

Agglomeration Economies and Urban Growth: The Case of Doha Industrial Area

Asmaa Saleh AL-Mohannadi¹, Raffaello Furlan^{2*}

¹Masters Candidate, College of Engineering, Department of Architecture and Urban Planning, Qatar University, Qatar University, Doha, Qatar

²Assistant Professor, College of Engineering, Department of Architecture and Urban Planning, Qatar University, Qatar University, Doha, Qatar

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*Corresponding author: Raffaello Furlan

Abstract

Agglomeration is derived by clustering of firms that contributes to the generation of centers in urban areas or in areas of vibrant economic activities. Doha as a city has witnessed clustering of several industrial activities in different locations since the beginning of the industrial development of the state and the discovery of hydrocarbons. Today, Doha Industrial Area is becoming a major zone that is growing as a result of agglomeration as well as the effective private sector's participation in the running of small-to-medium industrial activity, managed by the government. This research study explores the role of agglomeration in the clustering of industries and its economic impact on the city based on the theory of agglomeration economies. Considering the land use of the studied industrial area, its accessibility, location and other urban considerations, Doha Industrial Area, namely zone 57, is explored as an exemplar case to offer an understanding of agglomeration of industry clusters in the context of Doha. The research is shedding light on the role of active governance in the distribution of land use within the studied zone. Further analysis of establishment types, areas and spatial distribution within the zone provides impressive remarks on the role of agglomeration in the creation of specialized cities to enhance the private sectors' role in the process of economic growth and urban development.

Keywords: Agglomeration Economies, Industry Clustering, Doha, Small-to-medium industry.

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INTRODUCTION

This research study focuses on the analysis of agglomeration economies that drive the urban growth. Agglomeration economies is defined as *"the positive externality acquired by firms through increased productivity generated from the spatial concentration of industry"* [1]. The study explores an industrial estate in the city of Doha in Qatar, Doha Industrial Area. The aim is to investigate the effect of firm clustering on the urban development of areas in addition to analysing the role of agglomeration in the creation of specialized cities.

In general, urban growth in the developing world is facing challenges that contribute to the disequilibrium of urbanization [2-5]. The city of Doha in Qatar is no exception to this argument as it currently lacks the proper management and implementation of urban growth plans [6-8]. Recent studies indicate that the initial planning schemes of Doha has failures in terms of the following, *"master plan formulated by external consultants who are insensitive to local dynamics; lack of a serious discussion about ongoing*

megaprojects or non-participation in planning processes; fragmented governance and lack of integrated land management; and incapable and redundant local government agencies" [9, 10].

The problem of increased demand for industrial land in Qatar results in the creation of isolated, condensed zones dedicated for small-to-medium industrial activity that contributes to the fragmentation of the city. The effectiveness of land use, land rent and spatial distribution of activity within such clustered industrial zones is questioned, and further analysis is supported by theories of urban economics that interrelate existing scenarios to theorized models of urban growth [11, 12].

The research study aims to understand the effect of agglomeration on industrial activity within a clustered industrial zone. The hypothesis is assuming a high benefit gained by industrial zones in terms of land use, land value, and specialization resulting in a growing demand for such zones [13-15]. The active participation of the private sector in the economic

development results in the establishment of Doha Industrial Area as it is primarily dedicated to small-to-medium scale industries. While infrastructure, utilities land use and zoning regulations are provided by the governmental authority. Thus, Doha Industrial Area is explored as an exemplar case to offer an understanding of agglomeration in the context of Doha, where collaboration of the public and private sectors is revealed through the urban management of the industrial area.

The question of the research is revolving around the following issues: What are the industries that are agglomerating in the Doha industrial area? How is agglomeration spatially manifested? What are the drivers of agglomeration and what is their economic impact on the city and its sustainable urban growth?

