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THE IMPACT OF DESIGNATED INDUSTRIAL ZONES ON EGYPT'S MANUFACTURING SMES

Name: Samaa Allam

Supervisor: Paula Nagler

Specialisation: Urban Competitiveness and Resilience

Country: Egypt

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Student number: 319135

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Institute for Housing and Urban Development Studies of Erasmus University Rotterdam

Summary

This study aims to investigate the relation between productivity and internationalization of small and medium-sized manufacturing firms in Egypt, and their location in designated industrial zone (DIZ). This is done using firm-level data from the World Bank's Enterprise Survey for the year 2016. First, the factors that drive firms to locate in DIZs are identified. Then the dependence of these factors on the geographical location of the firm and the manufacturing sector it belongs to is analysed. The extent to which these firms achieved their perceived benefits from clustering there is then estimated. Finally, the impact that these DIZs have on SME's labour productivity and export intensity is assessed. The study shows that several factors influence firm location in/outside of DIZs such as region, sector, firm age, gender of the manager if it has/had been owned by government officials. There is evidence that most firms have not achieved some benefits that should come from locating in DIZ such as land access and government facilitation; however, other benefits are achieved such as proximity to markets where they are more probably operating in the national level if they're located in DIZ. Finally, the results imply that DIZs do have a significant effect on firm productivity as well as export intensity; however, it is worth taking into consideration the region and sector in which they operate.

Keywords

SME, Clustering, Industrial-Zones, Manufacturing, Productivity, Internationalization

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Abbreviations

CAPMAS	Central Agency for Public Mobilization and Statistics
DIZ	Designated Industrial Zone
EFTA	European Free Trade Association
EIDS	Egypt Industrial Development Strategy
ES	World Bank Enterprise Survey
GAFI	General Authority for Investment & Free Zones
GAFTA	Grain and Feed Trade Association
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
HR	Human Resource
IDA	Industrial Development Authority
IHS	Institute for Housing and Urban Development
INV	International New Ventures
MFP	Multifactor Productivity
MTI	Ministry of Trade and Investment
NUCA	New Urban Communities Authority
OLS	Ordinary Least Squares
R&D	Research and Development
QIZ	Qualifying Industrial Zone
SME	Small and Medium Enterprise

Table of Contents

List of Figures

List of Tables

1 Introduction

1.1 Background

Egypt's Small Enterprise Law was issued in 2004. This law directly affected small and medium enterprises (SMEs) which gained a lot of attention when the national strategy declared the necessity for developing microfinance industries. In this type of industry sustainable financial services are promoted for lower market segments (Mokhtar and Abdelwahab, 2014). Even though SMEs became a major force to recon for the national economy, they still face many obstacles, especially those related to their internationalization where they have few highly concentrated exports. It is estimated that only 17% of SMEs manage to export (Loewe, Al-Ayouty, et al., 2013).

Aligned with the previous, a lot of efforts were made in Egypt toward trade liberalization, facilitating exports, removing barriers, and simplifying customs procedures. However, it has been argued that these liberalization policies only resulted in favoring larger firms and restraining the less competent and smaller ones. As more foreign firms entered the domestic market, local firms were left with the ability to compete in only one of two cases: if they are lowest-cost producers of a variety of products that no foreign firm could supply more efficiently; and/or if they export under the same principle. Thus, trade liberalization can lead to either the internationalization of the most productive domestic firms, or the exiting of the least efficient ones, or both. It may also lead firms to increase their individual competitiveness or to use their limited size to complement larger firms (Elewa, 2019).

Accordingly, SMEs became subjected to fierce competition and industrial policies started targeting SMEs fragmentation problems by shifting to a more inclusionary framework using policy-led industrial clusters (Elkhishin, 2018). This framework started emerging in the seventies, with three new cities being built on the outskirts of greater Cairo[1]. Later, these industrial zones attracted small and medium enterprises (SMEs), by providing them with small industrial units[2] with cheaper rents (Mounir, 2018).

In this study, I look at the influence of these policy-led clusters on productivity and internationalization of SMEs located in them. The study is quantitative using Probit models and multiple linear regression model on secondary data from the World Bank Enterprise Survey for the year 2016. First, I analyse factors that drive firms to locate in designated industrial zones (DIZ), and then determine if firms have achieved their perceived benefits from clustering there or not. Additionally, investigate whether a firm's location in DIZ has a positive or negative effect on their productivity and internationalization.

1.2 Problem Statement

Clustering of firms has shown to be an efficient policy to strengthen the national economy worldwide, however its impact on SMEs is not fully examined especially in emerging economies (Karaev, Lenny Koh, et al., 2007). Clusters – which are simply defined as "a group of related or linked firms in a well-defined geographical area" (Hassan and Abu Talib, 2015, p. 525) are viewed as an antidote for the size limitations of SMEs. Two types of industrial clusters usually exist spontaneous traditional clusters that grow because of existing surrounding factors, and policy-led clusters that grow based on national development policies. The latter, which I tackle in this research, has been a debate for years between researchers, some see it

1 Greater Cairo is the largest metropolitan area in Egypt composed of Cairo governorate which is Egypt's capital, and Giza governorate.

2 Industrial units are either empty land slots or built-up area with connected infrastructure and services.

necessary (Porter, 2007), while others believe it has several adverse effects (Brakman and van Marrewijk, 2013).

The impact that policy-led industrial clusters have on the productivity and internationalization of SMEs allocated in them, is a topic that is discussed to a very limited extent in Egypt. Many studies were done using the World Bank Enterprise Survey (ES)[3] regarding firm productivity, and export activity in the light of political instability, corruption, trade openness, and innovation (see (Wagner, 2017, Aboushady and Zaki, 2016, Francis, Hussain, et al., 2018, Abdelgouad, 2016, Márquez-Ramos, Martínez-Zarzoso, et al., 2012). However, all previous studies used data from 2004 to 2013 surveys, and to my knowledge, none was made using the most recently published data for the year 2016. Moreover, the influence of policy-led industrial clusters on SMEs in Egypt is a topic hardly ever discussed, only one study has taken in consideration the location of firms in DIZ as a control variable when linking firm productivity and exports (Kiendrebeogo, 2014). Another author looked at the industrial land allocation and licensing but using qualitative methods of analysis (Elkhishin, 2018).

1.3 Research Objectives

The research objective is to investigate the influence of the policy-led industrial clusters (DIZ) on the performance of SMEs and to examine whether in fact these zones are beneficial for SMEs or not. First, I aim to investigate the pre-conditions that lead firms to initially allocate themselves in DIZ and to find out if they differ from firms located elsewhere. And secondly, to investigate the perceived influence of those clusters on firm productivity and internationalization.

1.4 Research Question

To what extent does the location of manufacturing SMEs in DIZ influence their productivity and internationalization?

1. What are firm characteristics and perceived agglomeration benefits that drive firms to locate in DIZ?
   a) Do they vary according to the region in which the firm operates?
   b) Do they vary according to the sector in which the firm operates?
   c) Do they vary between small, medium and large firms?
2. How does the SMEs location in DIZ influence their productivity?
3. Does their location in DIZ have an influence on their internationalization?

1.5 Significance of the Study

The study adds to the existing literature on the constrains, limitations, as well as driving factors to SMEs in Egypt. It mainly addresses the influence of DIZ on SMEs, since cluster-based industrial development is a focus in Egypt's Vision 2030[4]. It comes hand in hand with the government plans of developing new industrial zones that: create employment opportunities, increase sector's value, and attract manufacturers aiming to export. Based on this plan, the government declared introducing 10 new industrial zones in Upper Egypt supported by the World Bank, and another 50-year deal with Russian authorities to establish a 5 million square meters industrial zone in Suez port[5]. That being mentioned, the country's industrial development policy is strongly aiming toward more industrial zones, and while these policies might be beneficial for larger firms and multi-national investors, its influence on SMEs has not yet been fully examined. Moreover, there's a paucity of data as well as literature regarding this topic in Egypt.

[3]The Enterprise Survey is collected on private non-agriculture firms operating in manufacturing and service sectors.

[4] http://arabdevelopmentportal.com/publication/sustainable-development-strategy-sds-egypt-vision-2030

[5]https://oxfordbusinessgroup.com/analysis/room-build-industrial-zones-attract-new-manufacturing-capacity

1.6 Scope and Limitations

In this study, I will be using the World Bank Enterprise Survey, where SMEs are classified into small, medium, and large firms. In this case large firms aren't a focus in the study but are rather included to measure the difference between conditions of SMEs and that of large firms. The study will focus on non-agricultural manufacturing industries and will deal with the 27 governorates as classified into five major regions in Egypt (see Annexes). Some types of firms are excluded from this research, such as those in services or in the informal sector.

Additionally, the study was limited to comparing between firms that are located inside or outside DIZs, because the available data isn't differentiating between firms located in traditional clusters, un-clustered firms, and firms located in free zones. Meaning that the scope of the results doesn't cover the general clustering of firms' concept, or the difference between different type of firm clusters in Egypt, but rather the influence of DIZ on a firm's productivity and internationalization.

The study allows for a broad investigation of various dimensions regarding SMEs in Egypt, since the sample is taken on the national level; and from all manufacturing sectors. However, there are some limitations in this study: first, the scarcity of literature on the topic of policy-led clusters and their impact on SMEs in Egypt, limits the possibility of having conclusive analysis of the findings within the national context. Second the limited number of the surveyed samples may hinder the depth of this stud. As in some sectors, the number doesn't exceed 65 firms, and in some regions, it doesn't exceed 85 firms. Additionally, the total number of responses from both small and medium exporting firms is less than 85 firms. This shortage in representative sample may limit the ability to have a more in-depth finding.

2 Literature Review

2.1 Industrial Zones and Urban Management

Clusters has shown to be efficient in strengthening national economies (Porter, 1990). Industrial zones, also known as economic clusters, draw both the interest of geographers in determining industrial districts and economists in addressing agglomeration economies (Yang, 2010). The location of industrial zones, influenced by market pressure, space paucity, and governmental incentives is however shifting from traditional zones to newly designated industrial zones in the outskirts of cities (Merenne-Schoumaker, 1977). They are usually followed by SMEs that strive to enhance their productivity, increase their competitiveness, complement larger firms, and connect to international market. This is done by the means of agglomeration and government facilitation (Karaev, Lenny Koh, et al., 2007). This re-allocation of economic clusters in the outskirts of already existing capital cities is usually accompanied by increased migration of workforce (Merenne-Schoumaker, 1977), leading to a vicious cycle of expanding the metropolitan areas (See Figure 1).

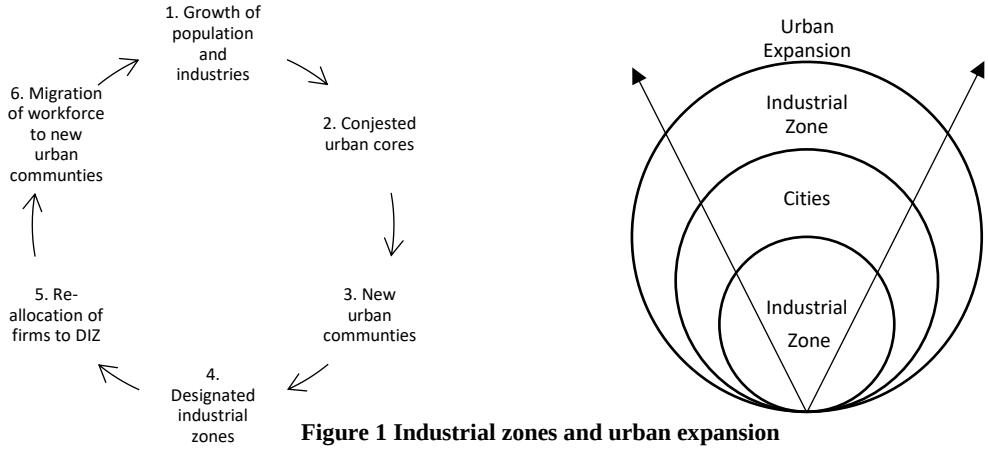

Figure 1 Industrial zones and urban expansion

These clusters and their expansion contribute prominently to urban management on several aspects. Analyzing the dynamics of these clusters lead to the understanding of local demand/supply structure of the market. This sort of understanding informs urban managers on: first, the allocation of industries, infrastructure, and land use projects; second, it assists in mobilizing urban strategies based on response to competition between industries; finally, it opens a window to examine the economic-spatial structure and the change in the city (Yang, 2010). In order to understand the dynamics of these clusters, one aspect to analyze is SMEs and the perceived agglomeration benefits that attract them to locate in clusters, a topic that has not yet been fully examined especially in emerging economies.

On one hand, studies show that a cluster with good entrepreneurial environment generates opportunities and creates conditions that attract SMEs. It accomplishes this through promoting cluster benefits such as: labour market pooling and mobility, specialized input suppliers, knowledge spillovers (Marshall, 1920), geographical proximity, competitiveness, innovation, and trust (Karaev, Lenny Koh, et al., 2007). On the other hand, some believe that aside from advantages of geographical proximity, clustering may invoke fierce market competition, regional lock-in and knowledge routines that restrict innovation, and congestion cost of increased wages, land, and housing prices (Lee, 2018). Consequently, it is hard to conclude on a general effect of industrial zones on firm performance; as the literature shows very diverse findings, which opens the door for more context-based research.

2.2 Productivity

Productivity is widely known as "…a volume measure of output to a volume measure of input use" (Schreyer, 2001, p.11). There are several ways to measure the productivity of firms and the choice between them usually depend on the purpose of study as well as the availability of data. There are two main categories of productivity measures: the first is single-factor productivity which is dependent on measuring output to a single input, such as labour or capital; the second is multifactor productivity (MFP) which measures output to a group of inputs such as labour and capital combined. Among the most used techniques is labour productivity based on gross output. This technique gives insights on the personal capacities of workers while disregarding other inputs involved in the process such as capital and intermediate inputs. All of which lead to using MFP as a more representative measurement (Schreyer, 2001).

Many studies were focused on measuring the influence of clustering on firm productivity, one study found that clustering has strong influence on labour productivity due the transfer of the know-how inside clusters in a state of collective learning that promotes innovation (Capello, 1999). Another study found that firms located in clusters are likely to be more productive because of agglomeration advantages of networks, knowledge spill overs, and human capital mobility (Madsen, Smith, et al., 2003). Not only do firms become more productive when located in agglomerations, but also their level of productivity increases significantly in larger regions which have higher total regional employment (Andersson and Lööf, 2011).

Even though, plenty of scholars discuss the influence of agglomeration on productivity of firms, a scant amount of literature is available on the influence of policy-led clusters. Industrial clusters has become a dominant national policy, as it is thought to contribute to raising productivity and innovation; however, the shortcoming in this case is that immediate results are expected which is not possible. Government facilitation is needed to promote collaboration, enhance social networks and strengthen the cluster productivity (Uyarra and Ramlogan, 2016). Some find that the cluster concept is rather fuzzy since the spatial scale of clusters changes rapidly with the fast pace of globalization. They argue that even though it has been shown that higher firm density is associated with higher productivity, the causality between them is yet still unclear, and doesn't justify cluster policies which often stimulates a cluster at the expense of another, leading to overall lower productivity (Brakman and van Marrewijk, 2013).

One study looked at both labour and total factor productivity (TFP) of large firms and SMEs in the policy-led industrial zones of the Malaysian manufacturing sector, findings indicated that even though productivity rates may vary between sectors and sub-sectors, but overall, SMEs recorded a higher average growth rate in TFP than large firms, indicating that SMEs are benefiting more of their location in industrial zones (Oguchi, Karim, et al., 2006). When looking at the relation between innovation, productivity, and the location of firms in industrial districts, Cainelli (2008) found that firms show higher productivity when located in industrial districts, and even higher productivity when there is a combined effect with product innovation which result due to rivalry between firms. These findings were found to be significant when looking at each sector/specialisation separately, except for the food industry.

2.3 Internationalization

Besides the influence of clusters on firm productivity, there are many other benefits, amongst is the internationalization of firms. Clusters usually help in: attracting foreign multinational firms; collocating with foreign firms which increase opportunity to find and join international markets; gaining the knowledge to understand international markets; and finally, operating in a well-known cluster which makes internationalization seem more feasible. Clearly, there are many clustering benefits that influence a firm's ability to internationalize; however, it was found that negative consequences may result as well. Whereas cluster grows, the ability of firms to internationalize is subjected to increased competition on and from foreign partners, which limits the access to main investors who are essential for fostering new knowledge spill overs, innovation, and consequently success (Fernhaber, Gilbert, et al., 2014).

Internationalization – including both inward and outward involvement in international business (Bhattarai, 2013) – has proven to increase the survival rate of SMEs and help them overcome domestic hurdles, by means of their foreign expansion and escaping competition with larger firms (Leonidou, 2004). It is argued that since the 1980s, and after the decolonization period, there has been a shift from trading between developing countries, into an increasing trade relation between developing and developed countries (Williams, D., 2014). That being mentioned, there is quite a resemblance between developing and developed nations in terms of export barriers for SMEs (Al-Hyari, Al-Weshah, et al., 2012).

Many strands of literature use theoretical models to explain the internationalization process of SMEs. These "…models differ in terms of their epistemological lens (i.e. behavioral sciences vs. economics), unit of analysis (i.e. firm vs. relationship), phenomenon of interest (i.e. lengthy firm development vs. smaller and younger firms)" (Osei-Bonsu, 2014, p.171). An example of these models are: the Uppsala model where firms develop into stages as they move cautiously to the closest international market (Johanson and Wiedersheim-Paul, 1975); the eclectic paradigm which discusses that ownership, location-Specific, and internalizing advantages (Dunning, 1980); the transaction cost model which is centred around minimising transaction costs by having firms develop their own internal market (Ruzzier, Hisrich, et al., 2006); the institutional model which sees that SMEs are pressured by the external environment forcing them to take a common path (isomorphism) of internationalization (Cheng and Yu, 2008); and the resource-based view model which mainly suggests that the organizational factors are the main firm's resource and it generate firms' competitive advantage and lead the way to internationalization (Osei-Bonsu, 2014).

In all the previous models, the firm takes one of many foreign market "entry modes" which is another term for venture type, both represent the form or the institutional arrangement in which a firm take when entering the international market. These forms are classified into three groups of modes: direct, indirect, and cooperative export; contractual modes, and investment modes. There is also e-commerce, as it has similar effect of exporting; however, it's not considered as a typical form of exporting (Wach, 2014). Even though there are a lot of entry modes to

internationalization markets, exporting remain the main and most simple internationalization entry mode, especially for SMEs, in many cases they would start with exporting and after having enough knowledge may get in a more complicated form such as opening a branch (Narayanan, 2015).

