An-Najah National University
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Urban Planning Engineering

Planning Agro-Industrial Park
In Kfr el Labad, Tulkarem

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Abstract

An Agro–Industrial Park (AIP) is a geographic cluster of independent industries grouped together to gain economies of scale and positive externalities by sharing infrastructure – roads, power, communication, storage, packaging, by–product utilization, effluent treatment, logistics and transport, laboratory facilities, etc. The development of the agrifood industry will obviously vary in different regions of the world depending on current levels of sophistication with respect to the production, preservation and processing of agricultural commodities.

To establish a viable Palestinian industrial estate specializing in agro–industries, many stages have been done, the major target, agriculture and agro–industry is a potential driving force for sustainable economic development .The targeted industries :target area of any investment of agricultural industries as food industries and related services. Foundations and requirements of planning AIP have been studied in West Bank ,Tulkarem Governorate in Kfr el Labad town with 850 dunums in many levels such as Regional ,local analysis, to decide where is the best location ,the site selection has been done, planning general master plan of AIP , Contains main zones as livestock industries zone ,Citrus zone..etc .And Detailed master plan and urban design.
Acknowledgments

God bless all who support me in my life. To my mother and the next to my mother and the next to my mother then to the world, and thanks to my Supervisors, Dr. Ali Abdehameed and Dr. Zahraa Zawawi
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Nomenclature

List of Abbreviation

GIS Geographic Information System
MP Master Plan
AIP Agricultural Industrial Park
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAIP</td>
<td>Tulkarem Agricultural Industrial Park</td>
</tr>
<tr>
<td>MP</td>
<td>Master Plan</td>
</tr>
<tr>
<td>AIP</td>
<td>Agricultural Industrial Park</td>
</tr>
</tbody>
</table>
Chapter 1

1. INTRODUCTION

1.1 Overview

An Agro–industrial Park is a geographic cluster of independent firms grouped together to gain economies of scale and positive externalities by sharing infrastructure – roads, power, communication, storage, packaging, by–product utilization, effluent treatment, logistics and transport, laboratory facilities, etc. – and taking advantage of opportunities for bulk purchasing and selling, training courses and extension services. Multiple agro–processing functions take place in the IAIPs, such as final processing, storage, packaging, marketing and distribution. Support businesses and social infrastructure are also present.

AIPs will include open area production zones, controlled environment growing, precision farming, knowledge hubs and research facilities, rural hubs, agrinfrastructure, collection centres, primary processing hubs, RTCs, social infrastructure and agri–marketing infrastructure, among others. AIPs will have state of the art infrastructure. General infrastructure will include: roads, power, water, communications, drainage, sewerage, sewage treatment plant, effluent treatment plant, storm water drains, rain water harvesting, and firefighting facilities, among others. Specialized infrastructure will consist of cold storage units, quarantine facilities, quality control labs, quality certification centres, raw material storage, controlled and modified atmospheric storage, central processing centres, etc. In addition, infrastructure at the IAIPs will emphasize environmental sustainability. (2012,UNIDO,p14)

The establishment of dedicated industrial estates of idea of AIP started between the late 19th century and the early 20th century, agriculture felt the effects of the industrial revolution that until then had only involved other production industries. Real modern industries were created that were nevertheless physically located in rural contexts where the economy and social fabric were still of the traditional type. It is in this social and economic scenario that the first agro–food buildings of impressive architectonic size and structure emerged. (2012,UNIDO,p18)

The targeted industries: target area of any investment respect to, in some way, and agricultural industries and related services. If there is, mixing, or you do not specify, for business or industry, with falls within the domain of the decision, or not; the body and the developer to review the details of the field of agro–industrial business, to report it. (2014,UNIDO,p20)

The development of the agrifood industry will obviously vary in different regions of the world depending on current levels of sophistication with respect to the production, preservation and processing of agricultural commodities.
current situation of Palestinian agricultural industrial park

To establish a viable Palestinian state, its sustainable economic development is indispensable. The role of the private sector, esp. SMEs, is crucial in achieving the sustainable economic development.

In the West Bank, agriculture and agro–industry is a potential driving force for sustainable economic development.

The concept is to materialize projects through regional cooperation for the prosperity of the region, working collaboratively with neighboring countries; such as establishing an agro–industrial park at the strategic site in the Jordan Valley.

The Palestinian Authority, Israel, Jordan and Japan established the Four– Party Consultation Unit, and started working on Jericho Agro Industrial Park as its core project.

The Major Target (2012, Japan`s Initiative):
Industry:Food industries
- Targeted Market: West Bank and Abroad
- Developer: JAIP Co.
(Concession contract signed on June 12, 2012)
- Incentive, lease fee to be finalized
- Financial support by the Government of Japan:
  < Infrastructure >
  - Upgrading Road to Jericho city (UNDP)
  - Land Reclamation of the Stage I (UNDP)
  - Establishment of Solar Power Plant (JICA)
  - Water supply to JAIP for Stage I (UNDP)
  - Administration Building (UNDP)
  - Jericho Waste Water Treatment Plant (JICA)
  - Substation (UNDP)
  < soft component >
  - PIEFZA capacity development (JICA)
  - Support for hiring PIEFZA General Director(UNDP)
Image of the Stage I
194 Donum (19.4ha)

Photovoltaic Panels
(Solar Power Plant)

Total of 111.5 ha:
Stage I (19.4 ha)
Stage II (42.1 ha)
Stage III (50.0 ha)

Representative Office of Japan in Ramallah
1.2 Research Problem

One of the perspective solutions of the problems of food security is to create an agro-industrial park, which will provide the infrastructure for agricultural producers during production, processing and sales of products by small producers. There will be organized the production process from raw material supply and production process control to pre-packaging, packaging and delivery of products to the consumer in the agro-industrial park based on principles of public-private partnership.

The ability of agricultural and food industries to continue to respond to the undoubtedly substantial increase in demand in future decades will be highly dependent on the increased application of existing technologies as well as the exploitation of new and innovative technologies. By 2050, the world demand for food will double, driven by the predicted population growth and the projected broad-based economic growth, which will lift low-income consumers out of poverty.

1.5 Research Significance

1.5.1 Objectives

The main object is to develop an agro-industrial area

The sub objectives:

- Diagnosis of the agro-industrial situation in Palestine
- Identify the problem and needs
- The study of the geographical and physical characteristics of the study area
- Providing planning proposals for the agro-industrial zone
- The strategic goal of creating the agro-industrial park is the production of competitive products and improvement of socio-economic development of rural areas.
- There will be organized the production process from raw material supply and production process control to pre-packaging, packaging and delivery of products to the consumer in the agro-industrial park based on principles of public-private partnership.
- To provide master planning and design services for AIP that here is not case studies such as this project.
- Achieve industrial decentralization
- Environment protection with high-leveled technology, Minimized post-harvest losses and reduced wastage
- This will reduce the maximum level of product loss and wastage.
- AIP could become a sustainable economic development model
- Encouraging investment, promoting trade and creating job opportunities
- To reduce rural poverty:

Poverty reduction will be achieved through the integration of smallholder farmers, small-scale processing enterprises and allied industries in commercial value chains. This, in turn, will increase local value-addition,
create additional jobs in rural areas and improve the overall efficiency of the agricultural value chain. Medium- and large-scale firms will also benefit from more efficient value chains, through reduced transaction costs, allowing for additional growth and job creation.

- To drive the structural transformation of the economy:

  Structural transformation will be driven by the development of the agricultural production system from its current fragmented and supply-driven practices, to one that is organized and based on quality and demand. Such a change will boost agro-processing and will help stimulate a shift in investment and human resources from agriculture to agro-industries.

- Provide a close interface between research, extension mechanisms, industry and farmers in the agricultural sector.

- Protect Environment:

  major consequences for agricultural production and food processing. Such scarcity of water will strongly influence the use and methods of irrigation, plant breeding…etc, water recycling and reuse in food production and processing systems.

1.6 Report Organization

This report will be arranged as follows: Section 1 introduce the problem and the hypothesis of this report. Section 2 presents the methodology followed to test the hypothesis. Section 3 presents sets of simulation studies. Conclusion of the study is presented section 4.
1.7 Methodology

سوف تعتمد هذه الدراسة في منهجيتها على الأساليب التالية:

1. الأسلوب النظري الوصفي من خلال دراسة التقارير والبيانات المرتبطة بالهيئة المدن الصناعية والوزارات ذات العلاقة، إضافة إلى الإطلاع على الدراسات والأبحاث في مجال الصناعة.

2. الأسلوب الإجرائي العملي من خلال الدراسات والمسوحات الميدانية وجمع البيانات والإحصائيات، والمقابلات الشخصية مع المعنيين بهدف استكمال المعلومات اللازمة في الدراسة وتغطية الجوانب الفنية والتقنية والتخطيطية.

3. الأسلوب التحليلي الذي يتمثل في تحليل المعلومات التي سيتم جمعها ووضع الاستنتاجات والاقتراحات المطلوبة، والتي تعتمد على القوانين الخاصة بإنشاء مجمع صناعي زراعي في مرحلة التخطيط والتنفيذ.

1.8 Data Sources:

ستتركز المعلومات والبيانات الواردة في هذه الدراسة على عدد من المصادر أهمها:

1. المصادر المكتبية وتشمل الكتب، الأبحاث، التقارير، النشرات، رسائل الماجستير في الدول الأخرى المتعلقة بموضوع الدراسة.

