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Nepal

CERTIFICATION

This is to certify that this thesis entitled **"AGRO MARKET HUB"** submitted by **Sakul ojha** (074-BAE-228) has been examined and it has been declared successful for the partial fulfillment of the academic requirement towards the completion of the Degree of Bachelor of Architecture.

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Prof. Dr. Sudha Shrestha (Thesis Supervisor)

DECLARATION

I declare that this thesis is done by my own independent work and investigation which has not been previously accepted for any kind of degree and is not concurrently submitted for any kind of other degree. Therefore, I have consent on any consequences if found accepted or submitted previously. All the references in my thesis will receive an acknowledgement.

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Sakul Ojha

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ABSTRACT

Markets have been vital elements of cities for thousands of years to provide shelters for the buyers and sellers and to protect and promote the trade in fresh food. Markets have existed for millennia as an important part of cities not only for economic purposes but also as a place for social interaction. In the context of Nepal, the architecture of famers' market remains unexplored and lacks permanency. So, there is need to explore the architectural possibilities of farmers' market in accordance to very demanding population of present scenario.

The research aims to touches on issues such as rethinking of the roles of markets in the urban structures as the new type of social area, supporting urban traditions and being the exchanging medium between communities not only economically, but also socially. The actual research is determined by the pursuit of new forms of market and functional programming corresponding to the request of a modern consumer.

This report was prepared to document the research carried out to discover and understand the design of markets related to food procurement. Research on the history and trend of markets, food procurement, market mechanisms, issues, market culture, physical realms of market and placemaking through various case studies and literature. The study provides the design guidelines, technical foundations, spatial relations, and functional requirement that are to be realized in the farmers' market.

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Chapter 1. Introduction

1. Background

Nepal is an agricultural country where 65.9 % of the total population is engaged in it. Our country is highly dependent on it, though agriculture is not capable of giving much to our country. People are highly engaged in it, but it hasn't enhanced the economy of the country so far because people are mostly engaged in subsistence farming. Agriculture plays a significant role in the Nepalese economy. It becomes the principle of economic activity. The contribution of agriculture to the GDP of Nepal was 36.21 in the fiscal year 2019/20 and increased to 19.9% in 2020/21. Since Nepal is a developing country, agriculture is of the utmost importance. Agriculture is the main source of food, income, and employment opportunities for many Nepalese people (especially in rural areas). Most people grow crops for personal consumption rather than selling them in the market, making them reliant on exports (Dahal, 2022).

figure 1: typical rice farming

For many developing countries like Nepal Agriculture represent the best opportunity to lift a country out of poverty and improve its development trajectory as it addresses food security, raises income, and spurs demand for other goods and services. Agricultural land (% of land area) in Nepal was reported at **28.75** % in 2018, according to the World Bank collection of development indicators (Trading economics, 2022). The restructuring of the states provided an opportunity to improve agriculture governance as well. Although top priority has been given to Agriculture, we could not improve the status of agriculture. Farmers are working hard to meet their demands and fulfill their desires. Even if they work hard, they are not satisfied with their income. They can hardly meet their household expenses and other expenses. They can't afford a good quality of life for them and their family. There is various reason for not developing the agriculture some of them are as follow:

Traditional method of farming, Lack of proper market, lack of transportation, lack of fertilizer and needed things to improve the seed, adequate storage facility, lack of modern agriculture tools and equipment. Due to various factor farmers are demotivated to work. Although Nepal has got diversified climatic condition and ecology only 18-21% of total land is cultivable. Moreover, the process of urbanization is increasing in the alarming rate. The horizontal diversification is not possible due to shrinking land and increasing urbanization. To meet the ever-increasing demand

of food, feed and fodder vertical diversification is the only alternative remaining with us. Considering high population growth rate and fragile ecology, the scope of increasing cultivable land is severely limited in Nepal. Nepal has still to depend on foreign countries for agricultural inputs. To tell the truth Nepalese sells rice at 17Rs/kg and buy rice husk at 21Rs/kg. This is really a pathetic condition of agriculture in Nepal.