It's also worth mentioning that there are many barriers when it comes to internationalization. Internal barriers which are about informational, functional, and marketing barriers; and external ones covering procedural, governmental, and environmental barriers (Leonidou, 2004). Other factors influence SMEs in particular because of their size. Factors such as: new technologies, additional costs; high delivering quality standards; policy biases between small firms and larger ones; market imperfections related to inputs, labour and finance (Khazragui, 2011). Other factors that influence SMEs in multinational context are : efficiency, which states that firms gain efficiency over time which leads to more experience, less production cost, and hence better outputs; limited portfolio, which argues that small firms have limited products to offer and limited markets in which they operate; market structure which indicates that smaller firms have higher failure rate because they have smaller market segments (Williams, D., 2014).

2.4 The Egyptian Context

Egypt has over two million micro, small, and medium enterprises, employing about 75% of its labour force. SMEs in Egypt are geographically concentrated in three out of twenty-seven governorates. Most of them (60% of total firms) have sole-proprietorship, meaning that the firm is owned and run by one individual who receives all profits and has unlimited control over the firm. As for the capital value, labour, and sales, it was found that in Egypt, 83% of SMEs have a capital value of less than 250,000 Egyptian Pounds (almost 15000 USD)[6], 85.4% have less than 20 employees, and about 50.4% of them have sales turnover less than 500,000 EGP which is almost 30000 USD (El-Said, Al-Said, et al., 2014). Other significant findings driven from Ismail, Tolba, et al. (2018), is that Egypt's entrepreneurial intention comes second in 66 economies with 55.5% of Egyptians having interest in starting a business within next three years. However, Egypt comes first in business discontinuation[7] increasing from 2.7% in 2010 to reach 10.2% in 2017, and additionally, only 17% of SMEs in Egypt manage to export (El-Said, Al-Said, et al., 2014).

2.4.1 Designated Industrial Zones

There are two types of clusters in Egypt: the organic clusters which developed spontaneously without the government intervention, and the industrial zones made by the government and provided with infrastructure and services to attract firms. The latter came into recognition in 2002, when the law of special economic zones was announced, stating that projects in these zones are subjected to distinctive incentives. In 2005, the Industrial Development Authority (IDA) was established and became responsible for industrial land allocation (Elkhishin, 2018). In 2006, Egypt industrial development strategy (EIDS) was issued for IDA to manage the DIZs, provide land, and facilitate cooperation between zones. The process that the SME needs to go through to operate in one of these zones are: land allocation after going in a tender, business and commercial registering, industrial registering, preliminary approval, construction permit, and final licensing. Despite all the efforts, the cluster approach later showed a lot of deficits especially in greater Cairo and Alexandria where only un-attractive plots were remaining with high prices and no infrastructure or services (Loewe, 2013). Accordingly, cluster-based industrial development was announced to be a key pillar in Egypt's vision 2030 (Abdelaziz, El-Enbaby, et al., 2018).

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[6] Based on the central bank of Egypt 1 USD is equal to 16.75 EGP [https://www.cbe.org.eg, retrieved in 27-06- 2019]

[7] Percentage of firms that exited the market by selling or shutting down their business in the previous year to when the Global Entrepreneurship Monitor (GEM) survey was done (Ismail, Tolba, et al., 2018)

Elkhishin (2018) investigates industrial land allocation and licensing in DIZ, in the view of the new law issued in 2017 that is thought to simplify the licensing process for low-risk industries by canceling preliminary approvals for firm to start operating. However, the main finding of the research is that the government has made promising policy reforms; however, on the ground, there are contradicting legal and institutional frameworks that led to inefficient policy implementation which influence SMEs productivity negatively. There is a high level of centralization demonstrated in conflicts between five institutional sides: IDA (Industrial Development Agency), GAFI (General Authority for Investment & Free Zones), NUCA (New Urban Communities Authority), MTI (Ministry of Trade and Investment), and local governorates. Results of the research show that these policies in Egypt are supply based ones and don't necessarily reflect the demand needs of SMEs. An example of that is the "Your Licensed Factory is Ready: SME initiative" in Upper Egypt which had a very low demand from firms, indicating the vital needs of firms weren't met.

2.4.2 SMEs and Firm Productivity

A report by Loewe, Al-Ayouty, et al. (2013) looked at firms in Egypt and factors that increase targets such as sales, number of employees, etc. The authors examined factors such as entrepreneurial and firm characteristics, firm networks, and business environment. They used three different tools to capture the factors that determine upgrading of SMEs: econometric analysis of panel data from the Egypt Investment Climate Surveys 2004-2008[8], semi-standardized interviews with SME owners, and open in-depth interviews with experts. The research led to six conclusions: the increasing number of SMEs in Egypt is accompanied with large numbers of ones exiting the market; "quality education, work experience, international exposure, motivation and readiness to take risks, investment in human resources development (HRD), market research, access to finance and deficits in the rule of law" are all determinant factors of SME growth (Loewe, Al-Ayouty, et al., 2013, p.5); the age of an SME also is found to form a bell-shaped curve with its likelihood to upgrade; firms are constrained by business-state interactions as taxes, licensing, etc.; hardly any SME is part of value chains or linked vertically or horizontally with other firms; a lot depends on the capability of an entrepreneur. Some limitations to this report were noticed, such as focusing on only three sub-sectors in five governorates which come across the question to what extent can this research be generalized in the MENA region, let alone Egypt (Loewe, Al-Ayouty, et al., 2013). Another study's results also showed that intermediate imports and R&D combined, as well as skilled labour force, have positive influence on firm productivity (Márquez-Ramos, Martínez-Zarzoso, et al., 2012).

After the Egyptian Revolution in 2011, many scholars investigated the state of informality in Egypt on firm productivity. A study done on data collected from 127 developing countries including Egypt using the ES found that firms which avoid registration cost at the start-up phase of their business are most likely to have better productivity on the long run. The study also showed that the longer this period of firm informality, and until the firm reaches medium size, reflects on its future productivity(Williams, C. C., Martinez–Perez, et al., 2017). Another study investigates political connectivity using variables such as if one of the owners, managers, or directors is a governmental official, the results show that politically connected firms innovate less, and their productivity is more dependent on privileges gained from their connections (Francis, Hussain, et al., 2018).

[8] Since 2005-06, Enterprise Surveys became a replacement for Investment Climate Surveys.

2.4.3 Trade and Firm Internationalization

Exporting is a matter of "life or death" for the Egyptian economy since Egypt has a floating exchange rate system[9]. A lot of efforts in Egypt have been made toward trade liberalization. Among the measures was bringing down custom duties, charges and tariffs, where it reduced tariff rate from 21% in 1997 to 5.5% in 2009. It has also remarkably decreased customs requirements from 26 to 5 approvals in 2010 (Khazragui, 2011). Egypt also has several trade agreements: GAFTA agreement where all involved countries are fully exempted of custom duties; Qualifying Industrial Zones (QIZs) agreement with US and Israel in 2005; free trade agreement with Europe in 2007 (Loewe, 2013).

Omer, Van Burg, et al. (2015) investigated how internationalization work as a strategy for SMEs to overcome local constraints (e.g. competition, regulations, financial gaps, lack of government support, and corruption), the paper focused on exports as a moderating factor between constraints and firm growth. The results confirmed that exports can be used to overcome some local constraints such as competition, regulations and financial gaps, but it doesn't help with others such as the lack of government support and corruption. One paper investigated the choice of export mode in Egypt and tested firm factors as well as local and target market factors. They found that the first was very significant, the second had an effect but less significant than the first, and the third was insignificant (El-Gohary, Edwards, et al., 2013). Another study uses firm characteristics to explain internationalization of firms by looking at factors such as the influence of skilled and unskilled workers, level of their education, training, manager's level of education, female employment share, unionized workforce, and temporary employment. It further investigates export starters who were not exporting in previous years but started in current year and found that a firm is more likely to export if it has one of the following: higher level of skill intensity, female workers, large size, R&D departments, or owned by foreigners (Abdelgouad, 2016).

After the political instability that followed the Egyptian Revolution in 2011, some authors started looking at the influence of cronyism and investment climate on firm internationalization. A study looking at the influence of political connectivity on innovation and internationalization of firms found that non-connected firms innovate more and they're more likely to operate in international markets on contrary to connected ones that mostly operate domestically (Francis, Hussain, et al., 2018). Another study found that among the most significant factors to increase probability of a firm to export, is if a firm is owned by the government, followed by private foreign ownership. This shows how the former use their relations and position to easily overcome export barriers, while the latter manages to stand out more in facing the competition of foreign market (Aboushady and Zaki, 2016).

Several studies were done connecting innovation and internationalization. One study found that innovation serves as an enhancing factor for productivity which indirectly causes firms to enter foreign markets. However, innovation process (R&D), if not followed by product innovation then it has no influence on neither firm productivity nor exports (Cassiman and Golovko, 2011). Another paper investigated the relation between firm exporting, innovation and the use of imported inputs using World Bank Survey for years 2004 and 2007. Findings of this study showed that traders that both import and export innovate more and grow faster, followed by only exporters, and lastly non-traders (Márquez-Ramos, Martínez-Zarzoso, et al., 2012).

[9] A system where national currency fluctuates constantly as it is set with respect to a foreign currency based on the state of demand and supply.

2.5 Chapter conclusions

The number of policy-led clusters is noticeably increasing. Urban managers along with economists are either foreseeing national plans to build new clusters in the outskirts of cities or witnessing the development of already existing economic clusters. These clusters contribute to urban management in several ways, and thus analyzing their dynamics is one way forward to understand and plan for both the allocation of new urban projects as well as understanding economics of cities in term of competitiveness of industries, regions, and sectors. SMEs that strive to enhance their productivity, complement larger firms, and connect to international market, start following the footsteps of larger firms and re-locate in these clusters.

Limited studies have shown the advantages of policy-led clusters while others are against it as its thought to not have the advantage of traditional clusters and agglomeration economies such as the social structure which takes years to be built. Accordingly, literature differentiate between traditional clusters and policy-led clusters when measuring the impact of each on the productivity of SMEs. Some factors are common between the two types of clusters as a result of agglomeration economies, those are: innovation, network, knowledge spillovers, and human capital mobility. However, some factors are only relevant to policy-led clusters, such as government facilitation, the region in which the firm operates, and the sector in which it specializes. All three are subjected to cluster policies that might stimulate a cluster at the expense of another.

Clusters also influence SMEs' chances of joining international markets, since on one hand, multinational firms usually target clusters and knowledge spillovers assist firms in gaining the knowledge to understand international markets, however that is argued not to be true in policy-led clusters which may lack the social framework that drive firms to engage in sharing knowledge. On the other hand, firms can be negatively influenced by the fierce competition within a cluster over opportunities to engage in the international market. Some factors hinder SMEs to internationalize because of their small size, factors such as: policy biases to large firms, additional starting and tax costs, limited portfolio, and smaller market segments.

In Egypt, there are over two billion SMEs, with some distinctive features such as: most of them are solely owned by one person, they have highly concentrated exports, and they have a very high discontinuation rate. In 2002, the national government started providing incentives for firms and especially SMEs to locate in DIZs as a way to overcome their fragmentation problems. However due to bureaucratic procedures, SMEs had to go through a long and complicated process between several authorities in order to obtain land. Additionally, as time went by, most of the attractive plots in popular industrial zones in Cairo or in Alexandria were already taken. Some policies such as "Your Licensed Factory is Ready" promoted land slots in DIZs in Upper Egypt, but it received very low demand which showed that some policies in Egypt don't reflect the actual need of SMEs. The government introduced new reforms in 2017, ones that supposedly facilitate registration procedures for SMEs, however it was inefficiently implemented, which raised questions regarding how it negatively influences the productivity of SMEs.

There are nearly no previous quantitative studies in Egypt that looked at the relation between firm location in DIZ and productivity. However, many scholars investigated other factors that may influence the productivity of SMEs, factors such as: experience and education of top manager, firm age, skilled labour, research and development (R&D), time firms spend before being officially registered, and the political connectivity by having managers that are or were working for the government. It was also found that innovation is in many cases irrelevant to firm productivity but what is more important is privileges gained from the enterprise connections. Trade liberalization and the fierce competition within the local market drove scholars to investigate how internationalization work as a strategy to overcome local

constraints. The factors that was previously mentioned were found to also influence their internationalization, in addition to some other factors such as firm size, foreign ownership, and product innovation followed by R&D.

Finally, there are factors that influence firms located in policy-led clusters, these factors can be either encouraging or discouraging for firms' productivity and internationalization, and they can vary based on the context in which firms operate. They are classified into internal factors which are entrepreneurial and firm characteristics, and external factors that covers the enabling environment which includes market, government, and competition.

2.6 Conceptual Framework

The conceptual framework of this study is made on three different phases. The first phase looks at firm characteristics, enabling environment, and perceived agglomeration benefits that influence a firm's decision to allocate in a DIZ. Firm characteristics can be owner or manager characteristics such as experience, gender, education. Some factors are firm specific such as size, age, and sector in which firm operates. Other factors based on literature review of the local context such as innovation, informality before being officially registered, and having skilled workers. Some other factors can be driven from the enabling environment and the perceived benefits of agglomeration such as government facilitation.

Figure 2, contains the conceptual framework to this study, where the first phase contains three hypotheses, the first is that these factors may differ based on the region in which the firm operates, the second hypotheses is that they may differ based on the sector in which the firm operates, and the third hypotheses is that these factors differ based on firm size whether that is small, medium, or large. The second phase which is also the second hypothesis is to test if the location of SMEs in DIZ have a positive influence on a firm's productivity, while using the same set of pervious factors as control variables. Finally, the third phase which is also the third hypothesis, test if the location of SMEs in DIZ have a positive influence on the internationalization of firms represented by their export intensity, while also using the same factors from the first hypothesis as control variables.

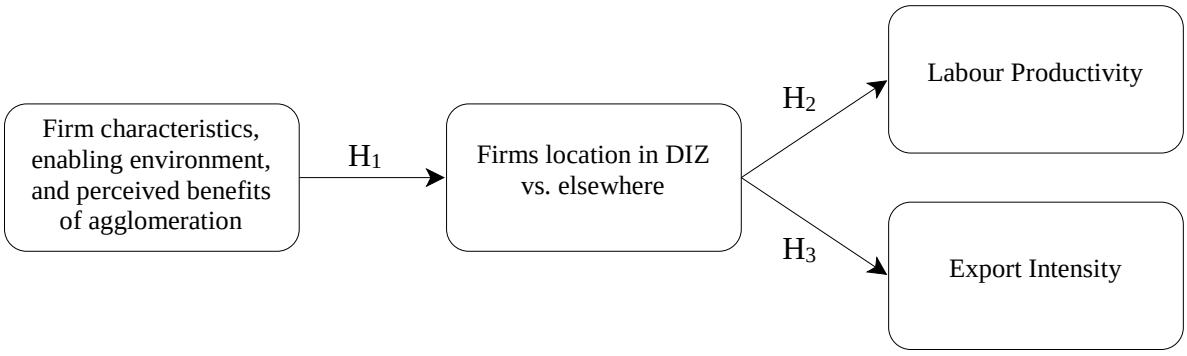

Figure 2 Conceptual framework

H_1: Firm characteristics, enabling environment, and the perceived benefits of agglomeration influence a firm's decision to locate in a DIZ

H_{1a}: These factors differ based on the region in which the firm is located

H_{1b}: These factors differ based on the sector in which the firm is located

H_{1c}: These factors differ based on the firm size

H_2: Clustering of SMEs in DIZ positively influence their labour productivity

H_3: Clustering of SMEs in DIZ positively influence their export intensity

3 Research Design and Methods

3.1 Research Strategy

In this study, secondary quantitative data will be used from the World Bank ES collected in Egypt between October 2016 and April 2017. The ES main aim is to give and overview of the private manufacturing and service sector, where it has been building a panel of enterprise data in Egypt since 2007. The data was collected using stratified random sampling, based on three criteria: sector, size, and location. A sample of 1,814 firms was collected, and after excluding 73 firms perceived as un-truthful, the sample becomes 1,741 firms. Only firms in the manufacturing sector were considered, which excludes the service sector and five firms in the extractives industry. The remaining sample is of 1,142 firms. Additionally, all questions that had less than 100 respondents, were excluded from the survey to ensure significance and generalizability.

The sample was taken in the period from October 2016 to May 2017. The survey takes place on two levels: the first is through a phone questionnaire, and the second is a face to face interview with the manager/owner/ to ensure the reliability of the information collected. As shown in Figure 3, The sample was taken from small, medium and large firms, which are firms between 5-19 employees, between 20-99 employees, and more than 100 employees. Firms with less than five employees, firms that are 100% state-owned, and informal firms were not included in the survey. The survey interviews a sample size that is large enough with levels of precision at a minimum 7.5% precision, meaning out of each 100000 firms, 120 firms are interviewed. The sample was taken on 8 regions Greater Cairo, West Delta, East Delta, Middle Delta, Suez region, Frontier, South Upper Egypt, and North Upper Egypt. However, for this study, some regions were consolidated to form five categories which are Greater Cairo, Suez region and Frontier, North and South Upper Egypt, and finally Middle and East Delta. The sample size is also consistent across almost all industries in the manufacturing sector.