2. المصادر الرسمية وتشمل البيانات الصادرة عن جهاز المركز الإحصائي الزراعي والصناعي، الوزارات، والمؤسسات ذات العلاقة، إضافة إلى الخرائط والخطط.

3. المصادر الميدانية وتشمل المعلومات التي سيتم الحصول عليها من المقابلات الشخصية مع موظفي الهيئة المدن الصناعية والخبراء الأكاديمية في البحث والتطوير في هذا الجانب من مختصين وذوي العلاقة والخبرة الفنية والتقنية في هذا المجال.
2.1 The concept of industrial zones

Industry Definition

Industry is a practice of human activity in order to convert item or more of material to the other new material with specific properties and special conditions at their production in order to ease the marketing or for the performance of a particular function. (AlSamaak, Azhar and others, 1987)

The United Nations defines the industry as converting inorganic materials or organic materials, by mechanical operations or chemical processes to other products, whether it is accomplished by machine or by hand, and whether the place of production is in a factory, workshop or in the house, and either it was sold to a wholesaler or sold to retailers (AlSayeh, 2015, p19)

2.2 Genesis and Development of the industry

It can be said that the industry has appeared since that God created human on this earth, and it was found where people live and where raw materials of industry were available, after that the industry development appeared to satisfy the needs of people as hunting tools industry and the tools of war to protect from the dangers, and with the passage of time and the evolution of life have increased human needs to many things have developed industry, followed by clothing, food and farming tools and other industries. The phases of industry (Sharef, 1976) include:

First stage: when the little number of population and their limited needs, the practice of industrial activities was in surrounding of family. It was that the family produced its needs of clothing industry, hunting and food tools.

Second phase:
When the population increased and increasing of their needs, they lived in communities, and their production of materials and tools was surplus of their needs, the specialization in industry was appeared as consequences of these factors, for example, as specialization in agriculture tools. In this phase, it was that the worker founded the raw material and produced by freehand without any equipment or machines.

Third phase:
In this phase, with continual increasing of population and their new needs, and expanding of markets, development of transportation, also because of appearance of traders whom transferred their goods between these markets, as a result, the integrated relationship between workers of industries and traders was appeared, so the traders takes the goods from the workers of industries and soled them in regions far away from industries, but the traders gave the raw material for the workers of industries, for example, the wool.

Fourth phase:
In the latest of fifteenth century, the development of industry was accured with urban geographic was appeared, the industry in homes was substituted by industry in workshop independent of homes, and the teamwork was appeared in this phase instead of one worker.

Fifth phase (Al-Saqqar, 1994, p201):
Previous phases have been known as (Eotechnic), but this phase started after the industrial revolution in the early of eighteenth century, Shift from agricultural production to industrial manufacturing, The industrial revolution is typically thought of in terms of technology – the invention of complex machines and use of inanimate energy sources that greatly increased worker productivity – but important cultural, social and population changes were also involved. This phase was known as (palaeotechnic), as consequence of this industrial revolution, the appearance of development of transportation system as railways, and there was Immigrants’ Problems after immigration from rural area to cities to work in industrial area.

The sixth stage:
This phase began in the mid-twentieth century, after World War II, where the industrial revolution technological appeared, and the production has become less expensive and more quality, this phase was known as (Neotechnic), it is characterized by depending on electricity, light metals. The change of manufacturing was called (Automation) through the use of electronic machines. After the development of the computer, the automatic machine replaced a large part of the mental work and labor, creating a new economic relations and what is called the global economy. (Allam, 1998, p110).

2.3 Types of industrial areas

1 Type the industrial zone, according to the site (Alsaed, 2003 p42)

The industrial zone could be one of this types, an urban or semi-urban or rural area, determined by national policies on regional and urban planning of industrial development goals.

2 type of industrial area by Activity (Saudi Industrial Propert Authority, 2014, p116, AlSayeh, 2015, p23-24)

Identifying the principal activity of units in industrial area, the food industry, textiles and garments industry, wood and wood products and furniture industry, Paper, printing and publishing industry, chemical and plastic products industry, building materials and porcelain glass industry, basic metal industries, metal products industries, machinery and equipment and Cooling and storage depots.

1. And it is classified as industries in modern times to primitive Industry, simple Industry and complex industries.

2. Light, medium and heavy industries:

Light industry needs to small areas and are often near residential areas, the medium needs more space, and may be close to residential areas, such as furniture and food industry, heavy requires large area, it is often dangerous as weapons and metal industry.

3. Natural classification, this classification depends on the nature of the industry, for example:

- Process-Based Production industry: transforming raw materials into a new substance in terms of form and use.
- Extractive industry: the extracting of raw materials to use it in new industries are done by this type of extractive industry.
- Aggregated Industry: the compilation of the different products for the production of new goods such as cars and aircraft industry.

3. The Type of industrial zone according to the motivation (Alsaed, 2003 p23)

The industrial area can be classified based on the development, or promotional, or dispersal motivation, so the industrial area can be classified as follow:

1. Developmental Industrial Estate “منطقة صناعية تطويرية”

The region is designed to develop, improve and increase the level of industrial activity in the region where is located, and it is often in rural or semi-rural area, working to stimulate the profession of Contractors between artisans, this type establishes Nursery Estate “المنطقة الحاضنة”

2. Promotional Industrial Estate “منطقة صناعية ترويجية”

Entering new industries in the late economically regions and development of existing industries, as in the rural areas, where it helps to ensure the success and promotion of the industrial process in rural areas.

3. Dispersal Industrial Estate “منطقة صناعية احلالية”
The main aim of this type is solving the problem of industrial concentration that suffers from high density of population and lack of places and environmental problems. Also it will contribute to the development of industrial activities in the region and the reduction of population migration from the rural areas to the cities, it works on the distribution of investment and do not concentrate in a specific area as the capitals.

4. **Type the industrial zone according to the Sponsorship** (Alsaed, 2003, p24)

Industrial areas are classified according to ownership, sponsorship and financing the all money or partially.

1. **Governmental funding**

Local governments and local councils fund some industrial areas, the rural, urban and semi-urban industrial areas, and they work on rules and regulations that must be followed in the planning and construction of industrial zones, and that's where government industrial areas are significantly contribute to the development of the industry in developing countries.

2. **Private funding**

Participation of the private funding is low in construction of industrial areas in developing countries because these projects need huge capital, and the public sector has larger responsibility, while in the developed industrial countries, the private sector has the ability to establish industrial zones through Co-Operative Society, An Association of Industrialist, or limited company.

3. **Supported Private funding**

Governments provide grants and long-term loans to the private sector to help it construct industrial zones and foreign investment can contribute to support or global financial institution and may be funds from private and foreign sources.

5. **Classification by type**: (AlSayeh, 2015, p24), this depends on:

- the type of inputs: the type of raw materials
- the type of products: the type of products produced by these industries
- the type of industrial processes, whether manufacturing or extractive or aggregate

6. **Classification by the number of workers**: (AlSayeh, 2015, p24), this classification is based on labor-intensive:

- Low labor-intensive: it requires a few number of workers.
- Intermediate labor-intensive Industries: that needs to be greater number of workers than the previous workers.
- High Labor-intensive industries: this needs a large number of workers and workers housing often is close to factories.

7. **Classification by its impact on the environment** (AlSayeh, 2015, p25)

The two types are:

- by the quality of their outputs, which have an impact on gas environment, such as toxic gas emissions, air pollution, water pollution, such as the disposal of liquid wastes in seas or solid waste in the mountain environment.
- Classification of industries as environmental dangerous and divide into light and heavy industries with regard to its impact on the environment and public health.

2.4 **The objectives of industrial areas**

The most important reasons and motives for the establishment of cities and industrial areas at the national level of the follows (AlBath, 2003, p27):
1. The planning for the establishment of industrial zones is one of the important ways to raise the level of development and the economy by increasing the return on the industry.

2. For coordination to absorb surplus labor in the agriculture sector to work in the sector Industrial.

3. Work to mitigate the unemployment rate through the increase and diversity in employment.

4. Work to mitigate the problems and suffering of the agricultural sector, which is suffering as a result of difficult situations or the prevailing conditions.

5. Achieve balance in the optimal use of the most appropriate and natural and human resources.

6. Raise the level of the local economy by attracting investors and attract scientific and technical expertise.

2.5 Foundations and requirements of planning cities and industrial areas (AL – Buzz, 2003, p27-28)

Many of the industries are in harmony with each other and sometimes they different, and to achieve the balance and integration for the sustainability of the park at the industrial site, to satisfy future needs and expansion and the expansion of services. This is done through some of the requirements, they are:

1. social requirements. The main goal of which is to achieve prosperity requirement for visitors that region and meeting their needs while they are there, taking into account working-class density and the percentage of visitors to the region in order to achieve their requirements and their needs, whether administrative, technical and other services such as parking lots and places of comfort and restaurants, banks and mosques as well as the Center for queries and security and fire services.

2. economic requirements. That area needs of development of economic sector is issue that several stakeholders make the economical feasibility study to achieve the public interest before thinking any gains. So if the achieving of correct and clear economic study can be done, which can be promoted to it in different ways, this will contribute to the work on attracting business investment. Thus contributing to the revitalization economy and an increase in national income level and raise the standard of living of the individual, also increase job opportunities and to reduce the unemployment rate as well as to limit immigration.