Table 1; Agriculture land percentage of nepal

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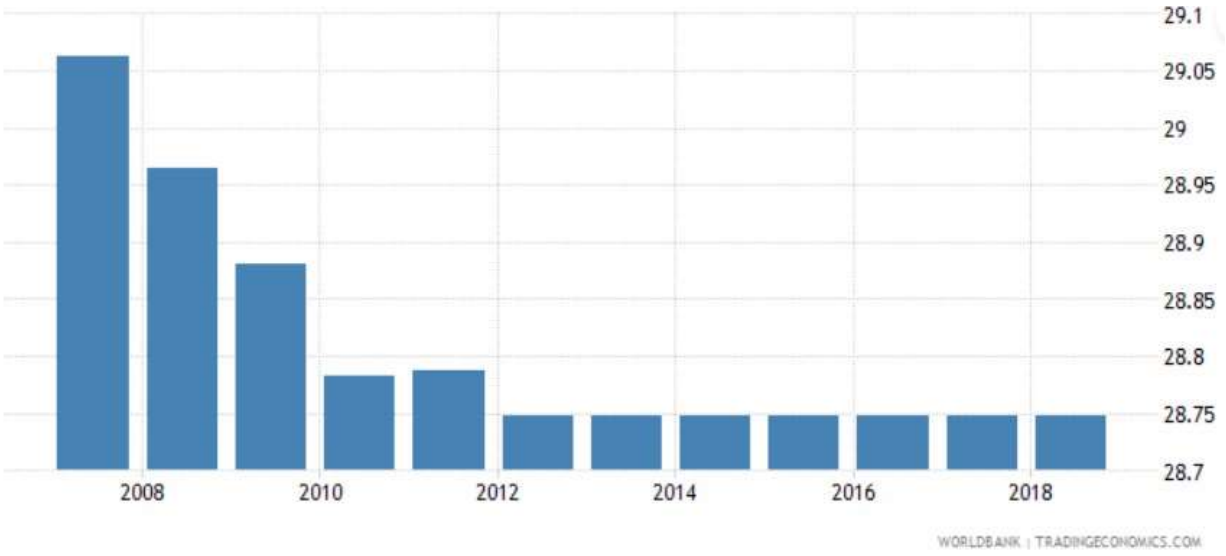

2. Need identification

On analyzing the living standards survey over past few decades, we can observe:

- Decreasing pattern of households involved in agriculture. Almost decreased to half between 2003 to 2010. Only 8.5% were involved in Kathmandu valley. (2010/11)
- 98.5% of Agri-households have less than half a hectare of land (less than 10 ropanies). Almost all farmers are not bulk producers.
- The concept of defragmentation of fragmented lands and commercial farming started to explore.

Table 2Selected characteristics of agricultural households (NLSS 1996,2004,2011)

Year	Percent of all agricultural households	Percent of Agri-households with land	Percent of women headed Agri-households	Median age (yr.) of Agri-household heads
1995/96	12.04	10.0	52.83	44.5
2003/04	16.2	14.7	19.3	53
2010/11	8.5	8.0	8.0	50

Table 3 Distribution of agricultural households with land by size (NLSS 1996,2004,2011)

Size (hectares)						
Year	Less than 0.1	0.1-0.25	0.25-0.5	0.5-1	1-2	2 and over
1995/96		77.47	21.40			1.13
2003/04	41.5	45.3	12.1	1.2	0.0	0.0
2010/11	45.9	39.7	12.9	1.5	0.0	0.0

Although located close to rich agricultural lands, urban areas often lack a permanent place to provide people with fresh, locally sourced foods. The architecture of the existing markets, that may be those steel trusses markets, or any supermarkets only concerned with economic exchange, they offer nothing for the social exchange and social cohesion between the layers of the community.

3. Project justification

An agriculture market hub is a centralized platform or location where farmers, buyers, and sellers can come together to exchange agricultural products and services. These hubs are designed to facilitate transactions between farmers and other actors in the agricultural value chain, such as processors, wholesalers, retailers, and consumers (OpenAI, 2023).

Agriculture market hubs can take different forms, including physical marketplaces such as farmers' markets or auction houses, as well as online marketplaces and e-commerce platforms. These platforms may provide various services such as price discovery, logistics and transportation, marketing and advertising, and financial and legal support (OpenAI, 2023).

The goal of an agriculture market hub is to promote fair trade practices, improve access to markets for smallholder farmers, increase market efficiency, and ultimately help to boost the income and livelihoods of farmers and other actors in the agricultural value chain (OpenAI, 2023).

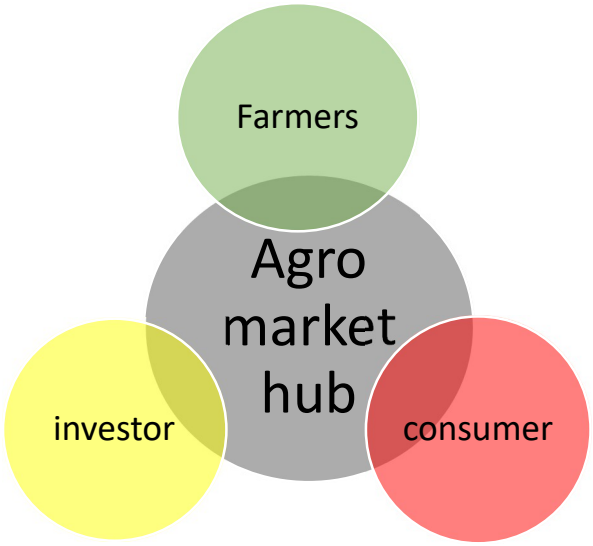

Figure 2; Agriculture hub linked

The following diagram shows the connection of Agro market hub with other bodies like Farmer/producer, Consumers, and Investor. This Agro Market hub offered a Wide Range of Facilities to Both Producer and Consumers as well as it also Connect Investor by providing Investing opportunity in the agromarket Field.

