

Analysis of the Factors Affecting the Development of an Agropolis- An Urban Farming City

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Abstract - In an era of fast-paced development wherein resources are getting depleted by the minute, what if an innovative design could bring a new outlook towards urban development? Details regarding the factors associated with such a design solution – Agropolis, are discussed through this paper. The objective will rely solely on identifying the underlying factors that affect the development of an Agropolis and its possible remedies. Literature study, Survey, and Interpretation are the three phases of studies considered for this paper. However, case studies are limited to literature studies as live case studies are few. The first and second phases will collect the data needed for the research. The third phase will explore the possible solutions to the underlying issues based on the database compiled for this paper. The paper's agenda is to pave the way for further studies regarding the development of an Agropolis.

Key Words: Agropolis, Agro-farming, Agrarian, transition layer, Aquaponics, Urban Agglomeration.

1. INTRODUCTION

Humans began to evolve seven million years ago, and researches show that the first modern humans appeared 200,000 years ago. With progress in time, the living standards of homo sapiens have also evolved hence making it a continuous process. An increase in the use of resources beyond the benchmark has affected the globe drastically, especially land-use. The actions implemented at present will predict the future of humankind. A remedy to land-use could be the development of Agropolis (Agros- Farm; Polis- City). Through this, food production and land-use, the two issues that the near future will face could be significantly resolved.

Redefining the ideology of existing Urban cities could become the ultimate weapon of development. How well the public accepts a design is a primary determining criterion for the success of any project. To understand the strategy and other factors to be implemented in the new design of an Agropolis, the public's opinion and judgment are of the utmost value as the final product/ result has to be approved and acknowledged by the public itself. Hence an attempt to understand the public's perspective should also be considered while considering the design solutions.

As for the reasons mentioned above, the design of an Agropolis should be user-oriented.

2. LITERATURE CASE STUDIES

As there are few such designs built-in reality and since the live case studies are spread apart globally, the case studies used for this will solely rely on literature case studies.

Literature case studies were selected based on most fit for this paper, but the case studies are not limited to the following:

2.1 Urban Agriculture and Food Security in Lilongwe and Blantyre, Malawi

Contradicting results were found while comparing to previous studies in another part of Africa, which depicted the urban population's dependence on urban farming (Maxwell,1995).

Identification of low-income and high-income neighborhoods enabled a deep understanding of the existing structure of urban farming. For example, research showed that high-income groups had more access to bigger plots and external sources to improve cultivation, such as fertilizers. Studies also depicted that women acted as efficient producers in urban farming than men. Primarily as the majority of the men preferred formal employment. Due to instability in the income generated through agriculture, most occupants chose formal professions, which led to a stable generation of revenue and life stability.

Funding acted as an essential aspect in urban farming, as low-income groups could not acquire larger plots and yields due to restricted access to resources.

2.2 Urban Agriculture and Physical Planning: A Case Study of Zaria, Nigeria

The city can be divided into two categories based on water for irrigation: rain-fed and irrigated farming. Irrigated farming lands required a nearby water source, whereas rain-fed grounds required alternative methods to store rainwater during the absence of rain. Aquaculture was majorly found on the city's outskirts due to the same reason mentioned above (nearby water source). Standard farming practices such as horticulture were found to be low in high-density residential areas and private lands.

One of the major causes of low farming levels is that existing laws and policies did not promote urban agriculture, which

acted as a constraint for further development in urban agriculture. Laws restricting urban agriculture led to restricted land-use for farming.

Farmers rented farming lands according to the growth patterns to migrate according to the seasons. The migration of farmers mainly depended on transportation costs, which promoted farmers to carry urban agriculture within peri-urban areas.

Even though the laws and policies were not supportive of urban agriculture, a more significant portion of farmers showed carried interests in continuing farming in the future as urban agriculture is seen as a critical part of their strategy for livelihood.

2.3 Agropolis

Agropolis is a design by the company Dark Arkitekter. Efficient and intensive farming to increase the surplus of food production is demonstrated in their design. The operation of Agropolis lies in the hands of 800 households. These 800 households will together deploy a farmer to handle the agricultural lands within the structure. The design is also called a “modern garden city” as it facilitates its users to be part of farming. The plan consists of low-rise to high-rise buildings that incorporate residential units, schools, and common areas.

This particular design will be located in Mjøndalen, Norway, and will act as an ideal example for future urban farming incorporated cities which are sustainable.

3. SURVEY

To analyze the public’s understanding, perspective, and willingness to shift to an Agropolis, a survey consisting of seven questions was created and distributed among various age groups, genders, and occupational categories.

Age, gender, and occupation were considered to generalize and equalize opinions from a diverse crowd. Questions were curated in such a way to reveal the psychological interests within an individual.

3.1 Survey questionnaire

Following were the questions used for the Survey:

- Define age group
- Define gender
- Define occupational category
- Out of the two pictures shown below, which city would you prefer to live in?