3. aesthetic and sensual requirements. This aspect, in which various other sciences may share. In order to keep the archaeological, historical and urban monuments, which are seeking to survive in the event of identification the land use. Therefore, the aesthetic, historical, heritage and cultural elements, they as a whole in the event of concerted relations between them and help to build the confidence of investors to do investment process and without any hesitation or reservation.

2.6 Factors that affect in size selection of industrial zones and cities (AL – Buzz, 2003, p27-30)

The size of the project will be established depends on factors that contribute with each other. Of the progress and development of industrial facilities where their impact on investor and Owners of capital to attract them in order to increase investment opportunities that increase later jobs and employment, and for this, it is necessary to take into account the following factors:

1. Nature of the market (the region). That demand for the commodity may usually be either a seasonal or intermittent. It is wobbling according to the needs and requirements of the market so that production are considered a particular sector, domestic only focus is on the production of goods and services for daily consumption. This type of production here does not require large volumes of buildings for such another projects, whereas if the demand increased. This means an increase in production as well as an increase in the size of the project so it is important Taking into account the expansion of all needs.
2. The nature and type of industry. The nature of the industry and the used technical processes in production and technological development for the use of modern machinery completely define and advance the spatial needs. As well as service-estimate the space required by the type of industry to be applied.

3. Type and nature of the product where some goods production depends on each other; therefore there is a sequence or thread to complete these production operations while producing goods with big size is reason of the required of increasing the space required, therefore, the criteria that falls has a classify and determine the size of these projects are either (AlBath, 2004, p24):

- A production capacity per unit of industrial size.
- The size of human resources and labor-based project.
- Capital, which governs and determines the size of the project, according to the type of industry — the light, medium or heavy industries.

4. Future developments and needs of the project, the growth of the size of the project also depends on the expected growth rate based on studies and economic feasibility of the project as well as identifying the objectives of the establishment of this project and this means that future developments should not be overlooked by a decision maker. Considering all needs for growth and development through the vision of a future in which a totalitarian and the balance enhances the sense of security and peace to the owners of capital and encourage them to investment also contributes to raising the efficiency of production in quantity and quality, particularly when modern technology will be used by some investors.

2.7 Industrial areas planning

Industrial areas planning is an essential component of urban and regional planning for cities planning, in addition to the planning of residential areas, commercial and agricultural, transportation, and other. in planning geographers, engineers and Economists cooperate with each other. (AlSaqqar, 1994, p378)

Intended planning methods, procedures and measures taken by the human to turn reality into a better and better picture and derive the area of industry planning its importance from the industry itself in the life, where the industry is the true measure of economic development where some countries put five or tenth or twenties plans for the development of the industry and the economy. (Yaaqoub, Almosawe, 2006, p59)

Many planners tend to realize the idea of industrial concentration where all the best areas away from population. (A. Sayeh, 2015, p26)

Table no(): The needs of the industrial areas of space facilities

<table>
<thead>
<tr>
<th>Number</th>
<th>Type Usage</th>
<th>Percentage%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>industrial buildings</td>
<td>60-70%</td>
</tr>
<tr>
<td>2</td>
<td>stores</td>
<td>20 &lt;=</td>
</tr>
<tr>
<td>3</td>
<td>Administration</td>
<td>10-15</td>
</tr>
<tr>
<td>4</td>
<td>Workers services</td>
<td>5-7%</td>
</tr>
<tr>
<td>5</td>
<td>Streets and corridors</td>
<td>12%</td>
</tr>
</tbody>
</table>
2.7.1 requirements of Industrial City site

One of the most important industrial city requirements include (AlBath,2004,p24):

1. Topography of the land should be easy and the slope nor the inclination percentage increase of 5%. In order to avoid increased expenses or risk of flooding in low-lying areas.

2. Appropriate use of the land to the type of industry and taking into account the needs of the region after determining wind direction and planning for open spaces and the establishment of green belts.

3. The existence of roads and good transport links.

4. Availability of facilities and services and get easy it.

5. To be signed at a place close to transportation and housing workers.

6. Availability spaces to plan of arenas and parking, restaurants and mosque.

7. Save energy and water security and fire services and extension services.

8. The presence of administration offices and the offices of technical consultancy and training.

2.7.2 forms of industrial endemic:

It is known that there is no one form of industrial endemic or geographical spread for economic and industrial activities in all states or within a state, there are several forms Industrial endemic and every form of these forms positives and negatives that can not be overlooked is that Forms(AlSaqqar, 1994, p. 194 + p195)

- distribution network"التوزيع الشبكي":
  
  And is the industries that are concentrated in limited areas, but spread all cities within And it spreads as well as in many of the neighborhoods in the same city was Link networked, so it is called a state or mostly, this distribution network and this model pros and cons, it is the pros link these industries Closely linked to the consumption market, reducing product transportation costs, and make it easier for citizens to take advantage of them. And buy them with minimal effort, as it uses the labor of more than one area. The cons of this model is represented with noise and pollution caused by the population there, and after all Raw materials, and Moanal and airports as well, and the narrow streets and roads are not designed for any use Grown for human use ... etc., so the fit of this model for all industries, but Can fit for some light industries such as food industries and services, it is difficult to Residents benefit from these industries as if they were concentrated in one place in the state.

- narrow distribution network"التوزيع الشبكي الضيق":
  
  The industries that span distances and wide but not distributed in all parts of the region such as The previous model we call) a narrow distribution network or limited, or what might be called Industrial scale "belt industrial." Name. This model is characterized by the presence of industrial zones close to but separate from each other despite the neighboring, similar The pros and cons of this model to some extent the previous model with some differences in the severity of these effects, since the distribution does not include all areas of the region, which limits the effects in the areas where industries and not in all regions, for example the cotton plants in the US United started spreading widely.
• concentration of the cluster”:

If increased industrial concentration for that model called positioning cluster, name or region industrial "industrial district," and this has grown the model has the industry concentrated in one place, that are found in relatively small regions, and the positives of this form near the industry of raw materials and ease noise relative to its distance from residential areas, and the availability of infrastructure such as suitable for these industries, while the drawbacks is represented revive another, and the migration of workers as well as form a major problem, and the distance from the market increases the costs and burdens if increased industrial concentration.

• Industrial zones, industrial estate,“المناطق الصناعية أو المستعمرات الصناعية”:

If the increased focus on the concentration of industry cluster, or confined in a place or one area And narrow, we get to the intense concentration or so-called industrial colonies name), an area Officially planned and customized commercial and industrial use is separated from residential facilities and areas. (A. Sayeh, 2015, p. 28)

2.8 Theories of industrial site

Many theories that dealt with industrial site and the foundations of his choice, which appeared confined

These theories in three main areas (Alaghabr, 2007, p. 24, + p 23):

• Theory of Weber Alferd : where he addressed in his theory known as the theory of industrial site industrial site solo issue did not mention to the communities or industrial cities, and revolves around the industrial site, which provides the maximum profit by reducing production costs to a minimum by reducing production costs to a minimum.

• theories focused addressed on the site and its importance by market factors and with industrial Products including Loesch theory.

• theories worked to integrate the former two types together, including studies of Isard individual theory, Weber is the origin of all the theories and studies on the industrial site in the third axis, and said that the site is optimized for the industry in the region where the distance between the production of raw materials and parts to be manufactured in only the minimum.

2.9 Theories industrial endemicity

There is a set of theories that dealt with industrial endemic, and most important of these theories, the following: (Alaghabr, 2007, p. 26, pp 25+):

• central growth theory (Berger 1925): that he said that the industrial zone is located on the edge of the two regions, the central business district and region transitional, which is of mixed land use is concentrated in light industries.

• sectors Theory (Humbert 1936): It believes that the growth of the city in the form of growth sectors to the outside, and is located on the industrial zone along the transport routes of the central region of the Suburbs.

• multiple nucleus Theory (to American, Shawn Harris and Edwar lMann, 1945): Re-growing cities on more than one line, and leads the growth of the city to the emergence of other centers as nucleus.

• Theory of minimum cost (Lauber 1945): the industry has identified site for less than the cost of transportation and with the lack of workers’ wages
• Theory of market space (to Indar): this theory is trying to answer the question what the industrial resettle, industrial endemicity by taking price and endemic of raw materials into consideration.
• Marginal theory: Says the industry is moving to the cities depending on their size, that is endemic in the industry and is moving at rates proportional the size of the markets measured the size of cities.

• Vertical integration (Basem Makhol): with population density through a series of years, when economies of scale exist, large firms may be more efficient than small firms, and the industry may consist of a monopoly or a few large firms. Production may be imperfectly competitive in the sense that excess or monopoly profits are captured by large firms. So we will know the relationship between the development between economic of scale & the density of population that makes the development of cities.

• Vertical integration is an important factor in economic development. The Benefits of Vertical Integration are Securing critical supplies
• Lowering costs (efficiency)
• Improving quality and Facilitating scheduling and planning.

2.10 DEVELOPMENT CONTEXT

2.10.1 Economic context
Few countries in the world have reached a high level of economic and social development without having developed an advanced industrial sector. It contributes to poverty reduction by generating employment and creating income. The industrial sector also has extensive linkages with other sectors of the economy. Agriculture-based industry is particularly important for developing countries and is a first step towards the structural transformation of the economy.