The Doha Industrial Area, zone 57, is investigated to provide a justification for the research study's hypothesis. Based on available census and statistics of industrial establishment, land use and spatial distribution of activity within Doha Industrial Area, the spatial distribution of industrial land, services and activity in the zone is traced and evaluated based on the theory of agglomeration economies. Further analysis includes the spatial distribution of employment, jobs and transportation.

The study concludes by referring to the increasing demand for localization economies in Qatar, and the need for industrial areas and cities that are characterized by clustering performance. The country is recently investing on megaprojects that support agglomeration including the expansion of the current Doha Industrial area and the ongoing Economic Zones projects. Such zones benefit from the agglomeration of economies and support current industrial and economic development of the country.

LITERATURE REVIEW

The rarity of references that provide theoretical or empirical analysis of urban economics in the developing context of the State of Qatar draws attention to the significance of the interdisciplinary consideration of urban studies that requires further exploration. Most of the analysis is concerned with the effect of the economic variable in the urban growth, which is limited to the spatial distribution of activities in the city or the economic impact on urban structures [16-18]. However, the essence of urban economics is concerned with the role of economics in the making of the city that found to be a missing linkage in the available body of literature. Thus, the literature review covers regional as well as international cases that provide a theoretical explanation of agglomeration economies.

In urban economics, which interrelates economic growth to urban studies, agglomeration

economies provide a theoretical justification to the question of why firms cluster rather than split to avoid competition in the urban region [19]. Thus, agglomeration economies refer to the benefits of clustering of firms, employment and population due to the economic forces of localization economies and urbanization economies. The two concepts are defined as follows:

“Localization economies imply that firms benefit from clustering with other firms in the same sector [20] while urbanization economies mean that diversity can better promote innovation” [21, 22].

The typologies of agglomeration economies are defined differently according to the scope of research and the regional imperatives of a definite context. Thus, when referring to industrial clusters, some researches assume industrial clusters to create urbanization economies rather than localization economies, where unrelated firms concentrate. Urbanization economies are assumed to be related to the diversity of the concentration that are represented by relatively small or new firms located within common industrial districts. Therefore, the following discussion provide an insight on the urbanization economies of industrial activities,

“In the case of spatially constrained external economies of scope, more commonly known as ‘urbanization economies’, the concentration of economic activity involves unlike but unrelated firms. Such an environment not only facilitates the sharing of specific inputs among diverse firms, but (more importantly) also permits these firms to share public utilities, transportation services, and other elements of the common infra- structure, as well as specialized business services, all of which are typically provided by a third party (the state or the market)” [23].

In the recent era of globalization, the value of innovation and technological advancement are utilized efficiently when firms agglomerate, allowing for better integration of expertise and knowledge. Recent studies interrelate agglomeration economies to business innovation, following the assumption that concentration of firms can bring knowledge externalities depending on the absorptive capacity of each firm [24]. Thus, the physical proximity of firms encourages mutual interactions and efficient knowledge transfer. Such benefits are related to the effect of globalization as a process on market openness and global flows, raising a new typology of agglomeration economies known as knowledge-intensive economies,

“In the context of industrial districts, Breschi and Lissoni [25] point out that specialized knowledge does not circulate openly; instead, its creation, access, and use seem to be restricted to certain specific communities or networks inside the district” [24].

According to the National Bureau of Economic Research, “*agglomeration economies are the benefits that come when firms and people locate near one another together in cities and industrial clusters*” [26]. These benefits all ultimately come from transport costs savings: the only real difference between a nearby firm and one across the continent is that it is easier to connect with a neighbor” [26]. Thus, one of the factors that support the creation of agglomerated economies is the reduction of transport costs due to the clustering of firms, zones or other specialized areas. Another factor is the limitless self-reinforcing gains that are associated with the clustering of firms or industries, under the assumption that “*the movement of one firm to a city increases the incentive for other firms to move to the city*” [19]. In addition, the benefit of firm clustering extends to cover the sharing of intermediate inputs; labor pooling; labor matching; knowledge spillovers; and the mobility of labor and services within the limits of a cluster.