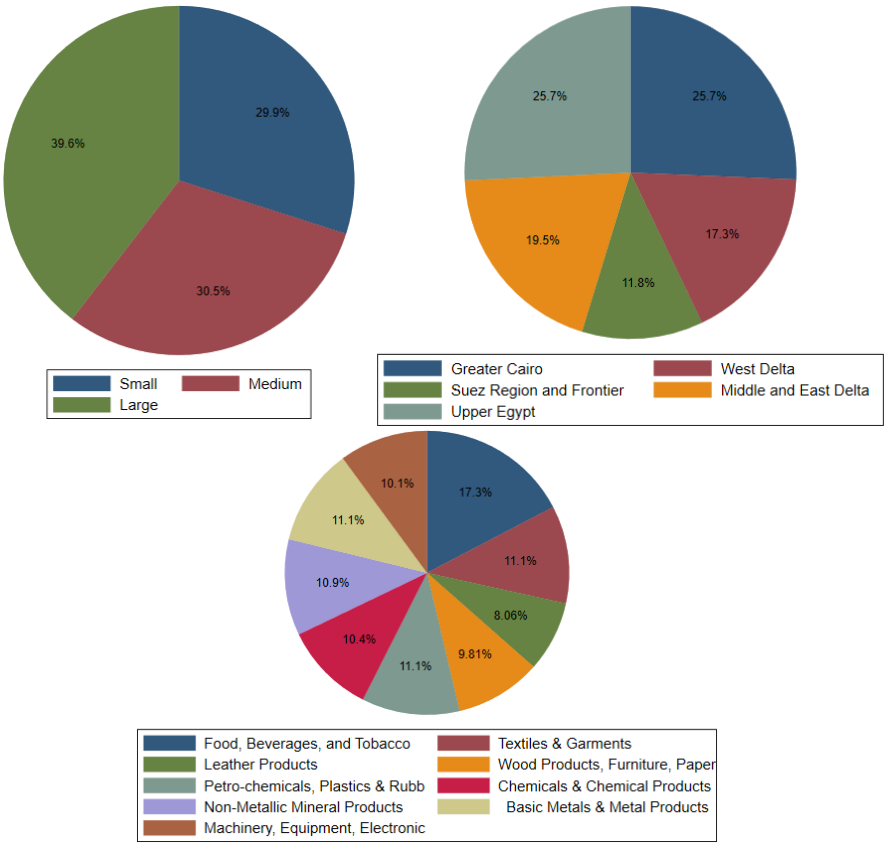

Figure 3 Distribution of surveyed firms based on their size, region, and sector

The study will be conducted on phases that build upon each other. The analysis will include first a general study on all firm sizes and will be made on each sector and each region separately to look at the broader scope first. Then the models will be replicated on small, medium, and large enterprises separately to account for specific subgroups. The large-sized firms are here used as a control group to which SMEs are compared to and thus avoid the internal validity issue that may arise when choosing only a single group of analysis. In all models of the research, the same set of control variables will be used to ensure the consistency of the analysis. For the internal consistency, variables that indicate the same concept will be grouped in new aggregate variables after running Cronbach's Alpha test (Santos, 1999). To ensure internal validity in the analysis and the conclusions, all concepts that are later used in the statistical models have been well defined in advance proceeding the measurement phase of the study, accordingly proper selection of variables and indicators has been assured.

3.2 Data Analysis

The quantitative analysis of the secondary data will be conducted in two phases. The first phase is the descriptive statistics of the main variables by showing characteristics such as industry, numbers, locations, and sizes of the complete sample as well as the percentage of exporting firms and firms located in DIZ from the total surveyed sample. The second phase is testing the three hypotheses of this study. In H_1 I want to test the hypothesis that there are factors that influence a firm's decision to locate in a DIZ. Here Probit regressions are used to explain the nature of the relationship between our dependent and independent variables. The following equation based on Stock and Watson (2006) describes the model used:

$$\Pr(DIZ_i) = \Phi(\beta_1 X_1 + \beta_2 Y_2 + \beta_3 Z_3) \qquad (1)$$

where the dependent Variable DIZ is a dummy variable that takes the value of 1 if a firm is in DIZ and 0 if otherwise, while the independent variables are classified into three groups X, Y, and Z. X represents the owner characteristics such as gender, level of education, and years of experience; Y represent firm characteristics such as firm size, firm age, sector, region, informality, firm ownership. As for the group denoted by the symbol Z, it represents the factors that are seen, based on literature, as the perceived benefits of DIZ such as land access, government facilitation, labour, network, and access to market.

In H_2 I want to additionally test the influence of the clustering of firms in DIZ on their productivity. There are several ways to measure it, I use labour productivity, which was previously used by Márquez-Ramos, Martínez-Zarzoso, et al. (2012) and Ali, Najman, et al. (2019), where labour productivity of firm i, is equal to the difference between sales and total annual cost, divided by the total number of full-time workers. To remove zero and negative values to allow for log transformation of labour productivity, the variable is winsowrized at an appropriate level. I test the influence of the clustering of firms in DIZ on the log of their labour productivity using Multiple Ordinary Least Square Regression (Stock and Watson, 2015), with the factors from H_1 used as control variables:

$$Prod_i = \frac{Total\ sales_i - Total\ cost_i}{Total\ full\ time\ workers} \qquad (2)$$

$$\ln(Prod_i) = \alpha + \beta_1 X_1 + \beta_2 Y_2 + \beta_3 Z_3 + \beta_4 DIZ + \varepsilon \qquad (3)$$

ln ($Prod_i$) is the logarithmic function of labour productivity, α is the intercept, and ε is the standard error.

In H_3 I would like to study if the internationalization of firms is also dependent on the same set of factors and their allocation in DIZ. Export intensity is first calculated by dividing the total

exports by the total sales then converting the result into percentages. For the sake of simplification, the percentages of export intensity are then put into categories and used as a dependant categorical variable in a multinomial Probit model (Stock and Watson, 2006),

$$Export\ Intensity_i = \frac{Total\ exports_i}{Total\ sales_i} \qquad (4)$$

$$\Pr\left(ExportCat_i\right) = \Phi(\beta_1 X_1 + \beta_2 Y_2 + \beta_3 Z_3 + \beta_4 DIZ) \qquad (5)$$

where export intensity is the percentage of export sales from the total firm annual sales. ExportCat is the categories for export intensity, DIZ is the main independent variable, and X, Y, Z, are control variables.

4 Research Findings

In this chapter, findings of this study are ordered as following: the first section includes descriptive statistics of the main dependant variables, independent variables, and the control variables as well. Then followed by the second section which include the inferential statistics to explain the influence of the independent variables on the dependent ones, using the first dependant dummy variable DIZ in 4 different Probit models: a general one of all firms in the sample, then three models based on the region, sector, and size of firms. For the second hypothesis a multiple linear regression model is used where productivity is the dependant variable, and finally for the third hypothesis a multinomial Probit model is used where the categories of export intensity is the dependent categorical variable.[10]

4.1 Descriptive Statistics

4.1.1 Dependent Variables

The first dependant variable is Designated Industrial Zone (DIZ), which is a dummy variable that takes the value of 1 if a firm is in a DIZ and 0 if not. In the sample taken, almost half of the firms are in DIZ. Figure 4, shows that the largest sample of firms taken from DIZ is of large firms, followed by medium firms, then small ones. In the surveyed sample, firms in Greater Cairo are concentrated more outside DIZs than they are inside them, more than any other region. While firms in all other regions are more concentrated in DIZ, especially Upper Egypt where 194 out of 294 surveyed firms are in DIZs. These come quite logical, since Greater Cairo is the capital and firms are most likely existing in traditional clusters in city cores, so already benefiting from agglomeration economy in more vital spaces in city centres. However, in other regions, the cities are indeed smaller and traditional clusters would be hard to find, which opens the possibility for investors to cluster in newly designated industrial zones.

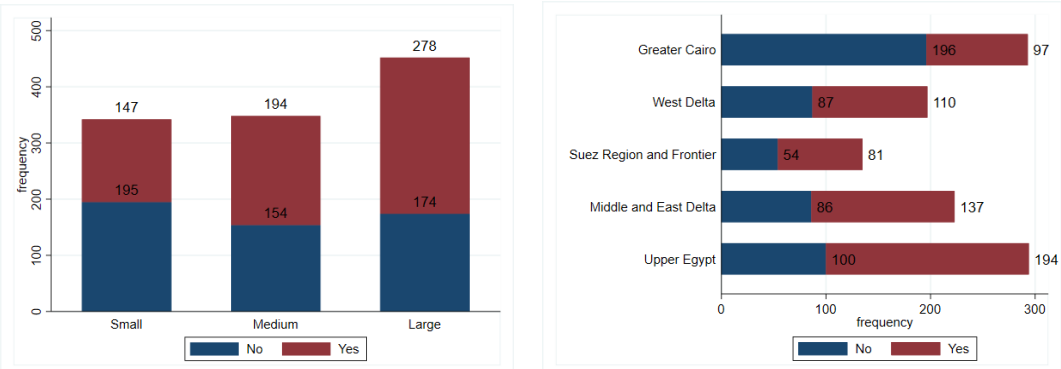

Figure 4 Distribution of firms in DIZ based on their size and region

[10] Data preparation and explanation of variables can be found in the Appendixes.

The reasons why firms locate in DIZ differs from one region to another, it also differs based on the firm size as well as the sector in which the firm operates. In general, almost 40% of firms locate in DIZ for the reduced costs and access to land, others locate there because of tax incentives and subsidies, as well as the proximity to labour, input, and market. When having a closer look on each region as shown in Figure 5, firms located in Greater Cairo, Suez Region and Frontier, and Middle and East Delta seem to locate in DIZ mostly because of the proximity to markets. While in regions such as Upper Egypt and West Delta, firms locate In DIZ mostly because of the reduced costs and free access to land. In some regions tax incentives and subsidies seem to be also important for a firm's choice to locate in DIZ.

As for firm size and sectors, the numbers show that the main reason why firms locate in DIZs vary between small, medium, and large firms. As small firms mostly locate in DIZ because of the proximity to markets, medium sized firms locate in DIZ mostly because of the reduced cost and access to land, as for large firms it is mostly because of the tax incentives and subsidies. The main reason also varies between sectors, the proximity to market is dominant in some sectors such as food and beverages, or machinery. The reduced costs and free access to land is dominant in almost all the other industries but with different levels (Refer to annexes for more details).

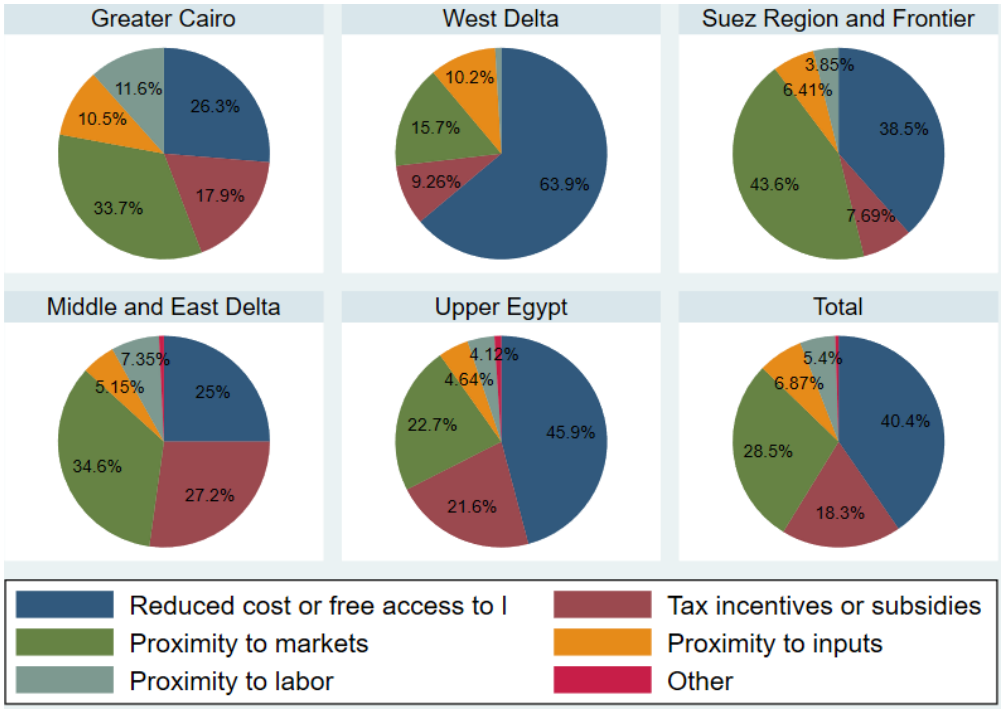

Figure 5 Reasons why firms choose to locate in DIZ based on their region

These numbers give a preliminary insight on two conclusions, the first is that the government incentives may vary based on the location of the DIZ, these incentives are most likely controlled by the nature of the region and characteristics of its population. These incentives might also vary based on the industry in which the firm specialize, where some industries may benefit from land access for example more than they would benefit from proximity to market. The second is that firms also might choose to locate in a zone because of the benefits that comes from it and not necessarily from government facilitations, so regions like Greater Cairo shape a good opportunity to integrate with the market in the metropolitan area and internationally, a good investment on the long run regardless of government facilitations. The second is that firms' needs, and facilitations of the government vary based on firms' size. However, these don't explain, if what the government supply is a reflection to what firms need based on their different conditions, or it's a top down process that firms have to conform to, making the best out of the situation.

The second dependent variable is labour productivity which is a continuous variable that was calculated by dividing the net profit by the number of full-time workers in a firm. Only 838 out of 1142 interviewed firms gave information on the total sales and costs in the last fiscal year. The variable's most values being less than 100,000 EGP per employee. The labour productivity of firms ranges from 325 to 389,000 EGP per employee per year, which is a very wide range, the median however representing the average value is almost 22,000 EGP per employee per year. Generally, a firm seem to have higher productivity if it's not solely owned by one person, has license to sell foreign product, has foreign owners, has government officials among its managers, or hadn't received any government facilitation (Refer to annexes for more details).

Figure 6 shows that the productivity of firms in DIZs varies among regions and firm sizes. Taking Greater Cairo for example, medium firms located in DIZ seem to have the highest productivity, compared to other firm sizes in same region and to medium firms in other regions. Medium firms also seem to be more productive if located in a DIZ in Middle and East Delta. When looking at small sized firms, they seem to be generally more productive when located in DIZs. Additionally, in some regions such as Suez Region and Frontier it doesn't seem to make a large difference in productivity of SMEs to be inside or outside DIZ. In Middle and East Delta, generally, it seems that firms of all sizes in DIZ are much more productive than those outside it. When looking at each sector separately, for SMEs it seems that they have higher productivity if they're in DIZs in all sectors. However, the increase in variation between firms located in DIZs and those located outside it, appear mostly in sectors such as chemicals, furniture, textiles, and leather products (Refer to annexes for more details).

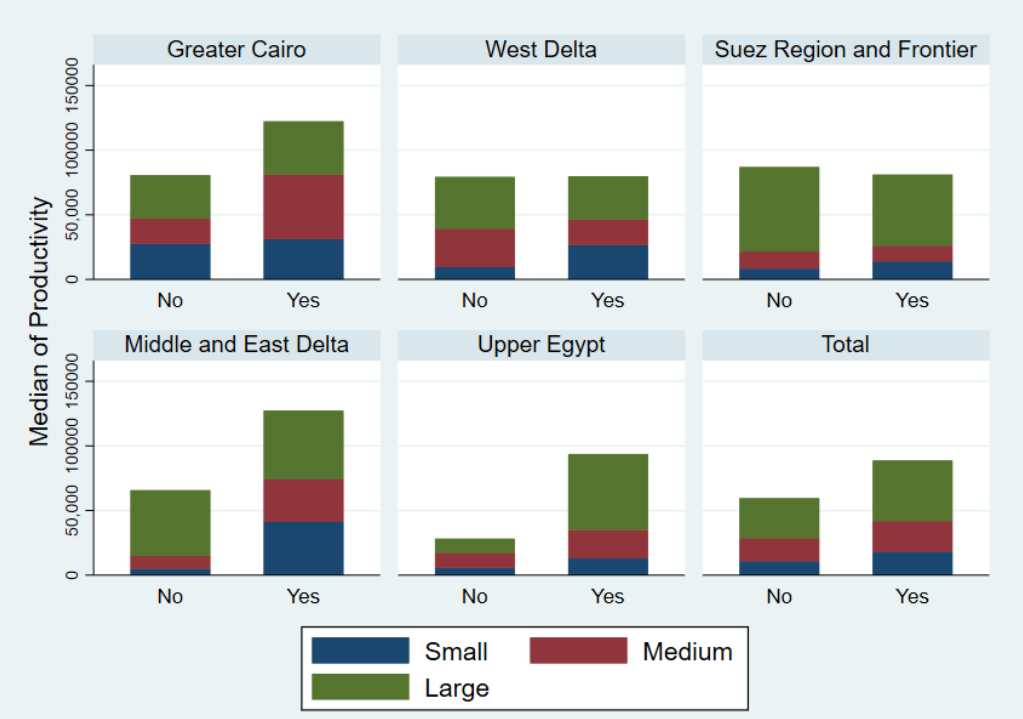

Figure 6 Productivity based on firm size and region

These numbers give some insights on the most appropriate regions and sectors for firm productivity based on their sizes. For example, overall SMEs tend to have higher productivity when located in DIZs, but for regions such as Greater Cairo and Delta region, the level of productivity is significantly higher. However, it is still unknown, based on these numbers, if firms are more productive because of their location or there are other factors that influence their productivity. These can be determined when testing through the inferential statistics at a later stage of the study, when running regressions while controlling for other variables.

The third dependent variable is Export intensity where 310 firms out of 1142 firms export, meaning almost less than 30% of firms manage to export and the majority of 70% doesn't export at all. The variable export Intensity is a categorical variable that explains firm export as a percentage of total annual sales. It has five categories, firms that export less than 20% of their annual sales, export from 20 to 40 %, export from 40 to 60%, and firms that export more than 60%. Figure 7 shows that most exporting firms are in DIZ, in regions such as Greater Cairo and Upper Egypt, most firms tend to export less than 20% of their total annual sales. While in regions such as Suez Region and Frontier, and Delta, firms tend to export more than 60% of their total annual sales.