City 1- City packed with buildings



City 2- Agriculture with incorporated city

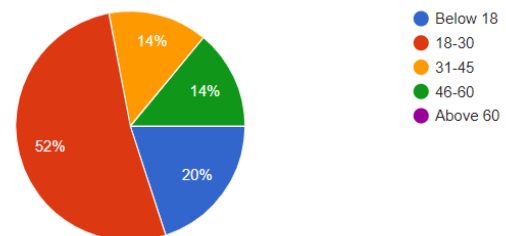
(Source: Google images)

- Would you migrate to an agriculture incorporated city (City 2) if the opportunity provides?
- Are you an actively participating individual in social activities?
- Would you like to take part in conducting agricultural activities within your community if the opportunity provides?

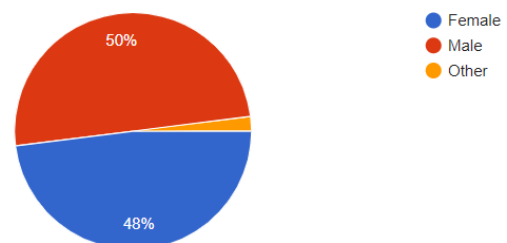
3.2 Survey Data

The total number of participants in the Survey is 50. Following were the observations recorded:

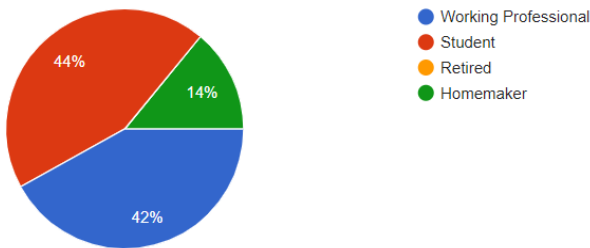
- Age group



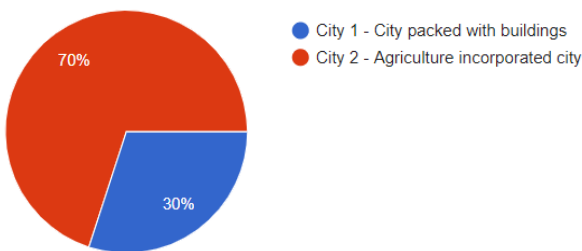
- Gender



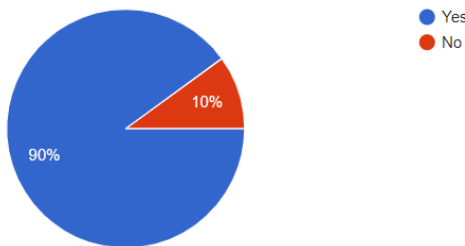
c. Occupation



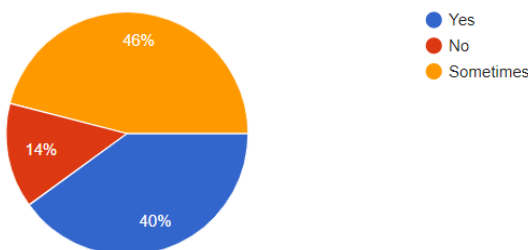
d. Preferred city



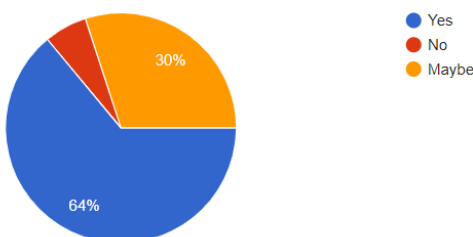
e. Migration to City 2 (Agriculture incorporated city)



f. Participation in social activities



g. Participating in agricultural activities in the community



3.3 Survey Findings

The image representing City 2- Agriculture incorporated city uses low rise building structures in Question 'd'. This particular image was put on purpose to understand users interests regarding low-rise buildings and high-rise buildings. When asked in Question 'd', a majority voted for City 2, and 30% voted City 1 (City packed with buildings). However, when it comes to Question 'e', we can see a massive difference in the majority by 20% when asked to migrate to an agriculture incorporated city. This demonstrates that the public is willing to adapt to the new built environment if a certain number of existing elements are applied to the upcoming design atmosphere. In this case, the public would adopt if high-rise building is provided along with incorporating agricultural practices. Hence this suggests that the building structures should be designed, keeping in mind that the public prefers high-rise structures.

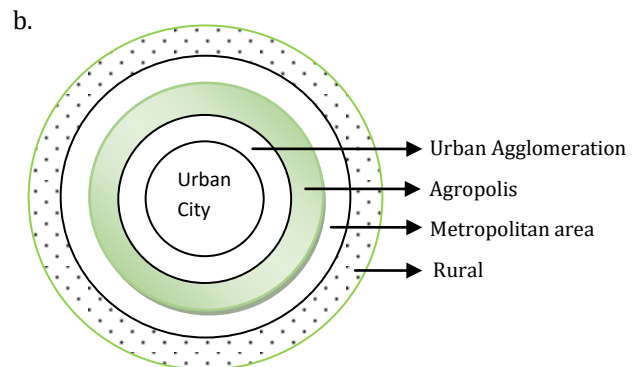
Question 'f' demonstrates the participation percentage in social activities, and Question 'g' indicates participation percentage in their community's agricultural activities. The positive difference in the majority when participating in agrarian activities depicts that the public is willing to participate in farming activities instead of other social activities.