One of the most valuable references in urban economics that targets the economics of agglomeration is a book titled “*Economics of Agglomeration. Cities, Industrial Location, and Regional Growth*” [27]. The book outlines the reasons for firm clustering. The aim is to investigate the economic reasons that leads to the concentration and clustering based on spatial location including industrial agglomeration. According to the book, “*The idea of localization economies also explains the growth and success of industrial districts, that is, regions that accommodate many small firms producing similar goods and that benefit from the localized accumulation of skills associated with workers residing in these places*” [28]. *Some industrial districts are engaged in high-tech activities* [29], *but others are involved in more traditional, labor-intensive activities, many of which can be found in the “Third Italy”* [30, 27].

The book also explains the formation of industrial clusters, which depends on the three forces of “*the magnitude of localization economies, the intensity*

of price competition, and the level of transport costs” [27]. Models and theoretical functions are utilized to better understand the process and effect of industrial agglomerations.

Since the research study is devoted to the analysis of agglomeration of industrial clusters in the State of Qatar, three interesting references are utilized to provide the required information concerning the industrial development of Qatar. The references include valuable PhD thesis documents conducted in the late 1980s and early 1990s by local scholars [31, 32]. Such reference provides the historical background of the establishment of industrial clusters in Qatar, together with the outlined process of land use and management, and the predefined economical as well as urban imperatives of the era. Consequently, the choice of location of Doha Industrial Area is defined by the urban strategy of zoning, following the advisory consultation of British planning firm, namely Llewellyn-Davies. The British firm was appointed by Qatari government to initiate an urban plan of Doha in the year 1973 [6, 33-35], and the execution of the project was carried out by Ministry of Public Works [31]. The following part of the research study is discussing the detailed approach of land use and zoning strategy of the initial plan of Doha Industrial Area, along with tracing the changes over time to compare the initial plan to the existing land use schemes and updated development plans.

THE RESEARCH DESIGN

The research study follows a theoretical, interpretative approach to fully comprehend the concept of agglomeration economies in a definite urban context, assuming the economic forces to create a noticeable phenomenon of industrial clusters within a portion of the city. Based on available urban information and census data of the studied zone, in addition to the relevance of historical information utilized in previous research, the findings reveal the direct effect of agglomeration economies on the spatial distribution of activity within the Industrial Area [36-39].