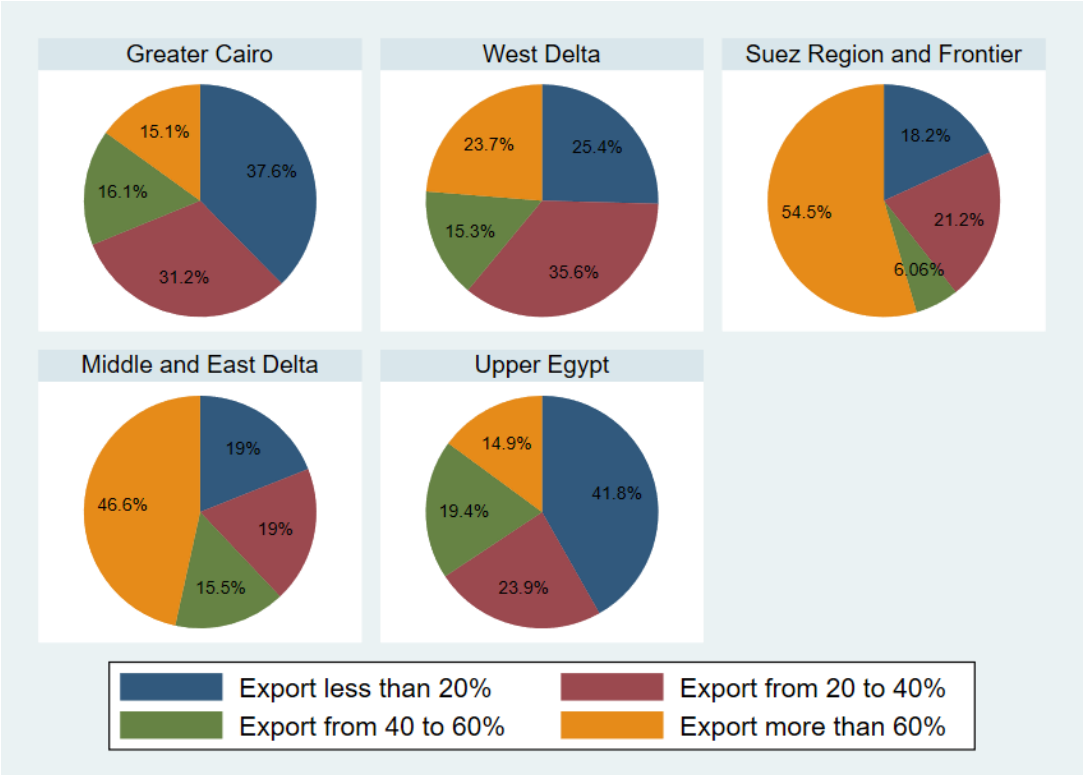

Figure 7 Categories of export intensity based on region

4.1.2 Independent Variables – perceived benefits

The independent variables here are the set of perceived benefits from agglomeration of firms in DIZ, which are five variables as shown in Table 1: the first is if the firm perceive land access as an obstacle or not where 32% of the surveyed firms – regardless of their location – find it to be an obstacle; second if the firm had any government facilitations, where almost half of the firms have benefited from one or more of government facilitation while the other half hadn't; third is the number of skilled workers which is a continuous variable that ranges between 0 to 3000 employees, however, the mean is 82 workers while the median is only 15 indicating that there are some large outliers; fourth is the main market which contains three categories of local, national, and international, the majority of 57% of firms operate nationally, followed by 36% of firms operating locally, and only 7% operating internationally; And finally, the network variable which indicates if a firm finds it easy to switch suppliers has a mean of 60% of firms that do find it easy to switch suppliers.

Table 1 Summary statistics of independent variables

Variable	Obs	Mean	Std.Dev.	Min	Max
LandAccess	1100	.32	.47	0	1
Government Facilitation	1,134	.51	.50	0	1
SkilledWorkers	1063	81.9	217.6	0	3000
Main Market	1089	1.71	0.59	1	3
Network	1138	.61	.49	0	1

4.1.3 Control Variables

The control variables in this study are divided into two groups: the first group is the manager characteristics which is the managers education, experience, and gender; the second group is the firm characteristics such as the region and sector in which the firm operate, firm size, firm age, if firm is owned by one person or more, if it has or had any government officials among its owners, if the firm has operated unofficially before its registration or not, if the firm is innovative or not, finally if a firm has license to sell foreign commodity.

Table 2 gives an overview of these variables: Region, sector and firm size are categorical variables, firm size and firm age are continuous variables, and all the others are dummy variables. It is worth noting that in this study the focus will not be on the allocation of firms in general in DIZ, but rather the allocation of small and medium-sized enterprises. Accordingly, the focus in this study includes specifically, not the 1142 interviewed firms, but rather the total of 690 SMEs. In this case, as clarified in the scope section, large firms aren't a focus in the study but are included to measure the difference between conditions of SMEs and that of large firms.

Table 2 Summary statistics of control variables

Variable	Obs	Mean	Std.Dev.	Min	Max
Region	1142	3.1	1.56	1	5
Sector	1142	4.7	2.7	1	9
Firm_Size	1142	2.1	.83	1	3
Firm_Age	1133	26.1	17.2	2	85
Manager_Experience	1132	22.3	10.9	2	50
Manager_Education	1141	.77	.42	0	1
Manager_Female	1138	.045	.21	0	1
Sole_proprietorship	1142	.29	.46	0	1
Franchising	1090	.12	.33	0	1
Government official	1139	.06	.23	0	1
Informality	1130	.08	.27	0	1
Innovation	1142	.059	.23	0	1

4.2 What factors drive firms "in general" to locate in DIZ?

The aim of this model is to look generally at why firms locate in DIZ, including both SMEs and large firms. The following table was concluded after running a Probit regression, then estimating the marginal effect of the output to allow for interpreting both the significance and the value of each indicator that may influence a firm location. The table contains three models: the first and the second contains control variables, while in the third model, the main independent variables are added. The latter has a high chi-squared yielding a p-value of 0.000 meaning at least one variable is significant. In these three models, the factor variables for regions and sectors weren't used, as the main aim of the models in Table 3, is to test whether the control variables and the main independent variables are generally significant to a firm's location in a DIZ. However, in later models the factor variable will be used.

Table 3 shows that both the region and the sector are very significant at 1 percent level, to whether a firm is in a DIZ or not, implying that the choice of a firm's location in DIZs is highly influenced by the sectors and the regions in which they operate. The data shows that firms are more likely to be in a DIZ if compared to the two base categories of region and sector: Greater Cairo, and the food, beverages and tobacco's sector. The former was in fact shown in the descriptive statistics, as surveyed firms from Greater Cairo are mostly located outside DIZs. The latter was mentioned in Cainelli (2008), who found that firms show less productivity when located in industrial districts in the food industry, implying that perhaps for some sectors, firms are better off being located outside DIZs. Which contradicts with Loewe, Al-Ayouty, et al., (2013) who focused on only three sub-sectors in five governorates and proposed that characteristics of SMEs in this research can be generalized to the entire MENA region.

Table 3 Marginal effects of Probit regression with DIZ as the dependent variable

	(1)	(2)	(3)
Region	0.06***	0.06***	0.05***
	(0.01)	(0.01)	(0.01)
Sector	0.02***	0.03***	0.026***
	(0.00)	(0.01)	(0.01)
Firm_Size	0.07***	0.03	0.01
	(0.02)	(0.02)	(0.02)
Firm_Age	-0.01***	-0.01***	-0.01***
	(0.001)	(0.001)	(0.001)
Manager_Experience	0.002	0.002	0.001
	(0.00)	(0.001)	(0.001)
Manager_Education	0.14***	0.11**	0.06
	(0.03)	(0.04)	(0.04)
Manager_Female	0.0985	0.08	0.12
	(0.07)	(0.07)	(0.07)
Sole_proprietorship		-0.10**	-0.08*
		(0.03)	(0.03)
Foreign_Ownership		0.09	0.003
		(0.06)	(0.06)
Franchising_Licensing		0.12*	0.097
		(0.05)	(0.05)
Govt_Official		-0.13	-0.14*
		(0.06)	(0.07)
Informality		-0.04	-0.04
		(0.05)	(0.05)
Innovation		0.01	-0.07
		(0.06)	(0.06)
LandAccess			0.035
			(0.031)
Gov_Facilitation			-0.16***
			(0.03)
SkilledWorkers			0.0001
			(0.0001)
MainMarket			0.09***
			(0.03)
Network			0.015
			(0.03)
N	1122	1066	986
Prob > chi2	0.000	0.000	0.000

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Other factors that are significant at a 1 percent level are firm age, government facilitation, and main market. The first factor is if a firm gets older by one year that decreases its probability of being in a DIZ by 0.7 percentage points, this proposes the question of why older firms prefer to locate outside DIZs, assuming older firms are more experienced and more aware of the local context of the market. These can be interpreted in many ways, for example it could be simply because they rather locate in traditional clusters, but it can also mean that they are in a state of lock in as city cores is where they have always operated, another explanation is that they have already made their functioning network that their location is no longer a factor. This can be tested in future research, but for the purpose of this paper, this can be further investigated in the section regarding the productivity of firms.

The second factor, significant at 1 percent level, is that if a firm has used any government facilitation, then its probability of being in a DIZ decreases by 16 percentage points. On one hand this is contradictory to what has been earlier mentioned in government strategies regarding encouraging SMEs to locate in DIZ to overcome their fragmentation problem, on the other hand, it comes in line with conclusions from Elkhishin (2018), that even though there are some forms of policies for SMEs to facilitate land allocation in DIZs, these policies are either mistargeting the needs of SMEs, or that the cost of going into the bureaucratic process of land

allocation exceeds what the firms can afford in this early stage. However, that is still to be confirmed in the next model when looking at each firm size separately.

Third factor is that having the main market to be national or international increases the probability of being in a DIZ by 9 percentage points, which is aligned with firms' reason of locating in DIZ for the proximity of markets, it also confirms what has been mentioned by Fernhaber, Gilbert, et al (2014), that one of the benefits that come from locating in clusters is that they work as a bridge to connect firms to international markets. Other factors that are significant at 5% level are variables such as if a firm is owned by one person or has/had an owner who is a government official which decreases the firm probability of being in a DIZ. The latter proposes the question of whether the benefits that come with DIZ are not very attractive to government officials, as they would prefer locating elsewhere, or that their privileges come from their political connectivity despite of any other factors as mentioned by Francis, Hussain, et al. (2018).

4.2.1 Do these factors vary according to the region where the firm operates?

In the following model, as shown in Table 4, regions were compared in terms of factors that influence a firm to locate in a DIZ. The results yielded a p-value of either 0.003 or 0.000 meaning at least one variable in the model is significant. It is worth noting that the base category for the sector's variable is food, beverages, and tobacco; and that for the main market is local markets. There seem to be some notable differences between regions. For example, if a firm is in the basic metals industry in Greater Cairo then it's more likely to be in a DIZ, while if it's in Suez Region and Frontier then its less likely to be in a DIZ. If a firm is in the textile industry and located in upper Egypt then its less likely to be in a DIZ by 30 percentage points, while if any other industry in same region then it's more likely to be in a DIZ. This gives an indication that even though all industries are found in all regions; however, the specialization of the available DIZs in one region will differ from another, based on the characteristics of the industry, sectors, as well as the government's allocation strategies.

However, these allocation strategies are doubtful to be in the best interest of the industries, since they are not set in an isolated bubble, but in an interlaced bundle of interests. For example, on one hand some industries are transferred into vulnerable sites, most probably in the desert, to avoid the negative impact that their wastewater disposal has on the water quality. An initiative that is taken regardless of the business interest of these industries. On the other hand, the interests of some polluting industries are protected at the expense of water quality, if these industries belong to an "elite" interest group (Luzi, 2009). Here comes the crucial role of urban managers to balance the choices made regarding the allocation of land uses based on the best interest and not the monopolistic market in which a business operates.

Government facilitation is also significant at either 5 or 10% in all regions as firms that used government facilitations are more likely located outside DIZ. Especially for Suez Region and frontier in which firms are more likely to be outside DIZ by almost 50 percentage points if they had any government facilitations. Partnerships seems to be important as well in Suez Region and Frontier, where firms that are solely owned are more likely to be outside DIZs by 17 percentage points. That percentage increase immensely for firms with foreign owners in the same region. This indicates that the government facilitations with regards to industrial development are not necessarily targeting cluster policies in some regions. This comes in line with pervious literature which found that cluster policies can stimulate a cluster at the expense of another (Brakman and van Marrewijk, 2013). It may also indicate that in some regions such as Suez Region and Frontier the landscape of the industrial development may vary compared to the rest of the country as a result of being a sea port region and having Suez Canal which

Table 4 Probit regression with DIZ as the dependent variable in five models of the five main regions

	Greater Cairo	West Delta	Suez Region and Frontier	Middle and East Delta	Upper Egypt
Sector					
Textiles & Garments	0.06	-0.03	-	-0.05	-0.30**
	(0.09)	(0.17)		(0.15)	(0.097)
Leather Products	0.29*	-0.24	-0.08	-0.12	0.28*
	(0.12)	(0.16)	(0.26)	(0.15)	(0.14)
Wood Products, Furniture, Paper	0.25*	0.07	-0.12	-0.11	0.40***
	(0.11)	(0.16)	(0.17)	(0.15)	(0.12)
Petro-chemicals, Plastics & Rubber	0.24*	0.18	-	-0.23	0.38***
	(0.12)	(0.15)		(0.14)	(0.094)
Chemicals & Chemical Products	-0.003	0.20	0.47	-0.09	0.31*
	(0.09)	(0.15)	(6.40)	(0.15)	(0.12)
Non-Metallic Mineral Products	0.41***	0.16	-0.04	-0.29*	0.42***
	(0.11)	(0.21)	(0.10)	(0.13)	(0.09)
Basic Metals & Metal Products	0.39***	0.07	-0.22*	-0.25	0.33**
	(0.11)	(0.16)	(0.09)	(0.13)	(0.11)
Machinery, Equipment & Vehicles	0.12	0.008	-	-0.043	0.49***
	(0.13)	(0.17)		(0.14)	(0.097)
Firm_Size	-0.02	-0.01	-0.12	-0.001	0.04
	(0.04)	(0.05)	(0.0687)	(0.049)	(0.04)
Firm_Age	-0.02	-0.09***	-0.012*	-0.01***	-0.009***
	(0.002)	(0.002)	(0.005)	(0.003)	(0.002)
Manager_Experience	-0.001	-0.002	0.0002	-0.0002	0.004
	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)
Manager_Education	0.02	-0.08	-0.22	0.22**	0.02
	(0.09)	(0.096)	(0.13)	(0.08)	(0.06)
Manager_Female	0.17	0.14	-0.14	0.14	0.22
	(0.12)	(0.19)	(0.15)	(0.14)	(0.15)
Sole_proprietorship	-0.02	-0.08	-0.17*	-0.06	-0.11
	(0.07)	(0.08)	(0.08)	(0.09)	(0.06)
Foreign_Ownership	-0.13	-0.07	-13.03***	0.16	-
	(0.11)	(0.16)	(2.54)	(0.18)	
Franchising_Licensing	0.13	-0.07	-0.12	0.24	0.09
	(0.097)	(0.13)	(56.4)	(0.15)	(0.08)
Govt_Off	-0.17	-0.27	-	-1.06	-0.032
	(0.12)	(0.18)		(13.6)	(0.11)
Informality	-0.12	-0.15	-	-0.05	0.13
	(0.15)	(0.13)		(0.11)	(0.10)
Innovation	0.02	-0.38*	-	-0.34	-0.018
	(0.12)	(0.16)		(0.21)	(0.11)
LandAccess	0.06	-0.08	0.099	-0.18	0.014
	(0.07)	(0.06)	(0.077)	(0.098)	(0.052)
Gov_Facilitation	-0.14*	-0.20**	-0.49**	-0.11	-0.12*
	(0.06)	(0.07)	(0.17)	(0.09)	(0.05)
SkilledWorkers	0.00001	0.001**	0.03**	0.002*	0.00001
	(0.0001)	(0.0004)	(0.009)	(0.001)	(0.00017)
MainMarket					
National	0.09	-0.05	0.018	0.05	0.0006
	(0.06)	(0.09)	(0.095)	(0.09)	(0.05)
International	0.11	0.26	-	-0.02	0.20
	(0.15)	(0.13)		(0.20)	(0.11)
Network	-0.01	0.06	0.199	-0.06	-0.008
	(0.06)	(0.09)	(0.12)	(0.07)	(0.05)
N	260	180	83	158	260
Prob > chi2	0.003	0.000	0.000	0.000	0.000

plays an important role in world trade by connecting the east to the west[11]. However, this contradicts with the government upcoming plans to build new industrial zones in Suez Region. It also raises more questions on the validity of policy-led clusters as a development policy in some regions with distinctive features such as Suez Region. A peculiar case that will be looked at briefly in the upcoming model of productivity and export intensity. Moreover, it can be a vital question for future research, a one that would allow for more in-depth study.

Some other factors also vary based on the region. Firm Age is still significant in all regions, and in some regions more than others, except for Greater Cairo. Additionally, firms seem to be influenced by the manager's education in only Middle and East Delta, where firms with a manager who has a higher education are more likely to be in DIZ by 22 percentage points. In conclusion, this model has been calculated on a sample of small, medium, and large firms, so it doesn't aim to explicitly discuss the conditions of SMEs in each region but to show the variety between the driving factors in each region. More necessarily, this model shows that the factors may vary significantly. Thus, it is crucial to study regions separately in future research.

4.2.2 Do these factors vary according to the sector in which the firm operates?

The results for all sectors are significant with high chi-squared yielding a p-value of 0.000 meaning the regression is quite reliable, except for basic metal sector which has a p-value of 0.149, so was omitted from the model. The number of observations in some sectors is smaller than others, the lowest number of observations being in the leather products which contain only 66 observation; however, most sectors have over 80 observations which can give a rough estimation of the current situation.

Table 5 shows that the findings of this sectors' model is congruence with the previous model on the regions. It confirms that sectors as well as regions have seemingly different features from each other's. Implying that a generalized study or development strategy to the entire manufacturing sector could be to a large extent misleading. A difference from the previous model is that, some sectors located in Suez Region and Frontier are more likely to be in a DIZ if they operate in one of the following sectors: food, beverages and tobacco's; wood products; furniture, paper & print. This doesn't contradict pervious results, but indicate that the sector, and even the local region in which the firm is located requires more in-depth study.

Other factors vary based on the sector. A variable in one sector may increase the probability of a firm to locate in DIZ, while in anther sector it may decrease it. For example, firms operating nationally in leather products are more likely to be in DIZ, while those operating nationally in machinery, equipment, electronics & vehicles are less likely to be in a DIZ. This could be, since the leather industry is usually accompanied with generation of large amount of waste, waste water and gruesome odour. Thus, producing on a national scale it would only make sense to locate in DIZs in the outskirts of cities. Additionally, the Egyptian government made a lot effort to transfer a large portion of the industry, from its original location in old Cairo, to a DIZ in the outskirts of the capital (Hadad, 2018). However, as for the machinery, equipment, electronics & vehicles, if its working on the international level then it could make sense to be located in DIZs, however for the national level the industry is either working in the assembly of products or production of spare parts, both are usually not harmful and can operate within the city. Moreover, both sectors are less likely to be in a DIZ if the firm is solely owned by one person.