To sustain and translate this growth into structural transformation, the development of higher-productivity activities, such as manufacturing, is critical. (UNIDO, 2014)

2.10.2 An Integrated Agro-industrial Park Definition and History of it
An Agro-industrial Park is a geographic cluster of independent firms grouped together to gain economies of scale and positive externalities by sharing infrastructure – roads, power, communication, storage, packaging, by-product utilization, effluent treatment, logistics and transport, laboratory facilities, etc. – and taking advantage of opportunities for bulk purchasing and selling, training courses and extension services. Multiple agro-processing functions take place in the IAIPs, such as final processing, storage, packaging, marketing and distribution. Support businesses and social infrastructure are also present.

AIPs will include open area production zones, controlled environment growing, precision farming, knowledge hubs and research facilities, rural hubs, agri-infrastructure, collection centres, primary processing hubs, RTCs, social infrastructure and agri-marketing infrastructure, among others. AIPs will have state of the art infrastructure. General infrastructure will include: roads, power, water, communications, drainage, sewerage, sewage treatment plant, effluent treatment plant, storm water drains, rain water harvesting, and firefighting facilities, among others. Specialized infrastructure will consist of cold storage units, quarantine facilities, quality control labs, quality certification centres, raw material storage, controlled and modified atmospheric storage, central processing centres, etc. In addition, infrastructure at the IAIPs will emphasize environmental sustainability. (UNIDO, 2014, p6)

Evolution of the Agro-industrial Sector
Since the early 1990s, there has been a rapid process of agro-industrialization in many developing countries, characterized by the establishment of private and formal sector firms across an increasing array of food and non-food sectors. In order to understand the nature and consequences of this evolution, however, it needs to be viewed in the context of the wider restructuring of the entire agribusiness complex. In this regard we can posit three broad sets of changes (Reardon, 2007). First, the growth of agro-processing, distribution and agricultural input provision activities off-farm by agro-industrial firms. Second, institutional and/or organizational changes to the relations between agro-industrial firms and primary producers, for example, increasing levels of vertical integration. Third, changes in the primary production sector in terms of product composition, technology, sectoral and market structures, etc. (Reardon and Barrett, 2000). Thus, we can see the growth of the agroindustrial sector as being integral to profound changes in the entire way in which the agro-food complex is structured and organized. In turn, this suggests impacts on actors at all levels of the supply chain, from primary production to consumption. The framework developed by Reardon and Barrett (2000) provides a useful lens through which one can understand these processes of agro-industrialization in developing countries, the factors driving these processes and their consequences (Figure 1). (Silva, Baker and others, 2012)

Underlying meta-trends

Underlying the evolution of the agro-industrial sector is a broad set of metatrends, at both the national and international levels, that condition the way in which the sector is structured and operates over time. With respect to domestic markets for the products of agro-industries, population and income growth are driving changes in food consumption patterns at the broad commodity level, away from starchy staples and towards meat, dairy products, fruits and vegetables, oils and processed grains (see e.g. Cranfield et al., 1998; Pingali and Khwaja, 2004).

With increasing urbanization, greater participation of women in the paid labour force and greater ownership of household appliances (e.g. refrigerators and microwave ovens), demand for more highly processed and higher value food products with high income elasticities is growing. This trend is driving the evolution of the food-processing sector and providing a mechanism through which enterprises can counteract the downwards pull on relative food expenditure. In turn, this leads to an increased demand for raw materials from primary production, accompanied by shifts in the types and qualities of raw materials being demanded, which can generate economic benefits for the agriculture, fisheries and forestry sectors (Reardon and Barrett, 2000).

Through the 1980s and 1990s, the political economy in which agroindustries operated changed radically, both nationally in developing countries and internationally.
The establishment of dedicated industrial estates of idea of AIP started between the late 19th century and the early 20th century, agriculture felt the effects of the industrial revolution that until then had only involved other production industries. Real modern industries were created that were nevertheless physically located in rural contexts where the economy and social fabric were still of the traditional type.
It is in this social and economic scenario that the first agro-food buildings of impressive architectonic size and structure emerged.

The targeted industries: target area of any investment respect to, in some way, and agricultural industries and related services. If there is, mixing, or you do not specify, for business or industry, with falls within the domain of the decision, or not; the body and the developer to review the details of the field of agro-industrial business, to report it.

The development of the agrifood industry will obviously vary in different regions of the world depending on current levels of sophistication with respect to the production, preservation and processing of agricultural commodities. (UNIDO, 2014, p)

Each IAIP is served by a network of rural transformation centres which provides linkages to producers. An RTC is a facility that provides integrated services to rural communities within a 100 kilometer radius of the proposed IAIP site. RTCs are rural development initiatives of the GoE which not only facilitate inclusive rural development, but also serve as a linkage to the IAIP in terms of raw material supply.

RTCs (Regional Training Centers) are geographic clusters of infrastructure and services, though on a smaller scale than IAIPs. Farmers and farmer groups deliver their produce and receive agricultural inputs. At the RTCs, agricultural produce is collected, sorted, stored and may undergo primary processing before onward transport to an IAIP. For most farmers, the RTCs are the main point of contact with commercial agricultural value chains. Apart from their primary functions, RTCs also offer small-scale financial services to farmers as well as basic social services. (UNIDO, 2014, p6)

![Diagram of IAIP and RTC connections](image)

*Figure 2: IAIP and RTC connections*

*Source: (INTEGRATED AGRO-INDUSTRIAL PARKS IN ETHIOPIA, UNIDO, 2014)*
2.11 The major components of AIP

2.11.1 The major components of RTCs include:

- Training and capacity-building for rural populations - Training opportunities for rural communities aimed at enhancing knowledge, skills and abilities to increase income-earning opportunities and, as a result, improve standards of living. Training will cover areas such as cultivation, post-harvest handling, packaging and branding, product performance and animal feed management. In addition to the proposed training centres, a network arrangement can be established with the existing farmer training centers within the catchment area of the RTCs.

- Market information centre - A one-stop information centre that combines information and services offered by various ministries and government agencies. The centre will provide information on agro-food business development, prices, market trends, and current market demand in terms of products and quality, among other services.

- Agriculture support services – These services will help rural communities to enhance productivity; produce premium vegetable, including high-demand vegetables such as capsicum; and cover areas such as dairy development, including raw milk marketing. These services will also target quality improvement by setting up agriculture input services, agriculture equipment support services, and agri-clinics, among others.

- Agro-food processing activities – Aims at developing food processing enterprises in rural areas, with an emphasis on improved agro-food product quality for local and overseas markets. This will support agro-industrial development through value added activities and generate additional income for farming communities.

- Agricultural produce supply chain management – These support services aim to improve the marketing of agricultural products through supply chain management from the farm to consumers. This will be achieved through better planning and appropriate quality control across the supply chain.

The primary feature of IAIPs and RTCs is the clustering of essential infrastructure, utilities and services required by businesses to operate and grow. Clustering allows for economies of scale that lower transaction and overhead costs. In addition, economies of scale in terms of raw material inputs allow processing firms to operate at full capacity. The clustering of firms also provides the critical mass needed for the efficient provision of services such as eco-friendly waste recycling and disposal, which is difficult to provide to widely dispersed firms. Furthermore, clustering allows it to better introduce and monitor targeted incentive regimes to promote agro-industrial growth.

Clustering also lowers the overall cost of production by reducing post-harvest losses, transportation and energy costs, as well as ensuring higher returns due to high quality outputs, off season availability, better traceability and enhanced productivity.

Another key feature of the IAIPs and RTCs is innovation diffusion. IAIPs facilitate vertical and horizontal links between resident enterprises, as well as between enterprises and facilitating organizations, such as government support institutions, development partners and research institutes.

By disseminating knowledge, skills and innovation, the IAIPs and RTCs will contribute to the overall upgrading of the agro-industry sector and allow firms to compete more successfully at the regional and global levels. The benefits also reach the farmer and small-scale processor level, ensuring higher product quality from farm to fork, and integrating larger portions of the population into commercial agricultural value chains. (UNIDO, 2014, p)
2.11.2 Integrating agro-allied industry companies

As commercial value chains become more integrated, there are greater benefits from specialization and an increasingly important role for agro-allied industry companies. Examples of such companies include those specialized in sales, distribution and transport, input supply, and food catering. By offering incentives, such as modest plot lease fees, financial assistance and training, the IAIPs or RTCs promote specialization and growth, generating important off-farm employment.

Lack of capital is currently the biggest challenge for these companies. Financial services for small-scale food processors to innovate or expand are only beginning to emerge, and credit from specialized banks remains minimal. IAIPs will facilitate access to finance through the presence of on-site financial institutions offering financial solutions catered specifically to agro-allied industry companies. Large-scale firms present in the IAIPs (and sometimes RTCs) can advance funds and operational equipment to smaller-scale firms, offering another option for access to finance. (UNIDO, 2014, p)

Development of industrial ecosystems (IE) is an effective method for recycling, reuse and resource conservation (Garner and Keoleian, 1995; Jin and Arons, 2009). This mechanism converts the industrial process from a linear process to a cyclic process where the waste generated by one industry can be used as a resource by another industry (Ehrenfeld, 2004). Since the establishment of the agro-chemical ecosystem in Kalundborg and another countries, many industrial ecosystems have been established worldwide. Facing resource shortage as well as stringent energy saving and emission reduction targets. (Ding and Hua, 2012)

2.11.3 The major components of AIP

The major components of AIP depends on many factors but the basic needs in each one should include the facilities as infrastructure, the storages, the types of food industry as described above, and below in this table 2 the many components will be described.