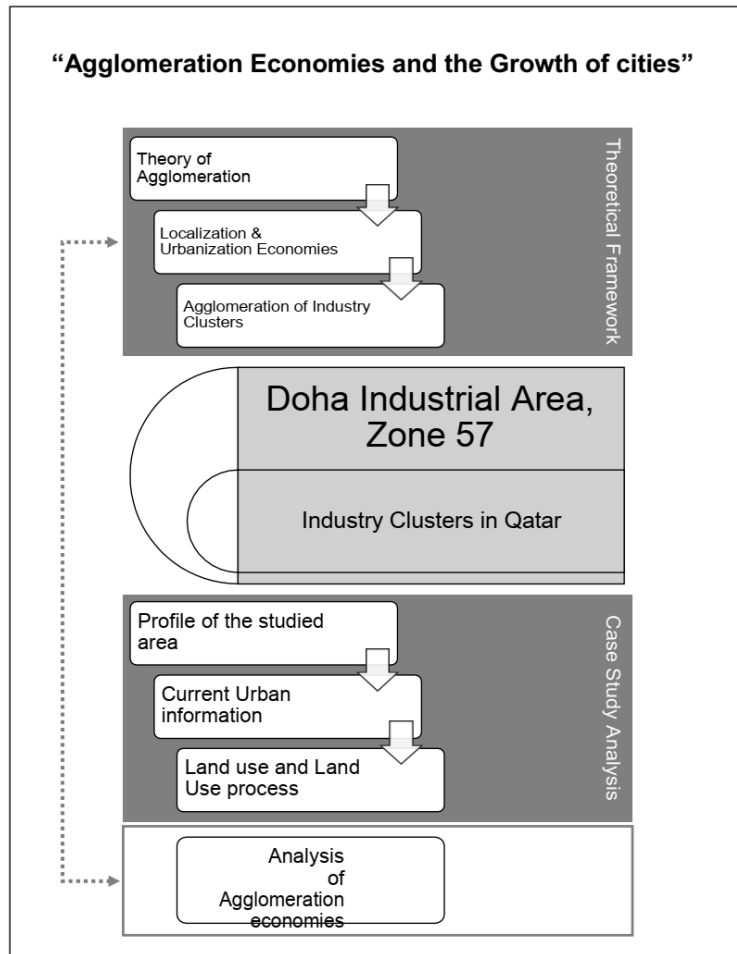


Fig-1: Agglomeration Economies and the Growth of Cities

FINDINGS AND DISCUSSION

The findings are structured into specific sections, following the methodology of case study analysis. A detailed land use categorization is identified

in addition to the contextual analysis of the connections, infrastructure, existing facilities, establishment census and other parcel information responding to the nature of economic activity in the selected zone.

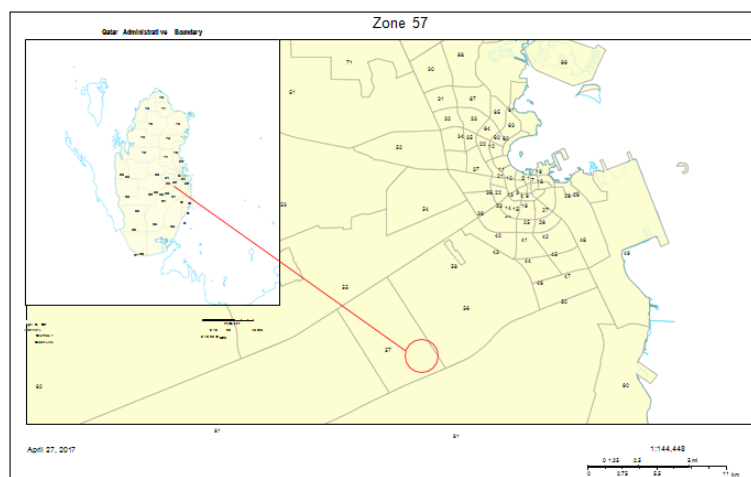


Fig-2: Profile of the Studied Area: Doha Industrial Area, Zone 57

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS

The Doha Industrial Area is located on Salwa Road, which is one of the main highways that connects heart of Doha to the external boundaries of the city. It is located 10 km west of Doha, covering approximate 28-30 km² of land area. According to the initial planning schemes of the Doha Industrial Area, it was chosen to allocate privately owned small-to-medium industries based on foreign consultation during the early 1970s. The aim was to allocate scattered privately owned industries away from the residential core of Doha into the boundaries of the city as a zoning strategy. Thus, *“The Salwa Industrial Area, south west of and outside the main limit up area was designed to enable these small industries to be relocated so as to reduce*

pollution, disturbance and traffic congestion in the developing capital city of Doha” [32].

According to the initial land use categories of the area, types of industrial activities include food industry, chemical industry, metal fabrication industry, non-metal industries, printing industry and warehousing [31]. Another reference states that the land use is divided into sections described as holding. The sections include garages and metal working, trading shops, glass and tiles factories, prefabricated asphalt mixers, car agencies and garages, office equipment and paper products, cooling systems, industrial equipment and warehouses, company equipment, as well as gas stores and diverse professions [32].