[11] Interactive map of alternative routes through Suez Canal [https://www.suezcanal.gov.eg/English/MediaCenter/Animations/Pages/RoutesAndTimeSaving.aspx, retrieved in 03-09-2019]

Table 5 Probit regression with DIZ as the dependent variable in 9 models of the 9 main sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)
Region								
West Delta	0.09	0.26	-.43***	0.32**	0.39**	0.39***	0.29	0.05
	(0.14)	(0.14)	(0.1)	(0.11)	(0.12)	(0.12)	(0.17)	(0.13)
Suez Region & Frontier	0.26**	-	0.11	0.34*	-	0.64***	0.11	-
	(0.09)		(0.196)	(0.17)		(0.11)	(0.195)	
Middle & East Delta	0.410**	0.540***	-0.192	0.326**	0.162	0.283	-0.131	0.306**
	(0.128)	(0.115)	(0.154)	(0.106)	(0.151)	(0.145)	(0.151)	(0.110)
Upper Egypt	0.0495	-0.195	-0.0311	0.507***	0.354**	0.601***	0.377**	0.327**
	(0.0828)	(0.102)	(0.198)	(0.101)	(0.129)	(0.0851)	(0.130)	(0.124)
Firm_Size	0.0472	0.0504	-0.0640	0.0765	-0.0131	0.0258	-0.100	0.0482
	(0.0448)	(0.0656)	(0.082)	(0.0727)	(0.0582)	(0.0514)	(0.0615)	(0.0551)
Firm_Age	-0.007**	-0.004	-0.007	-0.01***	-0.02***	-0.01**	-0.002	-0.01***
	(0.002)	(0.003)	(0.004)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Manager_Experience	-0.002	0.007	-0.003	-0.008	0.0004	0.016***	-0.008	-0.003
	(0.003)	(0.004)	(0.006)	(0.005)	(0.005)	(0.05)	(0.005)	(0.004)
Manager_Education	-0.007	0.26	0.19	-0.04	0.08	0.11	-0.036	-0.098
	(0.08)	(0.17)	(0.11)	(0.12)	(0.13)	(0.15)	(0.093)	(0.09)
Manager_Female	0.16	0.06	-	0.024	0.001	0.29	-	-
	(0.12)	(0.21)		(0.20)	(0.16)	(0.21)		
Sole_proprietorship	0.002	0.04	-0.24*	-0.08	-0.06	0.07	-0.13	-0.39***
	(0.06)	(0.12)	(0.11)	(0.12)	(0.098)	(0.099)	(0.087)	(0.11)
Foreign_Ownership	-0.098	0.003	-	-0.25	-	0.022	-0.067	-0.07
	(0.17)	(0.17)		(0.21)		(0.14)	(0.31)	(0.13)
Franchising_Licensing	0.22	-0.15	-	0.19	-0.04	-0.11	1.43	0.036
	(0.14)	(0.22)		(0.18)	(0.15)	(0.11)	(74.3)	(0.14)
Govt_Off	-0.12	-0.19	-	-	0.22	-0.28*	-1.2	-0.31*
	(0.25)	(0.22)			(0.35)	(0.11)	(74.3)	(0.13)
Informality	0.007	-0.10	-	0.29	0.25	-0.20	-0.003	-0.21*
	(0.16)	(0.18)		(0.21)	(0.25)	(0.39)	(0.12)	(0.09)
Innovation	0.09	-	-	-0.55**	-0.22	0.06	-0.15	0.22
	(0.198)			(0.19)	(0.16)	(0.14)	(0.27)	(0.17)
LandAccess	0.07	-0.121	0.003	-0.10	-0.05	-0.18*	-0.09	0.08
	(0.07)	(0.11)	(0.11)	(0.095)	(0.086)	(0.09)	(0.11)	(0.082)
Gov_Facilitation	-0.3***	0.07	0.09	-0.32***	0.01	-0.14	-0.3***	-0.25**
	(0.07)	(0.12)	(0.12)	(0.09)	(0.08)	(0.09)	(0.08)	(0.093)
SkilledWorkers	-0.0003	0.0004	0.003	0.0005	0.0009*	-0.001**	-0.000	0.0005
	(0.01)	(0.000)	(0.002)	(0.00)	(0.000)	(0.000)	(0.000)	(0.002)
MainMarket								
National	0.13	-0.16	0.34***	0.13	0.05	0.05	0.12	-0.22**
	(0.07)	(0.11)	(0.09)	(0.13)	(0.09)	(0.10)	(0.09)	(0.07)
International	0.26	-0.07	-		0.198	-0.049	-	-0.21
	(0.16)	(0.18)			(0.18)	(0.21)		(0.26)
Network	0.07	0.28*	0.06	-0.53***	-0.14	0.08	-0.08	-0.07
	(0.07)	(0.13)	(0.10)	(0.14)	(0.082)	(0.086)	(0.08)	(0.0753)
Pseudo r-squared	0.38	0.34	0.42	0.46	0.26	0.49	0.32	0.69
Number of obs	173	86	66	91	109	101	108	82
Prob > chi2	0.000	0.003	0.000	0.000	0.02	0.000	0.000	0.000

(1) food, beverages and tobacco's sector (2) Textiles & Garments, (3) Leather Products, (4) Wood Products, Furniture, Paper & Print, (5) Petro-chemicals, Plastics & Rubber, (6) Chemicals & Chemical Products, (7) Non-Metallic Mineral Products, (8) Basic Metals & Metal Products (omitted from table due to insignificance), (9) Machinery, Equipment, Electronics & Vehicles

When looking at other factors, such as if a firm find it easy to switch suppliers and operating in textiles & garments sectors, then it's more likely to be in a DIZ. A firm that find it easy to switch suppliers and operating in Wood products, furniture, paper & print is more likely to be located outside DIZs. Having had government officials among managers decrease the probability of firms being in a DIZ if working in one of two sectors: chemicals & chemical products, or machinery, equipment, electronics & vehicles. Also having had any government facilitations decrease the probability of firms being in a DIZ if working in one of the following sectors: food, beverages and tobacco's sector; wood products, furniture, paper & print; non-metallic mineral products; machinery, equipment, electronics & vehicles

It is possible to go into the details of each sector, as what happened in the leather production. However, basing on the pervious, the needs and the features of each industry vary significantly between sectors. To the purpose of this research, and with the available data, a collective overview on all firm sizes was achieved, however the data is not enough to analyse "based on region and sector" the small and medium-sized enterprises only. Accordingly, a collective study like this on Egypt can give an overview of the situation on a larger scale, it might show the variation. Nevertheless, a more in-depth study on SMEs within sectors, is needed. Finally, this model and the previous one show that in studying SMEs, it is more accurate to make a study on either all firm sectors located in one region or one sector throughout all regions.

4.2.3 Do these factors vary according to firm size?

By looking more into each category of firm size, Table 6 shows that conditions that influence a firm's location in a DIZ may vary between small, medium and large firms. For example, in small-sized firms, the region and the sector of the firm are not significant to its location in a DIZ, unlike medium and large firms which are significant at 1% and 5%. These in fact indicate that it is possible to research factors that influence small firms to locate in DIZ and manage to generalize the results on the national level. The case is not the same for medium and large firms, even though it seems that for all sectors and regions firms have a higher probability of being in DIZ; however, the magnitude of this probability varies widely.

Taking each firm size separately, small firms are more likely to be in a DIZ, if they have a manager with higher education. Moreover, a small firm working on the national level is more likely to be in a DIZ, which differs from local small firms outside DIZs. Even though a small firm located in DIZ seems to enlarge its market to the national level, firms that have made use of government facilitations have higher probability of being located outside. Additionally, small firms that find land access as an obstacle and are not solely owned by one person, then they are more likely to be in a DIZ. These indicators give a glimpse on the current situation of small firms in Egypt, where small firms operating on the national level, owned by several partners, and located in DIZ, with their promising qualifications, are more likely to face land access issues, as well as limited government facilitation.

Also, for medium-sized firms, they are more likely to be located outside DIZ if they have had any government facilitations. Finally, for larger firms, if they have a license to sell foreign product then they're more likely to be in a DIZ, but even larger firms in DIZs seem to have a problem with land access and government facilitation. Meaning that there are limited spaces in DIZs and not a matter of government preferring larger firms over smaller ones, but that DIZs are receiving fewer facilitations from the government compared to other areas. These results also show, that the claims of the government regarding supporting the small and medium sized industries to locate in DIZs is in fact questionable. As manufacturing firms outside DIZs are more likely to have had facilitations. Moreover, the role of the government in meeting the needs of the firms that were already located in DIZs is doubtful. Since, smaller firms are having land access issues, meaning that from the start, the units supported doesn't reflect their actual needs for larger spaces, this is aligned with the pervious study done by Elkhishin (2018).

Table 6 Probit regression with DIZ as the dependent variable with three models of three categories of firm sizes

	Small	Medium	Large
Region			
West Delta	0.03	0.16*	0.25***
	(0.09)	(0.08)	(0.07)
Suez Region & Frontier	0.08	0.48***	0.41***
	(0.08)	(0.09)	(0.09)
Middle & East Delta	0.04	0.24**	0.27***
	(0.09)	(0.09)	(0.06)
Upper Egypt	0.06	0.31***	0.24***
	(0.09)	(0.08)	(0.07)
Sector			
Textiles & Garments	0.03	0.12	0.061
	(0.11)	(0.12)	(0.097)
Leather Products	0.06	0.22*	0.28*
	(0.11)	(0.10)	(0.12)
Wood Products, Furniture, Paper	0.11	0.36***	0.26**
	(0.10)	(0.11)	(0.097)
Petro-chemicals, Plastics & Rubber	0.19	0.44***	0.17
	(0.11)	(0.097)	(0.09)
Chemicals & Chemical Products	0.23	0.36**	0.13
	(0.12)	(0.11)	(0.09)
Non-Metallic Mineral Products	0.24**	0.28**	0.26**
	(0.09)	(0.1)	(0.096)
Basic Metals & Metal Products	0.13	0.29**	0.27**
	(0.09)	(0.09)	(0.09)
Machinery, Equipment & Vehicles	0.20	0.19	0.32***
	(0.13)	(0.11)	(0.09)
Firm_Age	-0.007***	-0.005**	-0.007***
	(0.002)	(0.002)	(0.001)
Manager_Experience	-0.001	0.002	0.001
	(0.003)	(0.003)	(0.002)
Manager_Education	0.12*	-0.007	0.07
	(0.06)	(0.06)	(0.093)
Manager_Female	0.06	0.34**	0.05
	(0.13)	(0.13)	(0.105)
Sole_proprietorship	-0.10	-0.094	-0.012
	(0.05)	(0.058)	(0.07)
Foreign_Ownership	-0.15	0.084	-0.002
	(0.16)	(0.15)	(0.08)
Franchising_Licensing	0.11	0.007	0.11
	(0.2)	(0.099)	(0.06)
Govt_Off	-0.36	-0.24	-0.08
	(0.27)	(0.13)	(0.09)
Informality	0.09	-0.09	-0.11
	(0.10)	(0.09)	(0.096)
Innovation	-0.07	0.28	-0.097
	(0.24)	(0.22)	(0.073)
LandAccess	0.12*	0.035	-0.096
	(0.06)	(0.058)	(0.05)
Gov_Facilitation	-0.19**	-0.13*	-0.21***
	(0.06)	(0.06)	(0.049)
SkilledWorkers	0.0002	-0.0002	0.00014
	(0.0005)	(0.0005)	(0.0009)
MainMarket			
National	0.19*	0.023	-0.03
	(0.06)	(0.06)	(0.06)
International	0.16	-	0.06
	(0.17)		(0.09)
Network	0.014	0.01	-0.034
	(0.06)	(0.06)	(0.047)
Number of obs	285	303	392

4.3 How does the SMEs location in DIZ influence their productivity?

As shown in table 7, the location of firms in DIZ isn't influencing medium or large firms, but only small firms, where the latter's location in a DIZ increases their productivity by 73%. This is in fact interesting for two reasons: first, when comparing this result with that of the last model in Table 6, it is evident that small firms operating in the manufacturing sector are heavily relying on complementing large and medium sized firms that are more likely to be located in DIZ; second that not only are small firms more productive in DIZs but also that they're expanding their work and land access is starting to be an issue. It is then logical to conclude that it doesn't matter what sectors or regions they're in, if only they can find larger firms to complement.

This in fact take us back to the monopolistic landscape of the industrial sector in Egypt. A landscape that is mainly composed of a group of elite large firms dominating the market, and the government policies are mainly targeted towards the best interest of this group. For example, the department which is responsible to prevent water pollution in the Ministry of Industry, is in fact doing efforts to keep the interest of the most economically beneficial industries, regardless of their influence on the environment (Luzi, 2009). The case of monopoly was researched in the steel industry by (Selim, 2006), who found that one firm has over 60% of the market share of the steel industry.

When looking at other factors that influence firm productivity of small and medium firms, it's found that if a small firm is in Upper Egypt, then firm productivity is lower by 111% and if located in Suez region then it is lower by 80%. Additionally, firms in some sectors are more productive than others, such as food and beverages, which has almost double the productivity of firms operating in textiles, metals, or mineral products. Close results are also found for medium firms.

This could be related to the specialization of the region in which the firm operates, or that some industries are simply more productive than others. For example, Suez region is well known for trade and oil extraction, much more than its known for its manufacturing industries. However, government plans in Upper Egypt and Suez Region to create industrial zones and attract SMEs is then justified, because the two regions have less productivity, and industrial zones has shown to increase small firms' productivity. At this point, it is worth noting that Upper Egypt, is in fact currently receiving the aid of many international development organization to build the competences of the region. Through offering an ecosystem of resources to build young entrepreneurs. Through improving capacities of local incubators, establishing service centers for local entrepreneurs, and enhancing capacities and entrepreneurial spirit of the youth[12].

Two more variables that influence small firm productivity are the manager's education and experience, significant at 10%, as a firm is 50% more productive if it has a manager with a university degree, additionally having a manager with one year more of experience can increase firm productivity by 3%. Manager's education also influences medium-sized firms as it increases their productivity by 60% more, other factors are significant such as is a firm has a license to sell a foreign product which increases small and medium-sized firm's productivity by almost 140% and increase that of a large firm by 75%.

These other variables that influence firm productivity, do not only draw attention to the role of policy makers in supporting SMEs for better productivity. But also, for the role of urban managers in incorporating facilities that ensure that policy makers can deliver their role. For example, allocation of facilities such as knowledge hubs within DIZs can ensure the connection

[12] The Egyptian-German Promotion of Small and Medium Enterprises (PSME): https://www.psmeegypt.org/activity-fields-details/8 [Retrieved in 03-09-2019]

between higher education and DIZs, allow for connection with international markets, and allow for the transfer of experiential knowledge from more experienced managers to newly startups.

Table 7 Multiple linear regression with lnProductivity as the dependent variable

lnProductivity	(Small)	(Medium)	(Large)
DIZ	0.73**	0.24	-0.16
Region			
West Delta	-0.56	-0.44	-0.09
Suez Region and Frontier	-0.80*	-0.89*	0.16
Middle and East Delta	-0.34	-0.17	0.10
Upper Egypt	-1.115***	-0.61*	-0.34
Sector			
Textiles & Garments	-1.19**	-0.94*	-1.46**
Leather Products	-0.49	-0.47	0.33
Wood Products, Furniture, Paper & Print	0.01	-0.18	-0.41
Petro-chemicals, Plastics & Rubber	-0.57	-0.79*	0.00
Chemicals & Chemical Products	-0.68*	-0.00	0.13
Non-Metallic Mineral Products	-0.89*	-0.49	-0.20
Basic Metals & Metal Products	-1.01**	-0.39	-0.60
Machinery, Equipment, Electronics & Veh	-0.31	-0.83*	-0.06
Firm_Age	-0.01	-0.01*	0.00
Manager_Experience	0.03*	0.00	-0.000
Manager_Education	0.54*	0.60*	0.03
Manager_Male	0.05	-0.03	0.07
Sole_proprietorship	-0.37*	-0.29	-0.29
Foreign_Ownership	-0.25	0.07	0.13
Franchising_Licens~g	1.40*	1.47***	0.75**
Govt_Off	0.36	0.47	0.54
Informality	0.06	0.27	-0.29
Innovation	-0.38	0.21	-0.47
LandAccess	0.15	0.14	-0.31
Gov_Facilitation	-0.17	-0.19	-0.11
SkilledWorkers	-0.00	-0.00	0.001*
MainMarket			
National	0.10	0.17	0.02
International	-0.55	0.41	0.29
Network	-0.03	0.10	0.14
Constant	9.88	10.17	10.67
R-squared	0.27	0.22	0.22
Root MSE	1.45	1.49	1.58
Number of obs	251	250	271

4.4 Does the SMEs' location in DIZ influence their internationalization?

When running ordered Probit regression for the export intensity categories on both SMEs and large firms. The regression is done on the available sample of exporting SMEs. The number of observations is only 75 firms; however, the model has a high chi-squared yielding a p-value of 0.000 meaning at least one variable is significant. Results of Table 9 shows that SMEs are 8% to 12% more likely to be in a DIZ if exporting from 40 to 60%, and more than 60% of their total annual sales respectively. However, SMEs that export less than 20%, are 25% more likely to be located outside DIZ. These results come in line with the pervious literature regarding the fact that SMEs in Egypt have highly concentrated exports, where only a very small number of SMEs, are having a very high export intensity. Additionally, these SMEs are more likely to be in DIZs. Which gives an insight to the role of DIZs in connecting SMEs to the international market as mentioned by Fernhaber, Gilbert, et al. (2014).

Table 8 Average marginal effects of DIZ from the multinomial Probit model of export intensity

	(All Firms)	(SMEs)	(Large)
DIZ			
Export Less than 20%	0.001	-0.26*	0.02
	(0.06)	(0.12)	(0.06)
Export between 20 to 40%	-0.0003	0.05	-0.007
	(0.014)	(0.04)	(0.02)
Export from 40 to 60%	-0.0007	0.088*	-0.016
	(0.03)	(0.05)	(0.044)
Export more than 60%	-0.0003	0.12*	-0.001
	(0.01)	(0.07)	(0.003)

Results of Table 10 shows that SMEs that have used government facilitation, have lower probability of being in the two largest categories of export intensity that export more than 40% of their total annual sales, and higher probability of being in the lowest export category by exporting less than 20%. Meaning that SMEs that export the most, are less likely to have had government facilitations. This could either mean that the government does not support the internationalized firms, or that the facilitations of the government is different for the internationalized ones, meaning they have other benefits that are different from what a local SME normally have of one stop shops, subsidies…etc.

Table 9 Average marginal effects of Gov_Facilitation from the multinomial Probit model of export intensity

	(All Firms)	(SMEs)	(Large)
Gov_Facilitation			
Export Less than 20%	0.06	0.33**	0.017
	(0.07)	(0.12)	(0.09)
Export between 20 to 40%	-0.02	-0.06	-0.005
	(0.02)	(0.05)	(0.03)
Export from 40 to 60%	-0.03	-0.12*	-0.01
	(0.03)	(0.05)	(0.06)
Export more than 60%	-0.01	-0.16*	-0.001
	(0.02)	(0.071)	(0.03)

The result of this model on export intensity gives a hint of the current situation; however, it's not sufficient to conduct a proper analysis for the following reasons: first it is lacking many control variables that are specifically concerned with the international markets, variables such as export and import experience and the regions where the firm export to and import from. Additionally, the results of the last two tables aren't reliable due to very small number of observations. Finally, the analysis only gives a glimpse on exporting firms, whereas internationalization takes many other entry modes to international markets, that are either lacking from the data, or not enough number of observations which hinders the ability to conduct more reliant analysis. However, its seemingly a very important side of SMEs that is worth further investigation in future research.