Table 2: Overall Landuse Pattern
<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total site area</td>
</tr>
<tr>
<td>2</td>
<td>Livestock zone</td>
</tr>
<tr>
<td>3</td>
<td>Milk, egg &amp; honey zone</td>
</tr>
<tr>
<td>4</td>
<td>Vegetables zone</td>
</tr>
<tr>
<td>5</td>
<td>Cereals zone</td>
</tr>
<tr>
<td>6</td>
<td>Storage facility</td>
</tr>
<tr>
<td>7</td>
<td>Specialized infrastructure zone</td>
</tr>
<tr>
<td>8</td>
<td>Amenities zone</td>
</tr>
<tr>
<td>9</td>
<td>Utilities zone</td>
</tr>
<tr>
<td>10</td>
<td>Roads</td>
</tr>
<tr>
<td></td>
<td>Open space / greenery</td>
</tr>
</tbody>
</table>

**1. Livestock zone**
- Quarantine advisory cell
- Inspection area
- Receiving area
- Preparation area

**2. Milk, eggs, honey zone**
- Milk collection centre & testing area
- Milk tank & milk pump
- Honey & wax collection centre

**3. Vegetables Zone**
- Receiving warehouse
- Grading & sorting shed
- Washing and drying

**4. Cereals Zone**
- Receiving warehouse
- Grading & sorting shed
- Washing and drying

**5. Storage Facility**
- Egg grading, sorting & storage
- Bulk storage - Vegetables
- Cold storage - Vegetables
- Bulk storage - Cereals

Source: UNIDO, 2014
<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Residential area</td>
</tr>
<tr>
<td></td>
<td>3 Bedroom units - 64 numbers</td>
</tr>
<tr>
<td></td>
<td>2 Bedroom units - 48 numbers</td>
</tr>
<tr>
<td>2.</td>
<td>Amenities</td>
</tr>
<tr>
<td></td>
<td>School</td>
</tr>
<tr>
<td></td>
<td>Crèche</td>
</tr>
<tr>
<td></td>
<td>Places of worship</td>
</tr>
<tr>
<td></td>
<td>Retail space</td>
</tr>
<tr>
<td>3.</td>
<td>Utilities</td>
</tr>
<tr>
<td></td>
<td>Substation</td>
</tr>
<tr>
<td>4.</td>
<td>Green space</td>
</tr>
<tr>
<td></td>
<td>Green buffer, park and play ground</td>
</tr>
<tr>
<td>5.</td>
<td>Roads</td>
</tr>
<tr>
<td></td>
<td>30m wide road</td>
</tr>
<tr>
<td></td>
<td>24m wide road</td>
</tr>
<tr>
<td></td>
<td>18m wide road</td>
</tr>
</tbody>
</table>

**Total processing area**

**Non Processing zone**

**Total non processing area**

**Grand total of IAIP area**

Figure(): Acts of industrial wastewater treatment
6. Specialized infrastructure zone
- Rural market
- Admin building
- Market intelligence cell
- Agri equipment centre
- Agri input centre
- Training centre
- Women's self help group
- QA & QC labs

7. Amenities
- Truck parking
- Public parking space
- Creche, & nursing mothers area
- Cafeteria & restroom

8. Utilities
- Common effluent treatment plant & sewage treatment plant
- Solid waste management
- OHT - over head storage tank
- Substation

9. Roads
- 15m wide road
- 10 m wide road

10. Open Space/greenery
- Open space / greenery

Sub total
Total area
Chapter III
Case Studies

The methodology of study case studies

Figure 3: The methodology of study case studies
3.1 international case study
the first case study: Integrated Agro-Industrial Parks (IAIPs) in Ethiopia.

- Regional site of experience
- Components of the project
- Thought of experiment
- Urban planning development pattern
- Objective of the experiment

- Regional site of experience

An outline of the features of the four pilot IAIP sites in Central Eastern Oromia, Southwest Amhara, Eastern SNNP and Western Tigray follows.

Site selection process

The four pilot IAIPs were selected on the basis of six broad criteria as mentioned below: (UNIDO, 2014, p12)

1. Agricultural production potential for strategic commodities.
2. Inter-industry linkages and triggering effect
3. Infrastructure facilities
4. Market potential
5. Access to commercial and support services
6. Concentration of enterprises and attractiveness for investors.

Figure (4): map The four pilot IAIPs
Figure(5): Regional location and key information for Integrated Agro-Industrial Parks (IAIPs) in Ethiopia.

- Components of the project
  This experiment depended on:
  - the transportation and other criteria site selection
Figure(6): Components of IAIP in OROMIA

<table>
<thead>
<tr>
<th>Description</th>
<th>Location - Central Eastern Oromia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td>Wheat, barley, haricot bean, fava bean, tomato, potato, fruits and vegetables, dairy, fish, poultry, honey and meat</td>
</tr>
<tr>
<td>Growing area available</td>
<td>334,971 hectares</td>
</tr>
<tr>
<td>Total area of IAIP</td>
<td>263.00 hectares</td>
</tr>
</tbody>
</table>

Source: Location of Bulbula-Oromia IAIP
Figure(): Sample masterplan - Oromia IAIP. (2014, UNIDO, p9)
Figure (): Part of Ormia Master Plan

Figure(): Part 1 of Ormia Master Plan
**Table:** Features of the selected Oromia IAIP site

<table>
<thead>
<tr>
<th>Location of IAIP</th>
<th>Bulbulla town in East Shewa administrative zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of IAIP</td>
<td>263 hectares considered for initial development</td>
</tr>
<tr>
<td>RTCs Location</td>
<td>Shashemene, Dodola, Robe, Bekoji, Eteya, Welenchiti, Meki &amp; Biyo Biske</td>
</tr>
<tr>
<td>Agricultural potential</td>
<td>Availability of two operational sugar plantations</td>
</tr>
<tr>
<td>and agri facilities</td>
<td>Concentration of fattening, dairy farms, abattoirs</td>
</tr>
<tr>
<td></td>
<td>Fishery potential, Koka dam, rift valley lakes (Zeway, Langano)</td>
</tr>
<tr>
<td></td>
<td>Wheat, barley, haricot bean, fava bean, tomato, potato, fruits and vegetables, dairy, fish, poultry, honey and meat</td>
</tr>
<tr>
<td>Energy</td>
<td>Substation at Ziway town at a distance of approximately 17.5 kms</td>
</tr>
<tr>
<td>Water</td>
<td>Water source – River Bulbulla – it is proposed to provide infiltration well, collection well and pump house near the river basin at an approximate distance of 2 kms</td>
</tr>
<tr>
<td></td>
<td>Concentration of lakes, surface water, water supply</td>
</tr>
<tr>
<td>Road network</td>
<td>The site abuts the federal highway connecting Addis Ababa &amp; Awasa</td>
</tr>
<tr>
<td>Railways, dry port, airport terminals</td>
<td>Proximity to biggest airport terminal, dry port &amp; Djibouti port</td>
</tr>
<tr>
<td></td>
<td>Bole International airport, Addis Ababa – 180 kms</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>Telecom – communication facilities available in Bulbulla town can be extended</td>
</tr>
<tr>
<td>Raw materials required</td>
<td>859,354 MTPA</td>
</tr>
<tr>
<td>Growing area required</td>
<td>334,971 hectares</td>
</tr>
<tr>
<td>Total processing area</td>
<td>239.73 hectares</td>
</tr>
<tr>
<td>Total non-processing area</td>
<td>23.36 hectares</td>
</tr>
<tr>
<td>Total area</td>
<td>263.09 hectares</td>
</tr>
<tr>
<td>Length of road</td>
<td>14.06 km</td>
</tr>
<tr>
<td>Total water demand</td>
<td>6,660 m³/day</td>
</tr>
<tr>
<td>Wastewater generation</td>
<td>4,504.77 m³/day</td>
</tr>
<tr>
<td>MSW generation</td>
<td>59.38 TPD</td>
</tr>
<tr>
<td>Power demand</td>
<td>45.951 MVA</td>
</tr>
</tbody>
</table>

Source: (2014, UNIDO, p15)
Figure: Location of Beaker-Tigray IAIP. (2014, UNIDO, p6)
Figure(): Components of Tigray IAIP (2014, UNIDO, p6)

<table>
<thead>
<tr>
<th>Description</th>
<th>Location - South West Amhara</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crops</strong></td>
<td>Sorghum and sesame, fruits and vegetables, dairy, meat and other animal products</td>
</tr>
<tr>
<td>Growing area available</td>
<td>398,095 hectares</td>
</tr>
<tr>
<td>Total area of IAIP</td>
<td>154.99 hectares</td>
</tr>
</tbody>
</table>

**Amhara Region**

- Bure
- IAIP Total area 154.99 ha

Figure(): Location of Bure-Amhara IAIP
Figure(): The elements of Bure-Amhara IAIP (2014, UNIDO, p.7)
<table>
<thead>
<tr>
<th>Description</th>
<th>Location - Eastern SNNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td></td>
</tr>
<tr>
<td>Growing area available</td>
<td></td>
</tr>
<tr>
<td>Total area of IAIP</td>
<td></td>
</tr>
</tbody>
</table>

- Cereals, coffee, fruits and vegetables, dairy, meat and other animal products: 163,461 hectares
- 108.80 hectares

Figure(): location of Bure-Amhara IAIP (2014, UNIDO, p7)

Figure(): Components of the Bure-Amhara IAIP project (2014, UNIDO, p7)
- The theoretical ideology of the experience

- Urban planning development pattern

The IAIP had pattern of Semi-Grid and the Rural Transformation Centers (RTCs) had Rural transformation centres the Government of Ethiopia will establish rural transformation centres to serve as raw material aggregation points in the catchment areas (100 km radius) of each IAIP.