4. INTERPRETATIONS

The observations and analysis are based on Design factors, Socio-Economic factors, Environmental factors, Political factors, and Cultural factors.

4.1 Design Factors

a. Different climatic regions require other design treatments. Designing an Agropolis in a tropical climate will differ from an Agropolis built in a hot and dry climatic condition.



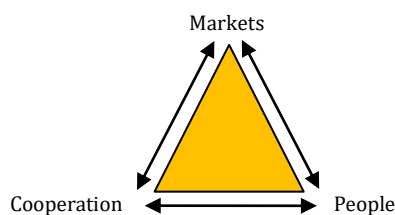
An Agropolis should act as a transition layer. Hence the ideal location for positioning an Agropolis should preferably be in between urban and rural

areas. This will also allow reduced transportation costs for farmers coming from rural areas.

- c. Each housing colony should comprise 5 to 8 apartments governing a minor agricultural area. Choosing a small number of apartments for housing units will make the working of an Agropolis manageable.
- d. A community should comprise around 250 to 300 housing colonies making up the whole of Agropolis. This categorization of interested occupants in each housing unit gets a chance to be part of the agro-farming process. This will also encourage occupants to become more active in their social circle and significantly impact their lifestyle.
- e. R&D centers and training institutes could be incorporated in the center of an Agropolis to highlight the importance of urban farming and increase research in urban agriculture.
- f. Some of the techniques incorporated in designing an Agropolis include introducing aquaponics and urban vertical farming.
- g. The design could include proposals for expansions of an Agropolis at the periphery for mixed-use building development.

4.2 Socio-economic Factors

- a. One of the significant issues of food generation will be faced shortly. Agropolis will play an essential role in the production of food. Through the embedded urban farming in an Agropolis, generation of income happens.
- b. To understand the working of urban farming in an Agropolis, it is best to analyze the existing hierarchy of flow in the farming sector and develop it.

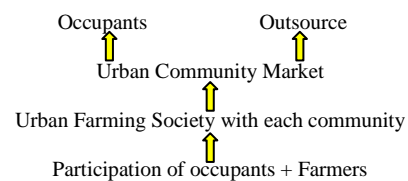


(Source: Socioeconomics of Agriculture, Stefan Mann)

Existing Hierarchy:



Developed Hierarchy for Agropolis:



- c. Through a developed system, the harvest's priority will be given to its occupants, and the surplus is outsourced to the public. This will create encouragement among the people to adapt to an Agropolis development.
- d. When it comes to farming, the vulnerable category is farmers due to the insecure hierarchy of value generation. Farmers working in Agropolis should be given an income generated through the harvest; through this method, farmers will be ensured stability, thereby eliminating the existing vulnerability in the system.
- e. Designing a prototype of an Agropolis will create awareness which could also attract international interests.

4.3 Environmental Factors

- a. In today's world, a lack of food security is seen widely. A solution to food scarcity and security is provided through such a design ideology.
- b. The location of an Agropolis plays a significant role in the source of water. Therefore, it is ideal for designing an Agropolis near a natural water source.
- c. The volume of an Agropolis should not affect the natural ecosystem, and existing habitat as such a design aims to become environment friendly.
- d. Climatic conditions of a region should be kept in mind to make solutions for natural disasters such as

drought. The key for drought measures could include incorporating rainwater harvesting systems.

4.4 Political Factors

- a. Favorable policies encouraging the development of an Agropolis should come into place.
- b. As depicted in this paper's literature case study, allotting plots for urban farming in cities start with the country's law and policymakers. Laws and policies should be developed to protect and promote sustainable development practices.
- c. Laws should not only be designed for national levels but also at regional and local levels. This will ensure that the information is passed on to each individual residing in the country.

4.5 Cultural Factors

- a. The social habits of a cultural community influence how that specific community evolves with time. The community organization should arrange awareness programs to encourage positive evolution. Through such awareness programs, the working generation, older generations, and the younger generations will know that developments such as Agropolis exist.
- b. Experimenting with innovative practices as a community ensures that each individual puts in efforts towards the community's progress, which will spread towards the development of a country.

5. CONCLUSIONS

Understanding the operation of an Agropolis and how the public conceives the ideology of an Agropolis will judge the success. Several predetermining factors such as location, climate, and environment shape the foundation and after built factors such as public's perception and opinions, which will conclude if such a development should continue. Therefore, pre-construction and post-construction measures should be considered strongly during the management of the project. Building prototype designs will merge the gap between the misconceived concept of excluding urban agriculture from urban cities. As seen as the paper's limitation, live case studies based on developed Agropolis are few, which acted as a barrier in conducting advanced research in this paper.

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