5 Conclusions

SMEs became a major force to recon for the Egyptian national economy since 2004, and a sustainable microfinance industry that promotes services for lower market segments. However, with the trade liberalization policies, Egypt was open to the global market, leaving SMEs with fierce competition with international firms. Hence their ability to compete was limited to selling a product that nobody else sells, being lowest-cost producers, complementing larger firms, or by going international. Industrial policies then became more aware of SMEs problems, and one of the targeted policies was to solve SMEs fragmentation problems by clustering them in industrial zones in the outskirts of cities.

The aim of this study was to look at the benefits of these clusters with regard to SMEs, in view of the perceived agglomeration benefits from the point of view of the firms locating there, in

other words, the reasons that derived firms to locate there. Four hypotheses were made. The first is that there are certain firm characteristics, enabling environment factors, and perceived agglomeration benefits that drive firms to locate in DIZ, the second was that their location there have a positive influence on their productivity, the third is that their location in DIZ have a positive influence on their export intensity.

The study was conducted on a sample of 1,412 manufacturing firms using the World Bank Enterprise survey collected in Egypt in the period from October 2016 to May 2017, with the aim to give and overview of the private manufacturing and service sector. The sample was taken from small, medium and large firms, which are firms between 5-19 employees, between 20-99 employees, and more than 100 employees.

The quantitative analysis of the secondary data was conducted in two phases. The first phase is the descriptive statistics of the main variables by showing characteristics such as sectors, locations, and sizes of the complete sample as well as the percentage of exporting firms and firms located in DIZ from the total surveyed sample. The second phase is testing the three hypotheses of this study.

In the first hypothesis, a model was first conducted on all firms to give an overview of the general conditions that drive firms to located in DIZs. The results show that the region and the sector in which the firm operates have a significant effect. Older firms, firms that have had government facilitations, or has/had an owner who is a government official, have less probability of being in a DIZ. Finally, locating in a DIZ increase the firm probability of having national market as their main market.

These results are aligned with only one benefit of agglomeration, which is the proximity of markets, where DIZs might have worked as a bridge to connect firms to international markets. However, the role of the government in the process is doubtful, as results show contradiction to government strategies regarding encouraging SMEs to locate in DIZ to overcome their fragmentation problem, but it comes in line with conclusions from Elkhishin (2018), that even though there are some forms of policies made by the government for SMEs to facilitate their allocation in DIZs, these policies are either not well targeted, or the cost of going into the bureaucratic process of land allocation in DIZs exceeds the initial capacities of firms.

The results also question the benefits that come with DIZ, which don't seem to be attractive to government officials and older firms, it could possibly be due to that their privileges come from their political connectivity as mentioned by Francis, Hussain, et al. (2018), but it could also be a matter of preference, a state of lock in, or that they have already made their functioning network that their location is no longer a factor.

When looking at each region separately, the results show that government facilitations are targeted toward certain regions and sectors on the expense of others. These results contradict with Loewe, Al-Ayouty, et al., (2013) who conducted a study on Egyptian firms and proposed that characteristics of SMEs in this research can be generalized to the entire MENA region. Results of the model shows that, the specialization of DIZs in one region will differ from another, based on the characteristics of the industry, sectors, as well as the government's allocation strategies.

However, these allocation strategies are doubtful to be in the best interest of the industries, since they are not set in an isolated bubble, but in an interlaced bundle of interests. For example, on one hand some industries are transferred into vulnerable sites, most probably in the desert, to avoid the negative impact that their wastewater disposal has on the water quality. An initiative that is taken regardless of the business interest of these industries. On the other hand, the interests of some polluting industries are protected at the expense of water quality, if these industries belong to an "elite" interest group (Luzi, 2009). Here comes the crucial role of urban managers to balance the choices made regarding the allocation of land uses based on the best interest and not the monopolistic market in which a business operates.

Government facilitation is also in all regions as firms that used government facilitations are more likely located outside DIZ. Especially for Suez Region and frontier in which firms are more likely to be outside DIZ if they had any government facilitations. Partnerships seems to be important as well in Suez Region and Frontier. This indicates that the government facilitations with regards to industrial development are not necessarily targeting cluster policies in some regions. It may also indicate that in some regions such as Suez Region and Frontier the landscape of the industrial development may vary compared to the rest of the country as a result of its distinctive features. However, this contradicts with the government upcoming plans to build new industrial zones in Suez Region.

When looking at each sector separately, a variable in one sector may increase the probability of a firm to locate in DIZ, while in anther sector it may decrease it. For example, firms operating nationally in leather products are more likely to be in DIZ, while those operating nationally in machinery, equipment, electronics & vehicles are less likely to be in DIZ. This could be, since the leather industry is usually accompanied with generation of large amount of, thus, producing on a national scale it would only make sense to locate in DIZs in the outskirts of cities. Additionally, the Egyptian government made a lot effort to transfer a large portion of the industry, from its original location in old Cairo, to a DIZ in the outskirts of the capital (Hadad, 2018). However, as for the machinery, equipment, electronics & vehicles, if its working on the international level then it could make sense to be located in DIZs, however for the national level the industry is either working in the assembly of products or production of spare parts, both are usually not harmful and can operate within the city. Moreover, both sectors are less likely to be in a DIZ if the firm is solely owned by one person.

When looking at firm sizes, small firm are more likely to be in a DIZ if a firm has manager with higher education, operating on the national level, find land access as an obstacle, haven't used government facilitation and are not solely owned by one person. These indicators give a glimpse on the current situation of small firms in Egypt. By looking more into each category of firm size, in small-sized firms, the region and the sector of the firm are not significant to its location in a DIZ, unlike medium and large firms which are significant. These in fact indicate that it is possible to research factors that influence small firms to locate in DIZ on the national level. However, the case is not the same for medium and large firms, where firms need to be analysed within regions or sectors.

In the second hypothesis, SMEs location in DIZ seem to be highly significant for their productivity, however, that is not the general case, in regions like Suez and Upper Egypt SMEs seem to have much lower productivity. This, in fact, proposes a question to the efficiency of the newly upcoming DIZ projects in those regions, and whether the government plans are to increase SMEs productivity in those regions using DIZ, or does it reflect a high level of centralization that neglect SMEs actual needs. This is in fact interesting for two reasons: first, when comparing this result with that of the last model it is evident that small firms operating in the manufacturing sector are heavily relying on complementing large and medium sized firms that are more likely to be located in DIZ; second that not only are small firms more productive in DIZs but also that they're expanding their work and land access is starting to be an issue. It is then logical to conclude that it doesn't matter what sectors or regions they're in, if only they can find larger firms to complement.

This in fact take us back to the monopolistic landscape of the industrial sector in Egypt. A landscape that is mainly composed of a group of elite large firms dominating the market, and the government policies are mainly targeted towards the best interest of this group. For example, the department which is responsible to prevent water pollution in the Ministry of Industry, is in fact doing efforts to keep the interest of the most economically beneficial industries, regardless of their influence on the environment (Luzi, 2009). The case of monopoly

was researched in the steel industry by (Selim, 2006), who found that one firm has over 60% of the market share of the steel industry.

When looking at other factors that influence firm productivity of small and medium firms, it's found that if a small firm is in Upper Egypt, then firm productivity is lower by 111% and if located in Suez region then it is lower by 80%. However, government plans in Upper Egypt and Suez Region to create industrial zones and attract SMEs is then justified, because the two regions have less productivity, and industrial zones has shown to increase small firms' productivity. At this point, it is worth noting that Upper Egypt, is in fact currently receiving the aid of many international development organization to build the competences of the region. Through offering an ecosystem of resources to build young entrepreneurs. Through improving capacities of local incubators, establishing service centers for local entrepreneurs, and enhancing capacities and entrepreneurial spirit of the youth.

In the third hypothesis, the results that the location of SMEs does indeed have an influence on their internationalization, which can be a result of the clustering benefits that come from SMEs' location within larger firms, and hence closer to international markets. The role of the government is still doubtful since both the most productive firms and the most exporting firms especially those located in DIZ are the least probable to be using government facilitation. The result of this model on export intensity gives a hint of the current situation; however, it's not enough to conduct a proper analysis due to lacking many control variables that are specifically concerned with the international markets, variables such as export and import experience and the regions where the firm export to and import from.

In conclusion, the need for the interference of urban managers is crucial in an array of functions. What happens is that industrial zones are built with standard unit sizes, standard services, and infrastructure on the outskirts of cities. Followed by a bureaucratic long process of land allocation through a bidding system. As time goes by, all attractive plots are full, the firms that already obtained unit/land access are having trouble with expanding their firms. The newly startups are suffering with less attractive plots in less productive regions (Elkhishin, 2018). The problem of DIZ goes beyond granting land access, land allocation, or the process of obtaining a license. The starting point is in studying the needs of each sector, the capabilities of each region to absorb a set of industries, the needs based on different firm sizes within sub-sectors. Then the tipping point is an urban manager's role in the strategic allocation of land uses, industrial units, and infrastructure in not only a complementary satisfactory manner to the business environment, but in a developmental path that achieve spatial and socioeconomic benefits of agglomerated economies.

Additionally, it is worth noting to policymakers that the management education and experience are both highly essential for better productivity of SMEs. So, including smaller firms in DIZs, the incorporation of entrepreneurial learning in higher education, and transferring experiential knowledge from older managers to startups, can significantly improve SMEs productivity in the long run. However, the three can indeed be a challenge, since first, in attractive DIZs in areas such as greater Cairo and Alexandria, only unattractive plots are remaining with high prices and no infrastructure or services (Loewe, 2013) and the government new DIZ development policies are mostly targeted toward regions that are found to decrease firm's productivity. Secondly, the experiential knowledge is usually perceived in Egypt as a treasure worth keeping, so it can be quite challenging to find an experienced manager who's willing to transfer his knowledge. And finally, the higher education system in Egypt is to a large extent traditional in its means, so incorporating new entrepreneurial education in it is not impossible, but difficult.

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Annexes

Description of variables

Table 10 Description of control, dependent, and independent variables

Control Variables	Sector	Food beverages and tobacco=1, Textiles &Garments=2, Chemicals and Chemical products=3, Petro-chemicals, Rubber and Plastics=4, Non-metallic mineral product=5, Leather products=6, Furniture, Paper and Printing and Wood products=7, Basic Metals and Metal products=8, Machinery, Equipment, Electronics, Vehicles and Recycling=9
	Region	Greater Cairo=1, West Delta=2, Suez Region and Frontier=3, Middle and East Delta=4, Upper Egypt=5
	Firm size	Small (Less than 50 employees), Medium (Between 50-99 employees), Large (More than 100 employees)
	Firm Age	Total number of years that passed since firm started operation.
	Manager_Education	Has the top manager graduated University? Yes=1 No=0
	Manager_Experience	Years of manager's experience
	Manager_Female	= 1 if female and 0 if male
	Foreign_Ownership	Does the firm have any foreign owners? Yes=1 No=0
	Sole_ proprietorship	Is the firm owned by one person? Yes=1 No=0
	Govt_Off	Did the firm have any govt official manager among its managers? Yes=1 No=0
	Informality	Has the firm operated before having its official registration? Yes=1 No=0
	Innovation	An aggregate variable of Product_Innov, Process_Innov, R&D, Quality_Certificate, Website, Email
Independent Variables	Land_Access	Do the firm find land access as an obstacle? Yes=1 No=0
	Gov_Facilitation	= 1 if firm has used one stop shop, industrial development, social fund, industrial zone authority, received any subsidies, and 0 if not.
	SkilledWorkers	Number of full-time high skilled production workers
	Network	Do firm find it easy to switch suppliers? Yes=1 No=0

	Main Market	What is the establishment main market of sales? Local, National, International
DIZ	DIZ	Is the firm located in a DIZ? Yes=1 No=0
Productivity	Ln (Productivity)	The logarithmic function of labour productivity which is equal to a firm's net profit divided by the number of full-time employees at the end of last fiscal year.
Internationalization	Export_cat	A categorical variable of 5 categories: Doesn't export, Export less than 20%, Export from 20 to 40%, Export from 40 to 60%, Export more than 60%

Data Preparation

The data was prepared and cleaned through first summarizing and browsing the variables to check for any unordinary data or missing responses. The questions holding less than 60 answers were removed along with unnecessary ones from the entire dataset of the ES. The data containing years (1889,1990…etc), were replaced with age, by subtracting the values from the year the survey was published in which was 2017. Some categorical variables were replaced with binary ones to fit the purpose of the research such as the legal status of the firm which originally had 5 categories, was replaced with new variable Sole_ Proprietorship on whether the firm is solely owned and managed by one person or otherwise. Some continuous variables such as firm age, sales, and cost were winsorized at 10 percent, to remove outliers and allow for normal distribution. Two new aggregate variables were formed after running a reliability test using Cronbach's Alpha, indicators used were questions of yes or no answers. The first newly generated variable is Gov_Facilitations, containing questions on the firm's usage of one-stop shops, social funds, industrial development funds, and online assistance the test resulted in a reliability coefficient of 0.70 which shows consistency between used indicators. The second newly generated variable is innovation which is an aggregate of process innovation, product innovation, research, and development, and if a firm had quality certificates own a website or contact clients via email which had a value of 0.75in a Cronbach's Alpha test.