- Rural transformation centres include warehouses, input supply, sorting, grading, extension services, pre-processing activities and microfinance.

- Public and private partners support farmers to increase production and productivity to supply raw materials of required quantity and quality to the industries in the parks.

- Market information centres will provide information on business development, prices, market trends, and current market demand in terms of products and quality, among other services.

Figure(): (2014, UNIDO, p10)
Sample masterplan for rural transformation center – Bulbula IAP, Oromia
Objective of the experiment

The development of IAIPs will produce an environment that is conducive to attracting investment in agro-food and allied sectors.

The IAIPs will:

- Create world class supply-chain infrastructure needed for agro-industrial development;
- Increase total flows of investment in agro-industry - both in terms of skills and capital - to establish backward and forward linkages;
- Foster strong linkages between agriculture and agro-industry;
- Provide a close interface between research, extension mechanisms, industry and farmers in the agricultural sector;
- Increase value addition and reduce wastages, thereby increasing the income of farmers;
- Produce better quality products;
- Create rural employment, off-farm income opportunities and improve quality of life in rural areas;
- Assist small-scale agro-industrial enterprises to remain competitive in global markets; and
- Facilitate commercialization of agriculture and increase exports of processed and value added agro-products.
-Analysis of experience:- The use of certain components of the project and associative relationships between components in Integrated Agro-Industrial Parks (IAIPs) in Ethiopia will be used in my Proposed AIP(Agro-Industrial Park).
1.1 Arab case study
Experience of the

- Regional site of experience
- Components of the project
- Thought of experiment
- Urban planning development pattern
- Objective of the experiment
- Regional site of experience Aswan in Egypt

Figure(): Aswan Location, (2015, Aldeeb, p30)
### 1-جدول استعمالات الأراضي المقترح للمجمع القروي

<table>
<thead>
<tr>
<th>الستمرام</th>
<th>الاستخدام</th>
<th>المساحة (فدان)</th>
<th>النسبة (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>سكني</td>
<td>قرى ريفية</td>
<td>600</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>خدمت المدنية</td>
<td>400</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>إراضي استصلاح</td>
<td>175</td>
<td>11.5%</td>
</tr>
<tr>
<td></td>
<td>الإجمالي</td>
<td>1000</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source (2015, Aldeeb, p41)
Figure(): (2015, Aldeeb, p36-40)
المخطط العام المقترح للمجمع القروي الزراعي الصناعي

Figure(): (2015, Aldeeb, p43)
فكرة الحل المقترحة لتجميع القرى والقرية المركزية لخدمة المجمع الصناعي الزراعي
1- التصميم المعماري المقترح للمبنى
<table>
<thead>
<tr>
<th>الاستخدام</th>
<th>الاستعمال</th>
<th>المساحة</th>
<th>العدد</th>
<th>نسبة</th>
</tr>
</thead>
<tbody>
<tr>
<td>سكني</td>
<td>670 منزل بقرة</td>
<td>50 فدان</td>
<td>(1)</td>
<td>33.3%</td>
</tr>
<tr>
<td>مسجد</td>
<td>1.4 فدان</td>
<td>(1)</td>
<td>0.9%</td>
<td></td>
</tr>
<tr>
<td>وحدة صحية</td>
<td>1.5 فدان</td>
<td>(1)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>مدرسة ابتدائية</td>
<td>1.5 فدان</td>
<td>(1)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>وحدة بطرية</td>
<td>5 فدان</td>
<td>(1)</td>
<td>3.3%</td>
<td></td>
</tr>
<tr>
<td>جمعية زراعية</td>
<td>5 فدان</td>
<td>(1)</td>
<td>3.3%</td>
<td></td>
</tr>
<tr>
<td>محلات تجارية</td>
<td>3 فدان</td>
<td>(18)</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>سوق أسبوعي</td>
<td>3.6 فدان</td>
<td>(1)</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>ترفيهي</td>
<td>7 فدان</td>
<td>(1)</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>الإجمالي</td>
<td>28 فدان</td>
<td>(2)</td>
<td>18.6%</td>
<td></td>
</tr>
<tr>
<td>مسجد</td>
<td>0.5 فدان</td>
<td>(2)</td>
<td>0.65%</td>
<td></td>
</tr>
<tr>
<td>ملعب رياضي</td>
<td>1.5 فدان</td>
<td>(2)</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>ملعب اطفال</td>
<td>0.5 فدان</td>
<td>(2)</td>
<td>0.65%</td>
<td></td>
</tr>
<tr>
<td>سوق صغير</td>
<td>1 فدان</td>
<td>(2)</td>
<td>1.4%</td>
<td></td>
</tr>
<tr>
<td>الإجمالي</td>
<td>7 فدان</td>
<td>(2)</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>معارض للمتجات الزراعية</td>
<td>3.5 فدان</td>
<td>(2)</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>الإجمالي</td>
<td>42 فدان</td>
<td>(2)</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>الطرق</td>
<td>10 فدان</td>
<td>(2)</td>
<td>6.65%</td>
<td></td>
</tr>
<tr>
<td>خدمات الحركة</td>
<td>29 فدان</td>
<td>(6)</td>
<td>19.3%</td>
<td></td>
</tr>
<tr>
<td>ممرات المشاة</td>
<td>9 فدان</td>
<td>(6)</td>
<td>6.1%</td>
<td></td>
</tr>
<tr>
<td>أماكن الانتظار</td>
<td>10 فدان</td>
<td>(1)</td>
<td>6.65%</td>
<td></td>
</tr>
<tr>
<td>جزام اخضر (حرم طريق)</td>
<td>58 فدان</td>
<td>(1)</td>
<td>38.7%</td>
<td></td>
</tr>
<tr>
<td>الإجمالي</td>
<td>150 فدان</td>
<td>(100)</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>
-الريفي:
1- زيادة نصيب الفرد من الأراضي الزراعية
2- تحسين الظروف المعيشية للفلاح
3- الاستغلال الأمثل للصناعات الغذائية
4- توفير الخدمات للقرى الزراعية

-الصحرائي:
1- محاور العرمان إلى الصحراء والمناطق الحضارية
2- الاستغلال الأمثل للصحراء التي تمثل ثالث مساحة مصر
3- خلق بؤر لجذب السكان إلى الصحراء

-الدلائي:
1- تخفيض المركزية في الدلتا على ضفاف النيل والاتجاه إلى الصحراء

الاستفادة من هذه التجربة في مشروع المقترح ربط مقومات المجتمع الصناعي الزراعي مع القرى المحيطة ونسبة مساحته لهم وعلى ان تكون القرية الزراعية المركزية بقوانين خاصة أكثر من القرى المجاورة. وكيفية استصلاح الأراضي والاستفادة من الأراضي عالية القيمة الزراعية بصنع المواد الغذائية.
3.2 Local case study
Experience of Alnaqab Desert(Palestine)

- Regional site of experience
- Components of the project
- Thought of experiment
- Urban planning development pattern
- Objective of the experiment
- Regional site of experience

Figure: Location of AlNaqab of Palestine (2015, Aldeeb.P22)
Al Naqab Desert of Palestine is located in the southern region, an area of 14,000 kilometers

The theoretical ideology of the experience

The exploitation of the desert and the establishment of residential communities through along the axes of longitudinal and cross on the sides the farms and residential buildings are located.
Characterized by the shape of Urban
- Taking a circular shape
- And it is divided into three main rings
- Urban Fabric is Compact

Figure: Urban Pattern of Alnaqab case study

Table no(): The basic components of the pattern schematic of the experiment

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Percentage</th>
<th>Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>residential areas</td>
<td>% 38</td>
<td>7,022.4</td>
</tr>
<tr>
<td>Service centers</td>
<td>% 29</td>
<td>5,359.2</td>
</tr>
<tr>
<td>Agricultural industrial uses</td>
<td>% 6</td>
<td>1,108.8</td>
</tr>
<tr>
<td>the road network</td>
<td>% 10</td>
<td>1,848.0</td>
</tr>
<tr>
<td>open Space</td>
<td>% 17</td>
<td>3,141.6</td>
</tr>
</tbody>
</table>

Source: (Aldeeb, 2015, p23)
The objectives of the experiment

- Spread development axes in areas
  Desert (the Negev desert of Palestine)