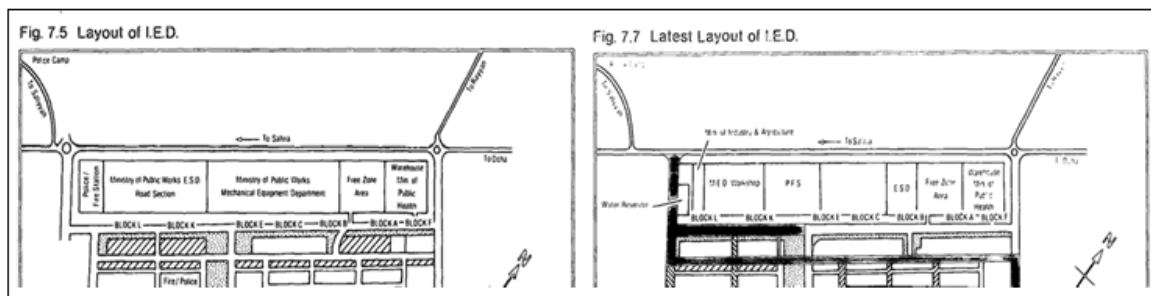


Fig-3: Layout of LED

Referring to the latest population census [40], Doha industrial area is considered one of the most populated zones in Qatar. This fact is directly related to the urban growth of the area as the population rate has been rapidly increasing due to migration of labor forces and the concentration of low-waged workers in the industrial area. In 2015, the population density of the Doha Industrial Area reaches 11,362.5 km², making it one of the highly populated zones of Doha. Table 1 below indicates the population growth in the studied zone since 1986.

Year	Population
1986	8704
1997	23,454
2004	62,612
2010	261,401
2015	364,710

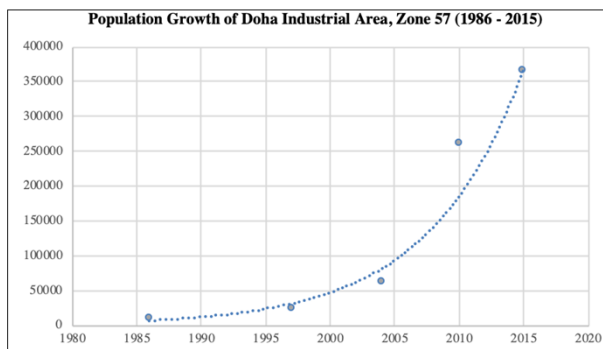


Fig-4: Population Growth of Doha Industrial Area

Current Urban Information of Doha Industrial Area

Among the factors contributing to the creation of agglomeration economies in the Doha Industrial Area is the availability of physical infrastructure and transportation network. The site itself is located on the main highway of Salwa road where infrastructure and utilities are provided by the government. The spatial location of the Industrial area contributes to the specialization of the area as an industrial estate where the role of active governance is clearly manifested in the administration and regulation of the services available in the area. In addition, the area *“began to be absorbed by the growth outwards of low density housing from the urban center, and effectively is now within Greater Doha”* [32].

Analysis of establishment status in the Industrial Area reveals that almost all establishments are currently operating by private stakeholders owning the land plots, as indicated in Table 2 below. While the analysis of settlement distribution and building status results in a low count of buildings under maintenance, construction or demolish within the Industrial area. Such data indicate the active nature of the industrial clusters within the area where the plots are fully utilized for various manufacturing as well as service industries.

Establishment Status in the Industrial Area, Zone 57, 2015	
Vacant	371
Under Preparation	134
Completely Closed	129
Temporarily Closed	105
Operating Establishments	4412
Total Establishments 2015	5151
Settlement Distribution in the Industrial Area, Zone 57, 2015	
Completed census buildings	4567
Building Under Maintenance	110
Building Under Construction	188
Building Under Demolish	58
Total Buildings 2015	4923

