weather conditions? III. How many days do you lose per month because of weather conditions? IV. Do you consider the effect of weather on planning? If not, how do you manage to finish on time, especially in winter?
	B. Overtime and working hours	I. How many hours per week do you work? II. Why are your weekly hours above or below 40 hours? III. What is the impact of long working hours on your productivity? IV. Does the employer pay you extra money for your overtime? If not, why?
	C. Payment (Salary)	I. What is your daily wage? II. Is your salary based on your output or qualification and work experience? III. Does your salary change with the experience gained?

Theme	Sub-themes	Questions to be asked during the interview
		IV. Have you ever not been paid for work done? V. Do you ever have to stop work or move to other work areas because of your employer's delay in payment? VI. What are the impacts of delayed payment on your output?
	D. Transportation, infrastructure and other facilities	I. How often do you have to work away from home? Why? II. How much do you pay to travel to work? III. How many hours do you spend each day getting to your site? IV. What are the effects of time and cost you spend daily on your output? V. What are the site hours? VI. Do you have the internet, electricity, water and other facilities on-site? VII. How much time is involved in travelling each day? VIII. Why/why not mobile within the West Bank? IX. Do you follow the health and safety requirements when you prepare the construction sites? If not, why not?
10. Definition of productivity	A. Efficiency and effectiveness or other aspects (example)	I. How do you use/ measure construction productivity? II. Do you think that the traditional definition, i.e. Output/ Input, is sufficient to define the term? Why? Why not? III. Do you think that the definition should include terms such as qualification, skills and quality of work? Why? Why not? IV. What is the best word to define productivity?
	B. Context	I. Do the complex geography (land fragmentation, checkpoints, etc.) and political instability affect productivity?
	C. Sustainability and low-energy construction	I. Are you aware of sustainable and low-energy construction?
	D. Historical data for productivity (if any)	I. Do you have historical data for your output? II. If yes, how do you use this data? III. If not, why?

Theme	Sub-themes	Questions to be asked during the interview
	E. Other aspects	I. What are the other aspects that should be considered while discussing productivity?
11. Other factors		I. What are the other factors that affect labour productivity in the West Bank?

Table 6A. 6: Themes, sub-themes and potential interview questions at the Meso-level

Variables	(1) No Exp
1. Skills	0.0466***
	(0.0142)
Age	0.0107***
	(0.000334)
Education	0.00495***
	(0.00128)
1. Legal status	-0.0214**
	(0.00844)
1. Work condition	0.0869***
	(0.0120)
1. Job satisfaction	-0.129***
	(0.0144)
1. Israeli policies	0.160***
	(0.0173)
1. Mobility IS	0.816***
	(0.00811)
2. Firm size	0.0350***
	(0.00819)
3. Firm size	0.0605***
	(0.0109)
4. Firm size	0.0245**
	(0.0122)
2015. year	-0.0293**
	(0.0129)
2016. year	0.0525***
	(0.0131)
2017. year	0.0741***
	(0.0129)
2018. year	0.153***
	(0.0127)
2019. year	0.191***
	(0.0130)
Constant	2.429***
	(0.0252)
Observations	16,352
R-squared	0.538
Robust	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A7. 3: Regression Analysis results after dropping off the Experience Factor

Variables	**Non-linear effects**

1. Skills	0.0511***
	(0.0140)
Age	0.0319***
	(0.00220)
Age^2	-0.000342***
	(2.98e-05)
Experience	0.000945***
	(0.000111)
$Experience^2$	-8.92e-07***
	(3.06e-07)
Education	0.00781
	(0.00623)
$Education^2$	-9.57e-05
	(0.000308)
1. Legal Status	-0.0282***
	(0.00830)
1. Working conditions	0.0754***
	(0.0117)
1. Job satisfaction	-0.131***
	(0.0144)
1. Israeli Policies	0.157***
	(0.0167)
1. Mobility to Israel	0.806***
	(0.00802)
2. Firm size	0.0262***
	(0.00811)
3. Firm size	0.0515***
	(0.0108)
4. Firm size	0.0202*
	(0.0119)
2015. year	-0.0246*
	(0.0127)
2016. year	0.0656***
	(0.0129)
2017. year	0.0904***
	(0.0128)
2018. year	0.164***
	(0.0126)
2019. year	0.204***
	(0.0128)
Constant	2.059***
	(0.0507)
Observations	16,352
R-squared	0.551
Robust	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A7. 4: The results of Regression Analysis for the non-linear relationship between Age, Experience and Education, and log Building Labour Productivity

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