- Security and military targets

- Exploitation and development of areas with
  Natural resources

- The reorganization of the major cities

- Achieving planning goals on some
  Historic sites

- Solve the problem of population growth and
  movement Internal migration

- Solve the problem of Overcrowding
  In big cities

Fig():
<table>
<thead>
<tr>
<th><strong>Kibbutz (الكيبوتس)</strong></th>
<th><strong>Moshav (الموشاف)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>It is one of the ideological forms used by Israel in development and can be defined as a group of settlers or cooperative village farms.</td>
<td>It is Israeli settlements. It is based on the work of agriculture. And the ownership of the cooperation is a type of Israeli town or settlement, in particular a type of cooperative agricultural community of individual farms of the Moshav. Estimates of the number of families within Gatherings between 40-60 family.</td>
</tr>
</tbody>
</table>
ideology planning to design the villages

Residential buildings

Axis of movement

agricultural landsent

Axis of movement

ideology of planning in the villages Israeli planning is the focus of a major movement on either side of apartment buildings. Followed by pieces of land with axes integrated with each other in a regular form or organic form.

figure: ()
**Figure**: Kissufim AIP
Regional Analysis

Palestinian Industrial Estates and Free Zones Authority established four main industrial estates as shown in this map:

Map(): Palestinian Industrial Estates
Map(): Location of industrial estates

Map(): Description of JIE including location, MP
Map:

Map():

62
Jericho agro-industrial Park

Map:

Map():
<table>
<thead>
<tr>
<th>الرقم</th>
<th>اسم المنتجات</th>
<th>حجم الاستثمار $</th>
<th>حجم المعمالة</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>مكملات غذائية ومستخلصات عشبية</td>
<td>1,000,000</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>خضاريات مفروزة</td>
<td>1,596,100</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>اعلان حيوانية، عسل السمك</td>
<td>1,556,000</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>انتاج مسحوق التمور</td>
<td>1,081,700</td>
<td>34</td>
</tr>
<tr>
<td>5</td>
<td>شركه بيير بال للورق الصحي</td>
<td>1,272,497</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>منتجات باليستيكية للصناعات البلاستيكية</td>
<td>747,753</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>مصنع بيض الصابون الفلسطيني</td>
<td>616,000</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>تجهيز مياه معدنية</td>
<td>1,257,200</td>
<td>26</td>
</tr>
<tr>
<td>9</td>
<td>تجهيز وتغليف التمور</td>
<td>1,264,500</td>
<td>12</td>
</tr>
<tr>
<td>10</td>
<td>شركة اموناز تستعرض المياه</td>
<td>824,000</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>شركة هولي لاند هيريس</td>
<td>945,000</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>عطل حيوانية، عسل دجاج</td>
<td>1,200,000</td>
<td>14</td>
</tr>
<tr>
<td>13</td>
<td>شركة أفاك للتمور</td>
<td>925,000</td>
<td>15</td>
</tr>
<tr>
<td>14</td>
<td>انتظار تنقل باستخدام الطاقة الشمسية</td>
<td>1,200,000</td>
<td>22</td>
</tr>
<tr>
<td>15</td>
<td>منتجات باليستيكية وماد تغليف</td>
<td>2,000,000</td>
<td>37</td>
</tr>
<tr>
<td>16</td>
<td>موبيليا شركة أرميسك</td>
<td>1,200,000</td>
<td>11</td>
</tr>
<tr>
<td>17</td>
<td>تجهيز وتغليف الفهوة</td>
<td>1,000,000</td>
<td>10</td>
</tr>
<tr>
<td>18</td>
<td>شركة سيفي، ورق صحي معطر</td>
<td>1,900,000</td>
<td>25</td>
</tr>
<tr>
<td>19</td>
<td>خدمات لوجستية شركة اربا للخدمات اللوجستية</td>
<td>9,000,000</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>عصائر ومضرعات طبية</td>
<td>1,550,000</td>
<td>28</td>
</tr>
<tr>
<td>21</td>
<td>مخالب بانائج مختلفة</td>
<td>1,350,000</td>
<td>27</td>
</tr>
<tr>
<td>22</td>
<td>مواد تجميل من منتجات البحر الميت</td>
<td>650,000</td>
<td>20</td>
</tr>
<tr>
<td>23</td>
<td>حلويات عربية</td>
<td>1,280,000</td>
<td>8</td>
</tr>
<tr>
<td>24</td>
<td>برامج ري وميزانية باليستيكية</td>
<td>1,200,000</td>
<td>25</td>
</tr>
</tbody>
</table>

Table():
map()::Gaza IE
Map():
Map(): Proximity of Governorate from International Land Crossing
Map(): all criteria of crossing

<table>
<thead>
<tr>
<th>Governorate</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jenin</td>
<td>8</td>
</tr>
<tr>
<td>Tulkarem</td>
<td>9</td>
</tr>
<tr>
<td>Nablus</td>
<td>5</td>
</tr>
<tr>
<td>Qalqilya</td>
<td>9</td>
</tr>
<tr>
<td>Salfit</td>
<td>6</td>
</tr>
<tr>
<td>Ramallah and Albireh</td>
<td>10</td>
</tr>
<tr>
<td>Bethlehem</td>
<td>9</td>
</tr>
<tr>
<td>Hebron</td>
<td>8</td>
</tr>
<tr>
<td>Jerusalem</td>
<td>10</td>
</tr>
<tr>
<td>Jericho</td>
<td>8</td>
</tr>
<tr>
<td>Tubas</td>
<td>6</td>
</tr>
</tbody>
</table>
Map(): A high percentage of Palestinian Authority Area (A&B) according to area of province

<table>
<thead>
<tr>
<th>Governorate</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jenin</td>
<td>3</td>
</tr>
<tr>
<td>Tulkarem</td>
<td>3</td>
</tr>
<tr>
<td>Nablus</td>
<td>3</td>
</tr>
<tr>
<td>Qalqilia</td>
<td>2</td>
</tr>
<tr>
<td>Salfit</td>
<td>2</td>
</tr>
<tr>
<td>Ramallah &amp; Albireh</td>
<td>2</td>
</tr>
<tr>
<td>Bethlehem</td>
<td>1</td>
</tr>
<tr>
<td>Hebron</td>
<td>2</td>
</tr>
<tr>
<td>Jerusalem</td>
<td>1</td>
</tr>
<tr>
<td>Jericho</td>
<td>1</td>
</tr>
<tr>
<td>Tubas</td>
<td>2</td>
</tr>
</tbody>
</table>
Map(): The existence of specialized university & colleges programs for industry and agriculture.
Criteria of A high percentage of high value agricultural land

Map():

Fig(): percentage the area of high value agricultural land in Governorates

This table shows that Tulkarem Governorate got the highest evaluation
### Evaluation of all criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Jenin</th>
<th>Tulkarem</th>
<th>Nablus</th>
<th>Qalqili</th>
<th>Salfit</th>
<th>Ramallah</th>
<th>Bethlehem</th>
<th>Hebron</th>
<th>Jerusalem</th>
<th>Jericho</th>
<th>Tubas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity of province from the nearest local commercial crossing</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Proximity of Governorate from seaport Commercial International Crossing</td>
<td>2</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Proximity of Governorate from International Land Crossing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity of Governorate from International Airport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High percentage of Palestinian Authority Area(A&amp;B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The existence of specialized university &amp; colleges programs for industry and agriculture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A high percentage of high value agricultural land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15/21</td>
<td>16/21</td>
<td>12/21</td>
<td>11/21</td>
<td>8/21</td>
<td>14/21</td>
<td>10/21</td>
<td>14/21</td>
<td>13/21</td>
<td>/11 21</td>
<td>21/11</td>
</tr>
</tbody>
</table>

#### 4.2 Site analysis

Table():Criteria of Site Selection in Tulkarem Governorate

<table>
<thead>
<tr>
<th>Criteria for Site Selection in Tulkarem Governorate</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1–Land of low agricultural value</td>
<td></td>
</tr>
<tr>
<td>2–Land is 200 meters away from the master plans</td>
<td></td>
</tr>
<tr>
<td>3–Lands are far from settlements</td>
<td></td>
</tr>
<tr>
<td>4–Proximity (near) to a regional or major street</td>
<td></td>
</tr>
<tr>
<td>5–Infrastructure can be able exist</td>
<td></td>
</tr>
<tr>
<td>6–Near to the land of high agricultural value for the get of local raw materials</td>
<td></td>
</tr>
<tr>
<td>7–To be in the territory of the Palestinian Authority expires or border territory with the powers of authority so as not to be the whole perimeter Lands C</td>
<td></td>
</tr>
</tbody>
</table>
Map(): Topography of Tulkarem Governorate
This map shows that hollow color that aerial photo represents low value of agriculture lands in Tulkarem Governorate, and the another area with colors in the legend shows the area of built up, high and mid agriculture lands that the industrial zone can not be located in these spaces.

Map(): Lands of low agricultural value, scale 1:20,000

And then the intersect between low value of agriculture land and topography is implemented in below map to decide where the slope is smooth with area more than 400 dunums as that was mentioned before in criteria.
This map shows the best location depends on criteria as show purple polygon.