Figures

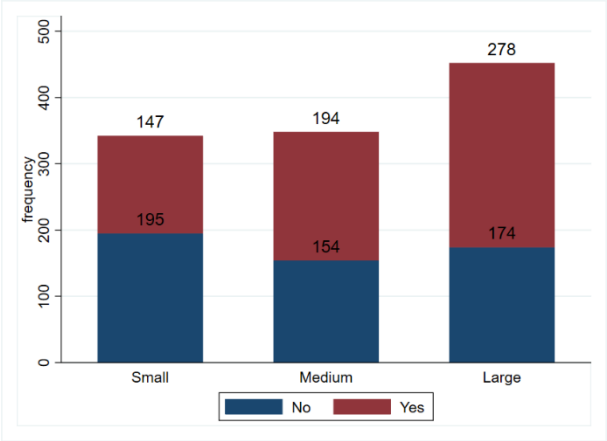

Figure 8 Percentage of firms located in DIZ based on size

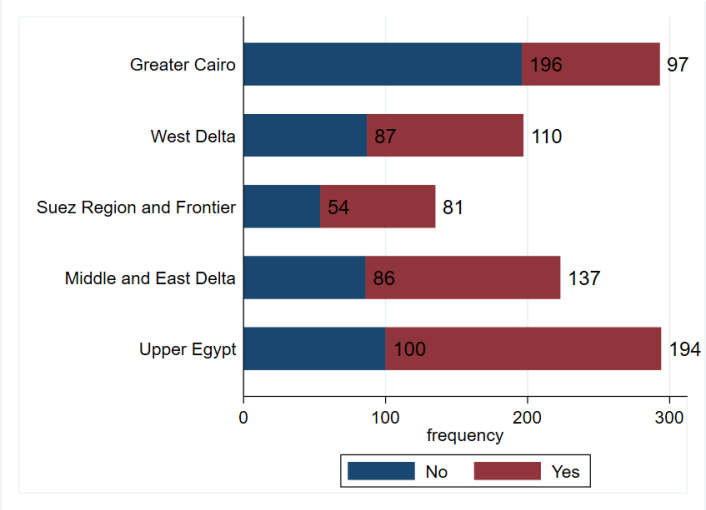

Figure 9 Percentage of firms located in DIZ based on region

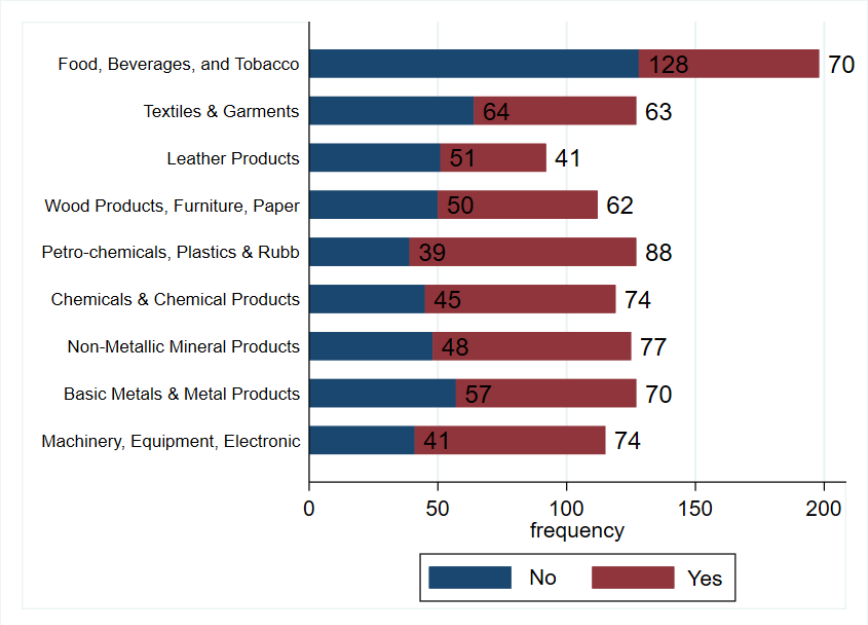

Figure 10 Percentage of firms located in DIZ based on sector

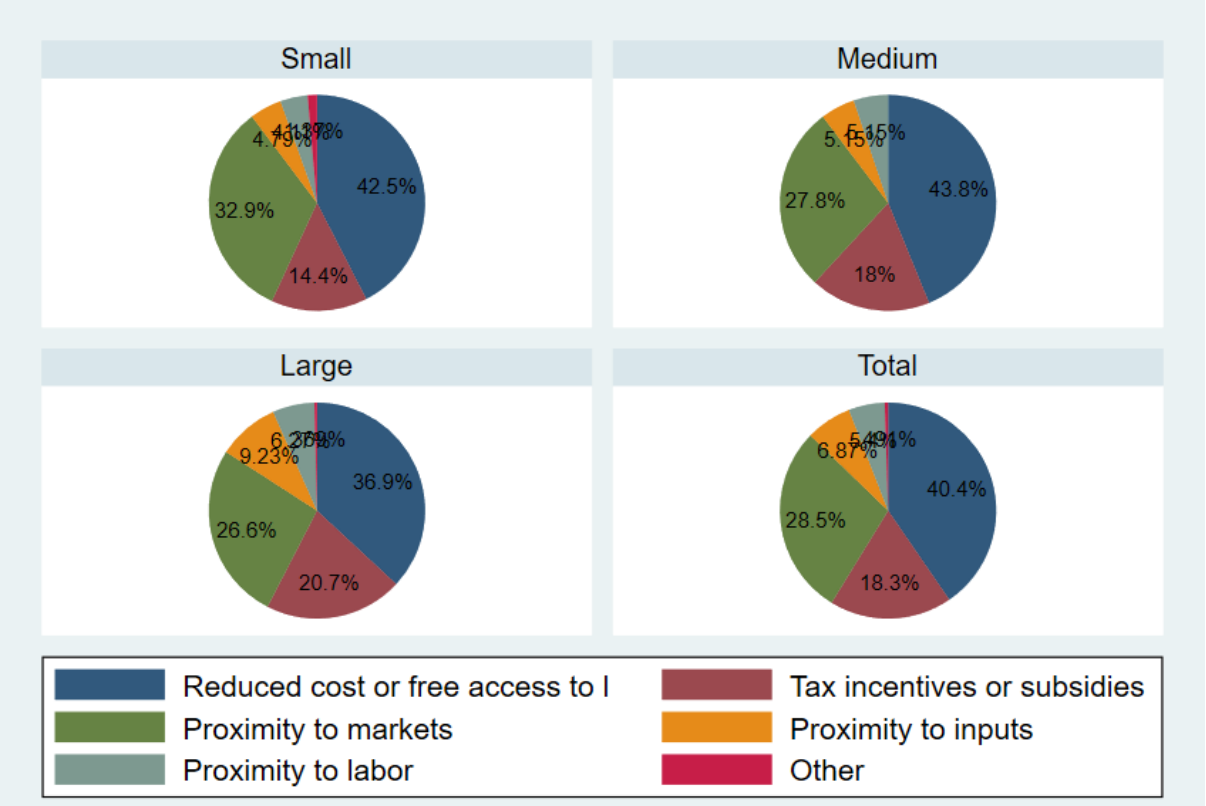

Figure 11 Reasons why firms locate in DIZ based on their size

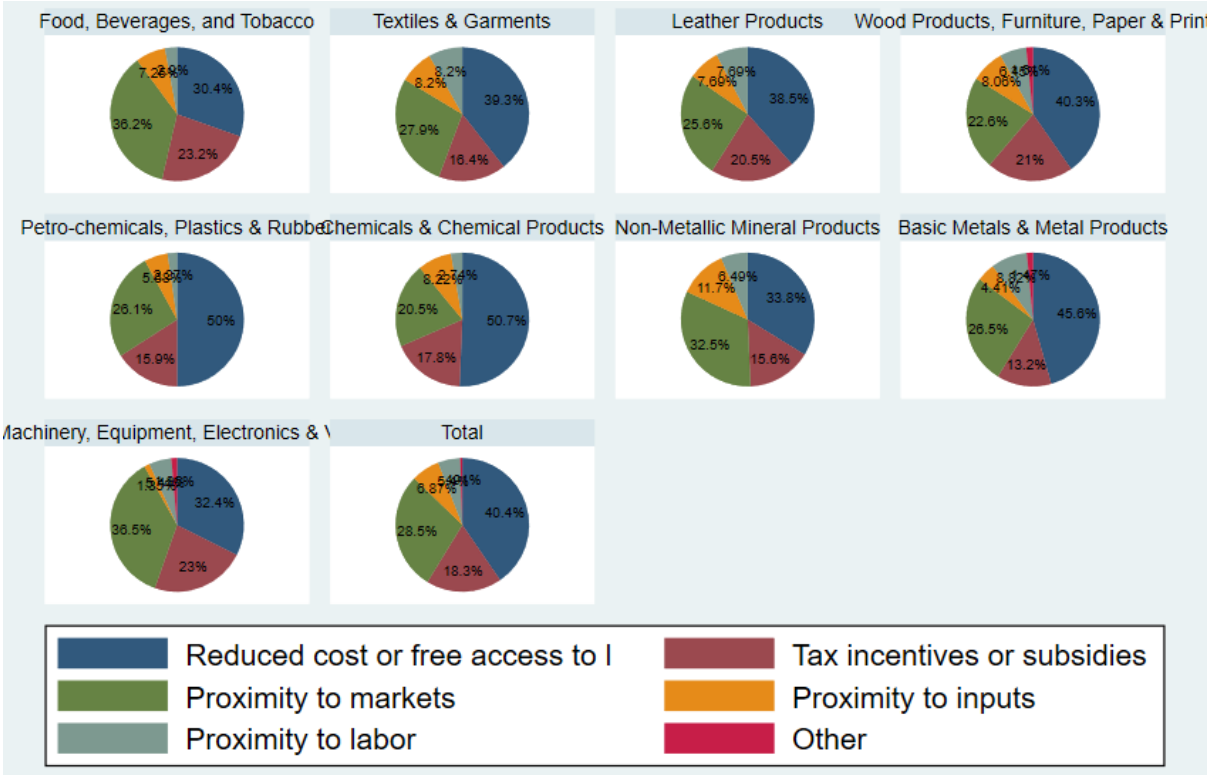

Figure 12 Reasons why firms locate in DIZ based on sector

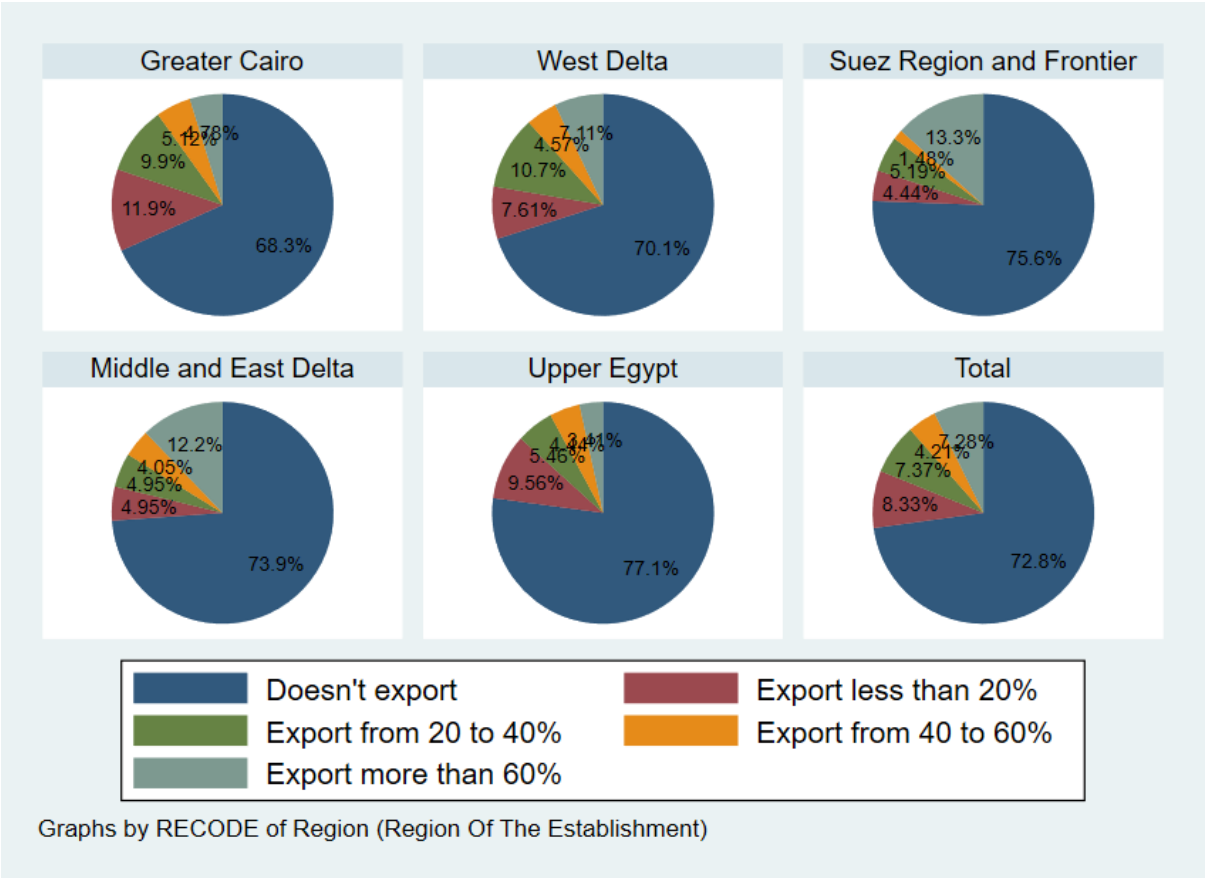

Figure 13 Percentage of categories of exporting firms from the total sample

Tables

Table 11 Coefficient of Probit regression with DIZ as the dependent variable

	(1) DIZ	(2) DIZ	(3) DIZ
DIZ			
Region	0.174***	0.166***	0.158***
	(0.0261)	(0.0274)	(0.0292)
Sector	0.0724***	0.0787***	0.0807***
	(0.0148)	(0.0156)	(0.0166)
Firm_Size	0.193***	0.0889	0.0245
	(0.0523)	(0.0571)	(0.0619)
Firm_Age	-0.0210***	-0.0229***	-0.0214***
	(0.00264)	(0.00279)	(0.00299)
Manager_Experience	0.00655	0.00583	0.00400
	(0.00391)	(0.00412)	(0.00444)
Manager_Education	0.413***	0.335**	0.174
	(0.102)	(0.111)	(0.118)
Manager_Female	0.286	0.226	0.361
	(0.190)	(0.196)	(0.210)
Sole_proprietorship		-0.305**	-0.260*
		(0.101)	(0.106)
Foreign_Ownership		0.280	0.00867
		(0.172)	(0.191)
Franchising_Licensing		0.351*	0.302
		(0.147)	(0.157)
Govt_Off		-0.377	-0.425*
		(0.195)	(0.214)
Informality		-0.110	-0.126
		(0.155)	(0.172)
Innovation		0.0312	-0.224
		(0.184)	(0.200)
LandAccess			0.108
			(0.0972)
Gov_Facilitation			-0.506***
			(0.0966)
SkilledWorkers			0.000280
			(0.000251)
MainMarket			0.281**
			(0.0861)
Network			0.0478
			(0.0924)
_cons	-1.102***	-0.655**	-0.677*
	(0.182)	(0.216)	(0.298)
N	1122	1066	986

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12 Coefficient of Probit regression with DIZ as the dependent variable, based on Region

DIZ	(1)	(2)	(3)	(4)	(5)
Sector					
Textiles & Garments	-0.24	-0.12	-	-0.19	-1.35*
Leather Products	-0.93*	-0.86	-0.51	-0.48	0.91*
Wood Products, Furniture, Paper & Print	-0.81*	0.23	-0.87	-0.43	1.39**
Petro-chemicals, Plastics & Rubber	-0.78*	0.65	-	-0.86	1.31***
Chemicals & Chemical Products	-0.01	0.7	6.09	-0.34	1.02*
Non-Metallic Mineral Products	1.26**	0.56	-0.25	-1.09*	1.48***
Basic Metals & Metal Products	1.19	0.24	-1.73*	-0.93*	1.08**
Machinery, Equipment, Electronics & Veh	0.44	0.03	-	-0.17	1.83**
Firm_Size	-0.06	-0.05	-0.91*	-0.002	0.16
Firm_Age	-0.006	-0.03***	-0.09	-0.04**	-0.04***
Manager_Experience	-0.003	-0.008	0.001	-0.001	0.02
Manager_Education	0.06	-0.32	-1.62	0.81*	0.01
Manager_Female	0.55	0.54	-1.006	0.52	0.98
Sole_proprietorship	-0.06	-0.30	-1.28*	-0.24	-0.48*
Foreign_Ownership	-0.41	-0.25	-96.5	0.62	-
Franchising_Licens~g	0.41	-0.28	-0.9***	0.88	0.40
Govt_Off	-0.55	-1.04	-	-3.99	-0.14
Informality	0.38	-0.55	-	-0.18	0.59
Innovation	0.06	-1.43*	-	-1.27	-0.08
LandAccess	0.19	-0.32	-0.73	-0.67*	0.06
Gov_Facilitation	-0.46*	-0.76**	-3.66*	-0.39	-0.54*
SkilledWorkers	0.00	0.004*	0.19*	0.01*	0.000
MainMarket					
National	0.28	-0.19	0.131	0.18	0.00
International	0.36	1.19	-	-0.06	1.15
Network	-0.04	0.24	1.47	-0.23	-0.04
Pseudo r-squared	0.14	0.32	0.64	0.30	0.39
Chi-square	48.4	78.2	73.7	64.7	129.8
Number of obs	260	180	83	158	260
Prob > chi2	0.003	0.000	0.000	0.000	0.000

Table 13 Coefficient of Probit regression with DIZ as the dependent variable, based on sector

DIZ	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Region									
West Delta	0.41	0.89*	-2.22**	1.66*	1.33**	1.74**	0.99	-0.03	0.29
Suez Region & Frontier	1.09*	-	-0.48	1.7	-	3.27**	0.34	-0.25	-
Middle & East Delta	1.62**	2.01**	-0.84	1.69*	0.49	1.26*	-0.45	0.05	2.03*
Upper Egypt	0.25	-1.01	-0.14	2.8**	1.19**	2.93***	1.37*	0.51	2.22*
Firm_Size	0.21	0.19	-0.31	0.37	-005	0.14	-0.39	0.02	0.43
Firm_Age	-0.03**	-0.02	-0.034	-0.04**	-0.06**	-0.04*	-0.01	-0.01	-0.09**
Manager_Experience	-0.01	0.03*	-0.01	-0.04*	0.002	0.08**	-.03	0.01	-0.03
Manager_Education	-0.03	1.02	0.93	-0.22	0.32	0.6	-0.14	0.3	-0.87
Manager_Female	0.72	0.23	-	0.12	0.002	1.58	-	0.16	-
Sole_proprietorship	0.01	0.16	-1.17*	-0.41	-0.23	0.37	-0.51	-0.22	-3.5**
Foreign_Ownership	-0.43	0.01	-	-1.2	-	0.12	-0.27	-1.26*	-0.59
Franchising_Licens~g	0.97	-0.59	-	0.94	-0.17	-0.59	5.66	0.72	0.32
Govt_Off	-0.50	-0.75	-	-	0.88	-1.51	-4.7	-0.84	-2.72*
Informality	0.03	-0.39	-	1.43	0.98	-1.09	-0.01	-0.72	-1.89*
Innovation	0.41	-	-	-2.7*	-0.89	0.34	-0.602	-0.49	1.93
LandAccess	0.33	-0.48	0.01	-0.5	-0.18	-0.97*	-0.35	0.65*	0.69
Gov_Facilitation	-1.09**	0.28	0.44	-1.54**	0.05	-0.76	-1.21*	-0.08	-2.2*
SkilledWorkers	-0.00	0.002	0.01	0.003	0.004*	-0.004*	-0.000	0.002	0.004*
MainMarket									
National	0.53*	-0.62	1.67**	0.63	0.18	0.274	0.49	0.62*	-2.11*
International	1.02*	-0.28	-	-	0.95	-0.26	-	-	-1.95
Network	0.29	1.11*	0.29	-2.61**	-0.56*	0.44	-0.31	-0.30	-0.61
Constant	-0.344	-2.77	0.17	2.741	1.05	-2.11	2.45	-0.46	5.80
Pseudo r-squared	0.38	0.34	0.42	0.46	0.26	0.49	0.32	0.17	0.69
Chi-square	70.6	39.8	36.4	57.8	34.5	67.7	46.1	26.6	73.9
Number of obs	173	86	66	91	109	101	108	115	82
Prob > chi2	0.000	0.003	0.000	0.000	0.02	0.000	0.000	0.149	0.000

(1) food, beverages and tobacco's sector (2) Textiles & Garments, (3) Leather Products, (4) Wood Products, Furniture, Paper & Print, (5) Petro-chemicals, Plastics & Rubber, (6) Chemicals & Chemical Products, (7) Non-Metallic Mineral Products, (8) Basic Metals & Metal Products, (9) Machinery, Equipment, Electronics & Vehicles

Table 14 Coefficient of Probit regression with DIZ as the dependent variable with three categories of firm sizes

DIZ	(Small)	(Medium)	(Large)
Region			
West Delta	0.089	0.51*	0.77***
Suez Region and Frontier	0.28	1.62***	1.39***
Middle and East Delta	0.13	0.75**	0.85***
Upper Egypt	0.20	0.96***	0.76***
Sector			
Textiles & Garments	0.11	0.39	0.19
Leather Products	0.19	0.72*	0.91*
Wood Products, Furniture, Paper & Print	0.37	1.17**	0.84**
Petro-chemicals, Plastics & Rubber	0.64*	1.44***	0.54*
Chemicals & Chemical Products	0.78*	1.17***	0.41
Non-Metallic Mineral Products	0.80**	0.91***	0.81*
Basic Metals & Metal Products	0.43	0.96***	0.88**
Machinery, Equipment, Electronics & Veh	0.68*	0.63	1.04**
Firm_Age	-0.03***	-0.02**	-0.02***
Manager_Experience	-0.00	0.00	0.002
Manager_Education	0.42*	-0.02	0.222
Manager_Female	0.22	1.13*	0.17
Sole_proprietorship	-0.36*	-0.31	-0.04
Foreign_Ownership	-0.53	0.28	-0.007
Franchising_Licens~g	0.40	0.03	0.35*
Govt_Off	-1.26	-0.79*	-0.26
Informality	0.32	-0.29	-0.36
Innovation	-0.25	0.94	-0.32
LandAccess	0.42*	0.12	-0.32*
Gov_Facilitation	-0.66**	-0.42*	-0.71***
SkilledWorkers	0.001	-0.001	0.000
MainMarket			
National	0.41*	0.08	-0.10
International	0.53	-	0.199
Network	0.05	0.03	-0.11
Constant	0.005	-0.81	-0.07
Pseudo r-squared	0.27	0.22	0.21
Chi-square	107.4	93.5	109.3
Number of obs	285	303	392
Prob > chi2	0.000	0.000	0.000

**** p<0.01, ** p<0.05, * p<0.1*

Table 15 Coefficients of multinomial Probit model with Export Intensity as the dependant variable