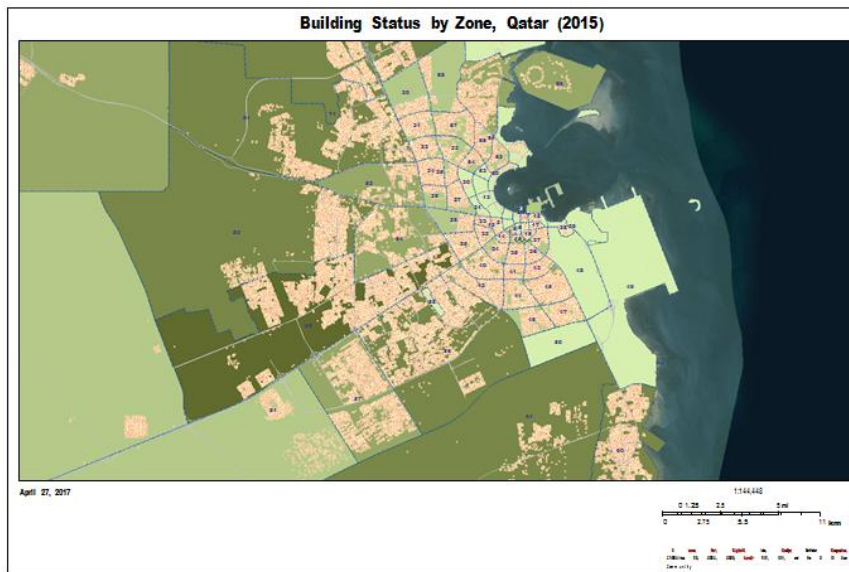


Fig-5: Building Status by Zone, Qatar (2015)

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Land Use and Land Use Patterns in Doha Industrial Area

The land use pattern of the Doha Industrial Area is characterized by industrial zoning, with low-to-medium impact industry zones or small-to-medium scale industries. This fact has been initially integrated in the planning of the zone since its early establishment in 1988 [41]. Referring to the initial two-phased plan of the government, the land use is indicated by the following zoning categories.

Zoning Category	Percentage
Industrial Zone	62%
Road Networks	22%
Green Belt and Open spaces	13%
Common Facilities	3%

Within the majority of industrial land area, nine activities are incorporated to provide the necessary industrial services and facilities. The industrial zone is divided into nine basic activities: (1) Food and beverages manufacturing; (2) textile, wearing apparel and leather products manufacturing; (3) wood and wood products; (4) paper and paper products; (5) hazardous

chemical industries; (6) non-hazardous chemical industries; (7) non-metallic mineral products; (8) fabricated metal products; and (9) other manufacturing industries [41].

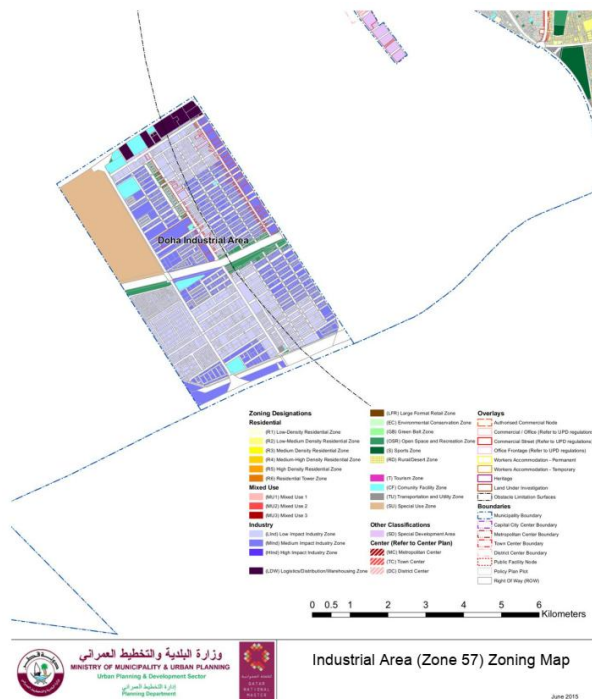
Referring to the zoning map of the industrial area that updated in June 2015 by Ministry of Municipality and Environment, the spatial allocation of low-to-medium impact industry zones is contained within the Industrial area’s boundaries. To the north on the main highway of Salwa road, most of the utilities are indicated as logistics, distribution and warehousing activities, with the integration of community facility zones including a police station, civil defence and limited sports facilities. On the eastern boundary of the area exists the main agency street, by which most of the international automobile and car agencies allocate their main workshop headquarters and support services. Opposite to this main street is a large residential zone, a labour city and Qatar racing club.