Fig(): Aerial photo of proposal location
map():Proposal Location of AIP project
Map(): Transportation map with proposal roads

Map(): existing transportation sector
Fig(): Al Taybeh crossing northern path
map(): Geopolitical Map

Map(): Topography of Proposal Site with surrounding
Map(): Topography of site

Map(): Classification of Agricultural Land
Map(): classification of agricultural land

map(): Land Cover in proposal site of TAIP.
Fig(): Parcels in Study area

map(): Location of existing source of water
Fig(): Sun path map

Fig(): Wind Directio and Sun path, 3D
Map(): Demolition orders of building in area c in study area.
**SWOT Analysis**

**Strengths**

1. Proximity to a regional road (Tulkarem–Nablus)
2. Land inclination suitable for the project (4%).
3. There is enough space for the project. (850 donums)
4. The region's need for the presence of an industrial zone organized, planned agricultural, support for the steadfastness of Palestinian farmers and encouragement of investment
5. Classification of the site as a high percentage of agricultural land with low agricultural value
6. Impressive access of electricity, water and other services
7. A border area with a Class A land and a proportion of the proposed land classification B
8. The existence of agricultural areas of high agricultural value west of the proposed area
9. Near to the Taybeh crossing 6 km

**Challenges**

1. The project is close to the settlements
2. There is a high proportion of C lands within the proposed site
3. A small proportion 15% of the land is a medium-value agricultural area
Map(): the boundary of extention in future of the nearest settlement colony

**Swot Analysis**

**Strengths**

1. Proximity to a regional road (Tulkarem–Nablus)
2. Land inclination suitable for the project (4%).
3. There is enough space for the project. (850 donums)
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9. Near to the Taybeh crossing 6 km

**Challenges**

The project is close to the settlements

There is a high proportion of C lands within the proposed site

A small proportion 15% of the land is a medium-value agricultural area
Vision

A typical agro–industrial Park, with adequate services and infrastructure that achieves sustainability and safe investment environment

Table(): Crops in Tulkarem Governorate
Figs.: Fruit trees in Tulkarem Governorate

Fig.: Production of Fruit trees in Tulkarem Governorate
Fig(): Vegetable production in Tulkarem Governorate

Fig(): Field Crops in Tulkarem Governorate
Fig.: Field Crops in Tulkarem Governorate
### 4.3 Urban Design

<table>
<thead>
<tr>
<th>Roads and Parking</th>
<th>Administrative facilities</th>
<th>Social facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Road:</strong></td>
<td>Management center Admin. Building</td>
<td>Meeting rooms and exhibition centers</td>
</tr>
<tr>
<td>24 wide road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 m wide road'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 m wide road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16m wide Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking(Car Parking,Truck Lay.,'parking lot)</td>
<td>Security buildings</td>
<td>Electricity Room Fairgrounds</td>
</tr>
<tr>
<td><strong>‘CAR ENTERANCE’</strong></td>
<td>Banks</td>
<td>Restaurants, COFFEE-SHOP’ + Cafeterias</td>
</tr>
<tr>
<td><strong>‘CAR EXIT’</strong></td>
<td>stop office</td>
<td>Mosque</td>
</tr>
<tr>
<td><strong>Filling station</strong></td>
<td>Concerning all about licenses and permissions.</td>
<td></td>
</tr>
<tr>
<td><strong>Weigh Bridge</strong></td>
<td>Water Source Well,surface water ‘CUSTOM CONTROL’</td>
<td>Clinic Entrance Day-care center</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Incoming Logistic Area</strong></td>
<td></td>
<td>‘SHOPPING CENTER’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education facilities Amenities</th>
<th>Green Space</th>
<th>External infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green buffer</strong></td>
<td>Water Source Well,surface water</td>
<td></td>
</tr>
<tr>
<td><strong>'SCHOOL</strong></td>
<td>Park</td>
<td>Elevated TanK</td>
</tr>
<tr>
<td><strong>KINDERGARTEN</strong></td>
<td>Playground</td>
<td>Electricity Room</td>
</tr>
<tr>
<td><strong>creche</strong></td>
<td></td>
<td>Photovoltaic Power</td>
</tr>
</tbody>
</table>
Fig(): Description of main land use in industrial city, proposal Tulkarem AIP
Land Subdivision

Boundary of Parcel

Boundary of max built up area

Setback can be open space and landscape with trees

Street with min 15m wide

Principles of Industrial Lands Division

Internal lands - External lands

Border lands

Module of units

25\times50=1250m^2

50\times75=3750m^2

100\times65=6500m^2

The width of the Module unit of land on the road shall not be less than half the length

And the ratio shall not be more than 2:3

The length of the connected group shall not exceed 5-10 modules except for the necessity of planning

Setback should be determined Dependence on area of parcel
Zoning is the process of dividing land in a municipality into zones (e.g. residential, industrial) in which certain land uses are permitted or prohibited. The type of zone determines whether planning permission for a given development is granted.

The main & sub entrance of factory should not be less than six meters
### Green Area

<table>
<thead>
<tr>
<th>Green Area (3-7%)</th>
<th>The average percentage of area from green areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated Green areas</td>
<td>50%</td>
</tr>
<tr>
<td>Open gardens</td>
<td>40%</td>
</tr>
<tr>
<td>Throw waste area</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Services

<table>
<thead>
<tr>
<th>Services Landuses (min 5%) from area of IE</th>
<th>The average percentage of area from services areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Services</td>
<td>40%</td>
</tr>
<tr>
<td>Social Services</td>
<td>30%</td>
</tr>
<tr>
<td>General &amp; Various Services</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Administrative, social and education facilities:
- Management center,
- Apprenticeship school,
- Technical high school,
- Union building,
- Meeting rooms and exhibition centers,
- Fairgrounds,
- Restaurants,
- Cafeterias,
- Mosque,
- Security buildings,
- Banks,
- Sport centers,
- Day-care centers,
- Filling stations etc.
Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect.

**Area equipped by PV array:**

After calculations, and I have the area of each PV-panel (2 m * 1 m)

And there is 7 modules, then the area of the panels = 7*(2*1) = 14 m²

And to avoid air pressure and heat between modules it’s preferred to let (30 cm) between each 2 modules, so [6 * 20cm = 120cm = 1.2 m] is to be added to the area of array, so

I took into account the house load needed to decide number of modules and the batteries, in order to get the optimum system, the solar irradiation, tilt, and azimuth angle values are introduced.

The load is to be calculated by taking the most important loads in the house which is: (Lighting, Refrigerator, TV, PC, Washing machine, Iron, and Heater). taking into consideration the wattage, and the daily working hours of each appliance to find the total consumption in (Wh/day) which is very important in determining the whole component of the system.
Transportation and circulation

- Mobility
- Right of Way
- Effective Width
- Crosswalk Markings
- Regional Roads
- Rural Roads
- Paved Roadway
- Pedestrian Walkway
- Multi-Lanes
- Travel Lane
- Pedestrian Crossings
- Grade-Separated Crosswalk

Hierarchy of roads
- External Roads
- Regional Roads
- Internal Roads
- Main Roads
- Collector Roads
- Local Roads

Load and unload are allocated from the backend interfaces

The curve radius of the intersection of roads should not be less than 20 m

Parking

<table>
<thead>
<tr>
<th>Parking (5% from area of IE)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>factory</td>
<td>1park to 1-3 Employees 1 to 30-50 m2 from all area of floors</td>
</tr>
<tr>
<td>Health center</td>
<td>10 cars</td>
</tr>
<tr>
<td>Administrative Building</td>
<td>1 to 40-60m2 for all area of floors</td>
</tr>
<tr>
<td>Bank</td>
<td>1 park to 25-30m2 from all area of floors</td>
</tr>
<tr>
<td>Storehouse</td>
<td>1</td>
</tr>
</tbody>
</table>

Parking should be in front of the building and not on the road

Public parking for workers should be less than 500m distance far away

| population | 7000 worker |
| Internal Rate of Return | 13 years |
| Payback period | 3 years |
the benefits of water harvesting techniques through the establishment of eight rain water collection systems, which will be a source of irrigation for 50 dunams of land.

Map(): water harvesting in kfr al labad; source: Arab Group For The Protection Of nature Land Research Center – LRC

افتتاح خزان مياه لروي المحاصيل الزراعية في كفرليلد
Livestock zone
Milk, egg honey zone
Vegetables zone
Cereals Zone
Specialized infrastructure
Utilities zone
Amenities zone.
Entry & Exit

Livestock Zone
- Truck Parking
- Preparation area
- Inspection area
- Quarantine advisory cell
- Loading bay ramp
- Sorting, storage
- Wax collection centre

Vegetables zone
- Cold Storage
- Bulk storage
- Washing & drying
- Grading and storing
- Receiving warehouse
- Truck Parking

Amenities zone
- Public parking
- Rural market
- Admin building
- Market Intelligence cell
- Training centre
- Agri equipment centre
Figure: The amount of required water
Source: Saudi Industrial Propert Authority, 2014

<table>
<thead>
<tr>
<th>مصطلح الصناعة</th>
<th>ميكرومتر مكعب/اليوم</th>
</tr>
</thead>
<tbody>
<tr>
<td>الصناعة الغذائية</td>
<td>مياء شرب بنسبة 100%</td>
</tr>
<tr>
<td></td>
<td>100 مياء شرب/اليوم</td>
</tr>
<tr>
<td></td>
<td>Food &amp; Beverages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>معدل استخدام الطاقة الكهربائية (كم.أ.م²/م²)</th>
<th>النشاط الصناعي</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/50 م²</td>
<td>صناعة المواد الغذائية</td>
</tr>
</tbody>
</table>

كمية المياه المطلوبة للأنواع الصناعات المختلفة

Figure: The amount of required water
Source: Saudi Industrial Propert Authority, 2014
5 References