Export Intensity	(All Firms)	(SMEs)	(Large)
DIZ	-0.005	1.119*	-0.087
Region			
West Delta	0.039	-1.797*	0.276
Suez Region and Frontier	0.047	-1.053	-0.197
Middle and East Delta	0.255	-0.194	0.495
Upper Egypt	-0.015	-0.882	0.077
Sector			
Textiles & Garments	0.448	1.980*	0.056
Leather Products	-0.695*	-0.885	-0.249
Wood Products, Furniture, Paper & Print	-0.614*	-0.529	-0.825*
Petro-chemicals, Plastics & Rubber	-0.399	-0.881	-0.488
Chemicals & Chemical Products	-0.026	0.418	-0.198
Non-Metallic Mineral Products	-0.001	0.290	-0.476
Basic Metals & Metal Products	0.070	-0.346	-0.032
Machinery, Equipment, Electronics & Veh	-0.365	-0.230	-0.635
Firm_Age	-0.006	0.004	-0.008
Manager_Experience	-0.010	0.020	-0.020*
Manager_Education	-0.660	-0.385	-1.033
Manager_Female	0.216	0.831	-0.340
Sole_proprietorship	-0.189	0.843	-0.375
Foreign_Ownership	-0.311	-0.974	-0.496
Franchising_Licens~g	-0.078	-0.169	-0.249
Govt_Off	0.056	0.518	0.217
Informality	0.044	-0.463	0.143
Innovation	-0.538*	-0.482	-0.660*
LandAccess	0.025	-0.153	0.174
Gov_Facilitation	-0.220	-1.451*	-0.063
SkilledWorkers	0.001*	0.004*	0.001**
MainMarket			
National	-0.010	0.832	-0.322
International	3.552***	3.938*	8.688
Network	0.168	0.091	0.049
cut1	-1.359	0.256	-2.419
cut2	-0.293	1.533	-1.285
cut3	0.933	2.629	0.793
R-squared	0.35	0.37	0.44
Prob > chi2	0.000	0.000	0.000
Number of obs	259	75	184

Table 16 Marginal effects of the multinomial Probit model with Export Intensity as the dependant variable

	(All Firms)	(SMEs)	(Large)
DIZ			
1._predict	0.00142	-0.257*	0.0234
	(0.0547)	(0.121)	(0.0647)
2._predict	-0.000351	0.0439	-0.00675
	(0.0135)	(0.0399)	(0.0188)
3._predict	-0.000742	0.0883*	-0.0158
	(0.0286)	(0.0462)	(0.0437)
4._predict	-0.000330	0.124*	-0.000829
	(0.0127)	(0.0654)	(0.00245)
Regions			
West Delta			
1._predict	-0.0109	0.358**	-0.0744
	(0.0686)	(0.110)	(0.0818)
2._predict	0.00278	-0.0733	0.0210
	(0.0173)	(0.0642)	(0.0227)
3._predict	0.00560	-0.0984**	0.0509
	(0.0353)	(0.0356)	(0.0577)
4._predict	0.00254	-0.187*	0.00247
	(0.0161)	(0.0822)	(0.00401)

Suez Region and Frontier			
1._predict	-0.0133	0.209	0.0540
	(0.0965)	(0.147)	(0.134)
2._predict	0.00334	-0.0170	-0.0227
	(0.0235)	(0.0391)	(0.0611)
3._predict	0.00683	-0.0704	-0.0302
	(0.0503)	(0.0457)	(0.0714)
4._predict	0.00309	-0.121	-0.00105
	(0.0229)	(0.0958)	(0.00256)
Middle and East Delta			
1._predict	-0.0698	0.0351	-0.130
	(0.0767)	(0.185)	(0.0864)
2._predict	0.0125	0.00453	0.0266
	(0.0123)	(0.0185)	(0.0189)
3._predict	0.0390	-0.0126	0.0975
	(0.0449)	(0.0670)	(0.0723)
4._predict	0.0183	-0.0270	0.00571
	(0.0226)	(0.136)	(0.00751)
Upper Egypt			
1._predict	0.00413	0.173	-0.0210
	(0.0690)	(0.107)	(0.0883)
2._predict	-0.00112	-0.00765	0.00723
	(0.0188)	(0.0204)	(0.0300)
3._predict	-0.00207	-0.0603	0.0132
	(0.0345)	(0.0352)	(0.0560)
4._predict	-0.000936	-0.105	0.000549
	(0.0156)	(0.0848)	(0.00246)
Sector			
Textiles & Garments			
1._predict	-0.111	-0.243*	-0.0136
	(0.0902)	(0.111)	(0.121)
2._predict	-0.00774	-0.192*	0.000508
	(0.0227)	(0.0866)	(0.00521)
3._predict	0.0764	0.0442	0.0121
	(0.0628)	(0.0984)	(0.108)
4._predict	0.0427	0.391*	0.00102
	(0.0393)	(0.179)	(0.00907)
Leather Products			
1._predict	0.201	0.213	0.0642
	(0.108)	(0.137)	(0.212)
2._predict	-0.0725	-0.0587	-0.0103
	(0.0470)	(0.0460)	(0.0494)
3._predict	-0.0840	-0.0692	-0.0505
	(0.0459)	(0.0522)	(0.156)
4._predict	-0.0441	-0.0847	-0.00342
	(0.0285)	(0.0715)	(0.0103)
Wood Products, Furniture, Paper & Print			
1._predict	0.178	0.125	0.220
	(0.102)	(0.180)	(0.120)
2._predict	-0.0606	-0.0242	-0.0744
	(0.0402)	(0.0488)	(0.0488)
3._predict	-0.0778	-0.0473	-0.139
	(0.0459)	(0.0650)	(0.0822)
4._predict	-0.0392	-0.0538	-0.00699
	(0.0277)	(0.0818)	(0.00937)
5.Sector			
1._predict	0.115	0.212	0.129
	(0.0942)	(0.167)	(0.115)
2._predict	-0.0321	-0.0583	-0.0313
	(0.0281)	(0.0596)	(0.0305)
3._predict	-0.0565	-0.0690	-0.0924
	(0.0478)	(0.0570)	(0.0865)
4._predict	-0.0264	-0.0844	-0.00544
	(0.0244)	(0.0796)	(0.00834)
6.Sector			
1._predict	0.00719	-0.0848	0.0507

	(0.0857)	(0.140)	(0.102)
2._predict	-0.00105	-0.0115	-0.00714
	(0.0123)	(0.0329)	(0.0138)
3._predict	-0.00420	0.0409	-0.0407
	(0.0502)	(0.0705)	(0.0842)
4._predict	-0.00194	0.0554	-0.00285
	(0.0233)	(0.0920)	(0.00702)
7.Sector			
1._predict	0.000243	-0.0606	0.126
	(0.0998)	(0.178)	(0.130)
2._predict	-0.0000330	-0.00506	-0.0300
	(0.0135)	(0.0251)	(0.0398)
3._predict	-0.000144	0.0289	-0.0904
	(0.0590)	(0.0858)	(0.0928)
4._predict	-0.0000665	0.0368	-0.00536
	(0.0273)	(0.111)	(0.00837)
8.Sector			
1._predict	-0.0190	0.0807	0.00798
	(0.0903)	(0.175)	(0.107)
2._predict	0.00201	-0.0114	-0.000596
	(0.0103)	(0.0342)	(0.00771)
3._predict	0.0115	-0.0327	-0.00685
	(0.0549)	(0.0681)	(0.0918)
4._predict	0.00543	-0.0366	-0.000539
	(0.0256)	(0.0821)	(0.00732)
9.Sector			
1._predict	0.105	0.0528	0.169
	(0.103)	(0.239)	(0.119)
2._predict	-0.0283	-0.00557	-0.0487
	(0.0310)	(0.0375)	(0.0395)
3._predict	-0.0526	-0.0222	-0.114
	(0.0514)	(0.0964)	(0.0853)
4._predict	-0.0243	-0.0250	-0.00626
	(0.0259)	(0.110)	(0.00885)
Firm_Age			
1._predict	0.00157	-0.000825	0.00218
	(0.00149)	(0.00256)	(0.00189)
2._predict	-0.000388	0.000141	-0.000630
	(0.000379)	(0.000437)	(0.000570)
3._predict	-0.000822	0.000284	-0.00147
	(0.000787)	(0.000881)	(0.00128)
4._predict	-0.000365	0.000400	-0.0000774
	(0.000357)	(0.00126)	(0.000104)
Manager_Experience			
1._predict	0.00288	-0.00452	0.00549
	(0.00228)	(0.00479)	(0.00282)
2._predict	-0.000710	0.000773	-0.00159
	(0.000585)	(0.000987)	(0.000903)
3._predict	-0.00150	0.00156	-0.00371
	(0.00120)	(0.00177)	(0.00195)
4._predict	-0.000667	0.00219	-0.000195
	(0.000566)	(0.00232)	(0.000224)
Manager_Education			
1._predict	0.184	0.0884	0.277
	(0.128)	(0.169)	(0.188)
2._predict	-0.0454	-0.0151	-0.0800
	(0.0335)	(0.0309)	(0.0583)
3._predict	-0.0962	-0.0304	-0.187
	(0.0678)	(0.0587)	(0.128)
4._predict	-0.0427	-0.0428	-0.00982
	(0.0324)	(0.0825)	(0.0122)
Manager_Female			
1._predict	-0.0603	-0.191	0.0912
	(0.126)	(0.214)	(0.202)
2._predict	0.0149	0.0326	-0.0263
	(0.0313)	(0.0431)	(0.0587)
3._predict	0.0315	0.0656	-0.0616

	(0.0656)	(0.0745)	(0.137)
4._predict	0.0140	0.0924	-0.00324
	(0.0294)	(0.108)	(0.00787)
Sole_proprietorship			
1._predict	0.0528	-0.193	0.100
	(0.0768)	(0.113)	(0.111)
2._predict	-0.0130	0.0331	-0.0290
	(0.0192)	(0.0275)	(0.0327)
3._predict	-0.0275	0.0666	-0.0679
	(0.0402)	(0.0456)	(0.0759)
4._predict	-0.0122	0.0937	-0.00356
	(0.0182)	(0.0616)	(0.00543)
Foreign_Ownership			
1._predict	0.0870	0.223	0.133
	(0.0682)	(0.163)	(0.0812)
2._predict	-0.0214	-0.0382	-0.0384
	(0.0177)	(0.0382)	(0.0254)
3._predict	-0.0454	-0.0769	-0.0897
	(0.0359)	(0.0609)	(0.0558)
4._predict	-0.0202	-0.108	-0.00471
	(0.0169)	(0.0839)	(0.00558)
Franchising_Licensing			
1._predict	0.0217	0.0388	0.0666
	(0.0558)	(0.0990)	(0.0694)
2._predict	-0.00535	-0.00663	-0.0193
	(0.0138)	(0.0175)	(0.0206)
3._predict	-0.0113	-0.0133	-0.0450
	(0.0292)	(0.0349)	(0.0472)
4._predict	-0.00503	-0.0188	-0.00236
	(0.0130)	(0.0478)	(0.00349)
Govt_Off			
1._predict	-0.0155	-0.119	-0.0583
	(0.0744)	(0.151)	(0.0909)
2._predict	0.00382	0.0203	0.0168
	(0.0184)	(0.0274)	(0.0266)
3._predict	0.00809	0.0409	0.0394
	(0.0389)	(0.0557)	(0.0617)
4._predict	0.00359	0.0575	0.00207
	(0.0173)	(0.0744)	(0.00380)
Informality			
1._predict	-0.0123	0.106	-0.0383
	(0.0884)	(0.159)	(0.117)
2._predict	0.00303	-0.0182	0.0111
	(0.0218)	(0.0306)	(0.0343)
3._predict	0.00642	-0.0366	0.0259
	(0.0461)	(0.0551)	(0.0789)
4._predict	0.00285	-0.0514	0.00136
	(0.0205)	(0.0781)	(0.00430)
Innovation			
1._predict	0.150*	0.110	0.177*
	(0.0633)	(0.187)	(0.0716)
2._predict	-0.0370*	-0.0189	-0.0511*
	(0.0180)	(0.0314)	(0.0239)
3._predict	-0.0783*	-0.0380	-0.119*
	(0.0346)	(0.0675)	(0.0506)
4._predict	-0.0348*	-0.0535	-0.00627
	(0.0177)	(0.0925)	(0.00695)
LandAccess			
1._predict	-0.00702	0.0351	-0.0466
	(0.0523)	(0.0965)	(0.0640)
2._predict	0.00173	-0.00601	0.0135
	(0.0129)	(0.0172)	(0.0188)
3._predict	0.00367	-0.0121	0.0315
	(0.0273)	(0.0331)	(0.0435)
4._predict	0.00163	-0.0170	0.00165
	(0.0121)	(0.0471)	(0.00280)
Gov_Facilitation			

1._predict	0.0614	0.333**	0.0169
	(0.0654)	(0.116)	(0.0877)
2._predict	-0.0151	-0.0569	-0.00489
	(0.0165)	(0.0448)	(0.0254)
3._predict	-0.0320	-0.115*	-0.0114
	(0.0344)	(0.0518)	(0.0592)
4._predict	-0.0142	-0.161*	-0.000601
	(0.0156)	(0.0706)	(0.00316)
SkilledWorkers			
1._predict	-0.000224*	-0.000956	-0.000329**
	(0.0000914)	(0.000563)	(0.000101)
2._predict	0.0000552*	0.000164	0.0000949*
	(0.0000274)	(0.000160)	(0.0000387)
3._predict	0.000117*	0.000329	0.000222**
	(0.0000491)	(0.000227)	(0.0000718)
4._predict	0.0000519*	0.000463	0.0000117
	(0.0000256)	(0.000272)	(0.0000123)
MainMarket			
National			
1._predict	0.00333	-0.230	0.105
	(0.0859)	(0.161)	(0.103)
2._predict	-0.000610	0.0649	-0.0184
	(0.0156)	(0.0638)	(0.0132)
3._predict	-0.00199	0.0966	-0.0787
	(0.0515)	(0.0646)	(0.0839)
4._predict	-0.000723	0.0689	-0.00748
	(0.0188)	(0.0495)	(0.0112)
International			
1._predict	-0.388***	-0.565***	-0.325***
	(0.0761)	(0.143)	(0.0911)
2._predict	-0.355***	-0.248**	-0.369***
	(0.0358)	(0.0881)	(0.0411)
3._predict	-0.139*	0.0275	-0.289***
	(0.0596)	(0.0814)	(0.0833)
4._predict	0.881***	0.785***	0.983***
	(0.0516)	(0.107)	(0.0180)
Network			
1._predict	-0.0470	-0.0208	-0.0131
	(0.0492)	(0.0868)	(0.0654)
2._predict	0.0116	0.00355	0.00377
	(0.0124)	(0.0152)	(0.0189)
3._predict	0.0245	0.00715	0.00882
	(0.0259)	(0.0300)	(0.0442)
4._predict	0.0109	0.0101	0.000463
	(0.0118)	(0.0420)	(0.00238)
N	259	75	184

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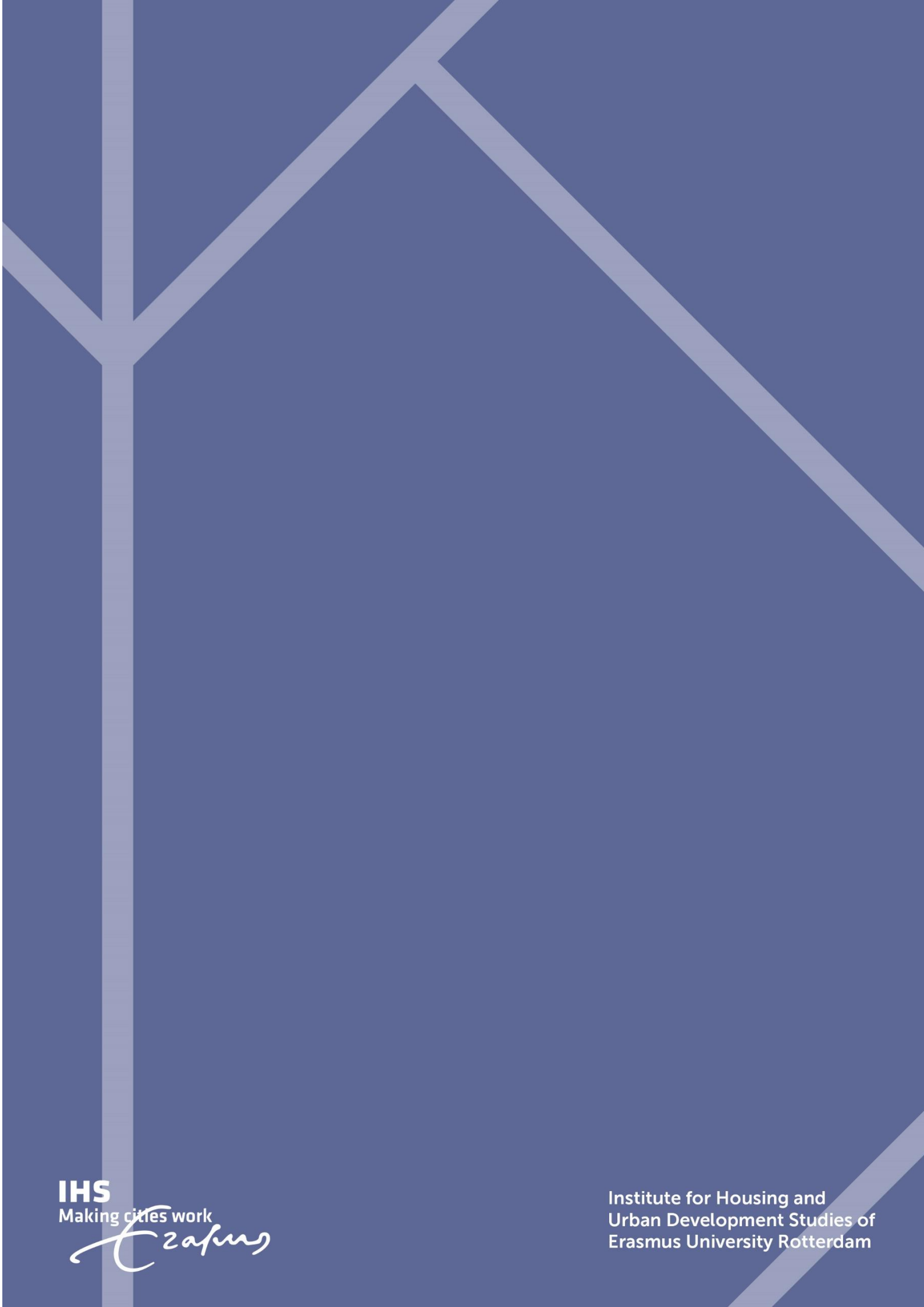

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