Approaching to the inner zones of the Industrial area, low impact industrial plots exist with a variety of services and activities including the nine

previously mentioned categories in addition to transportation and utility zones to serve the entire area. Further community facility zones are spatially

centralizing the area including Kahramaa main substation; workers hospital and labor camp areas. To the west exists a special use zone that is undeveloped.

Proportion of Land Use in the Industrial Area, Zone 57, 2015	
Zones Area (sq. km.)	32.10
% Land Under Use	62.63
Land Under Use (sq. km.)	20.10
Unused Land (sq.km.)	11.99
General Land Use Categories in the Industrial Area, Zone 57, 2015	
Residential	2.23%
Commercial and Industrial	10.35%
Education and Health	0.09%
Government Special Use	4.18%
Sports, Tourism, and Religion	0.05%
Farming and Green Area	0.00
Other including under construction	1.84%
Transportation and Utilities	0.54%



CONCLUSION AND RECOMMENDATIONS

The Doha Industrial area is highly gaining the beneficial externalities of agglomeration economies as the specialized zone is planned to serve a definite category of industrial activities. The existence of low-to-medium industries that are managed by private stakeholders including local manufacturers as well as international agencies support the creation of diversified concentration, which is assumed to be the forces of urbanization economies. The adequate provision of infrastructure, transportation and utilities by the government within the area is contributing to its development as a specialized city, where the existing labor populations are utilizing the community facilities and the camps scattered around the main industrial core of the area leading to further growth in the labor market pooling. A major sign of growth in the industrial area

is the rapid growth of its population, in addition to the authorities’ continuous plans for expansion. Lately, a new industrial area is extending from the recent area to the west with modern amenities that are expected to cover the rapid demand for industrial land in Qatar. Furthermore, the government is recently investing in the mega state-owned projects of the Economic Zones Company, Manateq. The company is a leading developer and operator of Special economic zones and logistic parks in the state of Qatar [42]. The economic forces of agglomeration would be further integrated in the process of economic growth with connection to urban economics. Expected higher rates of worker productivity, city-industry growth and external economies of scale would be intensified in the new proposed projects, compared to the foundation case of the Doha Industrial Area, that is still demonstrating the effective role of agglomeration in industry clusters.

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Asmaa Saleh AL-Mohannadi holds B.S. Degree in Architecture [43] from Qatar University. She was honoured by HH. Emir of Qatar for Educational Excellence in 2015. She is undertaking a Master’s Degree in Urban Planning and Design at Qatar University.

Raffaello Furlan is an Assistant Professor at the Department of Architecture and Urban Planning (DAUP) at Qatar University. Raffaello Furlan holds Bachelors and Masters Degrees from IUAV University in Venice (Italy), and a PhD in Architecture from Griffith University in Brisbane (Australia). He has held visiting and permanent positions in Australia (University of Queensland and Griffith University in Brisbane), UAE (Canadian University of Dubai) and Qatar (Qatar University). He has been teaching Art History, History of Architecture, Project Management, Urban Design, Architecture Design and Interior Design. His areas of interest include Vernacular Architecture,

Architecture and Urban Sociology, Project management, Art History. Member of the Board of Architects in Italy and Australia, he has 20 years professional experience, split between design management, project management and supervision roles, with some highly respected companies, 6 years of which were in Italy, 10 years in Australia, and 4 years in Middle East.

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