The agriculture market hub is nothing but a place where it links all the related body like famer, investor buyers, sellers and consumer and reduces the gap between them, to improve the agriculture economy.

figure 3; Normal supply chain

figure 4; Supply chain after Ag-hub

4. Problem statement

Nepal is predominantly an agrarian country, wherein 65.9% of population is engaged in agriculture. There is enormous potential in agriculture in the Terai region of Nepal as it is considered to be granary of Nepal. As the soil here is fertile, more than half percent of people of Nepal depend on the vegetation of Terai region. Most of the crops and food for the whole country are grown in the Terai region. But due to lack of infrastructure and processing facilities, raw materials are not being utilized to their full value. Hence the farmers have been facing problems upgrading their lifestyle despite the hard work. The major problem is that the agriculture practices is basically traditional. The main actor in any agricultural development system is the farmer. The farmer is basically a traditional person. It is easier to go along with what he is doing rather than having to change. When we say change in technology, the farmer has to adopt a lot of new practices for the change to occur. He requires more money to buy more inputs needed by new technology. In many cases, he needs to employ more skilled labor for which training is required. For high production technologies, irrigation should be ensured, fertilizers should be available, seeds should be of good quality and management should be skilled. Having received all these the production, which is the main focus of high technologies, may still remain low or may not meet expectations.

My proposed site for the thesis will be located in Chitwan. form my personal experience I found that Producers are not well linked with profitable markets, especially to emerging sectors of domestic and regional markets. Although the agriculture development of Chitwan is the main part of the economic development, there are many direct or indirect reasons for not being able to accelerate. With increasing urban development, there is a problem in meeting the demand for food. Such problems have arisen due to the inability of locally produced good to find the right market. Also lack of availability of necessary machinery, seed, fertilizers, and technology for good quality production. The observed main problems are

figure 5 News of Milk Price hike

- Lack of proper connection between farmers, government, consumers, and investors.
- Lack of social interaction and sharing of knowledge.
- Poor market management.
- Availability of seeds, fertilizer, and machinery etc.
- Lack of knowledge.

figure 6 Chitwan Farmers Stage Protest Throwing Vegetables On road

5. Objectives

- **To provide a place to exclude intermediaries from the agriculture food supply chain (market).**

- **To provide the places of various agriculture activities, social interaction space and marketplace in one place for every people whether they may be youths, child, or old aged groups of that locality.**

- **To provide a place for training and research facilities of new technology related to agriculture.**

- **To build a hub that explores and expresses rural architecture: regional identity "architecture that respond to present, respect past and accommodates the future".**

Chapter 2.

1. Methodology

The successful execution of any research follows certain methodologies that become the backbone of the whole project. Hence, review of basic prerequisites is mandatory. Following research methods will be pursued out of which required facts, data, codes of conduct and standards will be gathered, analyzed, and employed in design.

a. Literature review

Writing a literature review is a prime factor that establishes a conceptual and theoretical foundation of a research topic. It is an important academic skill that enables researchers to explore, analyze and synthesize published work in a field and make connections between existing studies and their own research (Ahmed, 2018). literature review can be identified as "the selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed (Sajeevanie, 2021). Conducting a literature review has many purposes. As explained by Randolph (2009) "Conducting a literature review is a means of demonstrating an author's knowledge about a particular field of study, including vocabulary, theories, key variables and phenomena, and its methods and history".

A first review of academic literature will help to narrow down the broad problem and to develop a clear and specific problem statement. A second review of the literature or critical literature review is essential in most research projects. In both inductive and deductive research, a review of the literature will help to develop a conceptual or theoretical background. In deductive research, a literature review will also help the researcher to develop a theoretical framework and hypotheses. In inductive research, it is not required to develop a theoretical framework. A review of the literature will thus help the researcher to get familiar with relevant knowledge related to the problem that aims to solve (Sajeevanie, 2021). In addition to that, Randolph (2009) has explained that literature review plays a role in, identifying the research problem, seeking new lines of inquiry, avoiding fruitless approaches, gaining methodological insights, identifying recommendations for further research and seeking support for grounded theory.

There are six generic steps involved in conducting a review article as explained in templier and pare (2015).

- Formulating the research question(s) and objective(s)
- Searching for the extended literature.
- Screening for inclusion.
- Assessing the quality of primary studies.
- Extracting the data, and
- Analyzing data.

Methodological approach

Several methods can be adopted while writing the review. They are basically as mentioned below.

- Quantitative method (e.g., survey) are best for measurement in figures.
- Qualitative methods (e.g., interviews) are best for description and interpretation.
- Mixed methods allow for a combination of numerical measurement and in-depth exploration.

There are a number of appropriate types of sources that can be utilized to make and support an argument in a literature review. Sources can be considered as having varying degrees of value in a literature review. Berg (2009, p.389) listed the potential sources and their relative value in order of:

- Scholarly empirical article, dissertation and books
- Scholarly, nonempirical article and essays.
- Trade journal articles
- Certain nationally and internationally recognized "good" newsmagazines.

Few peers reviewed articles are accountable for the methodological approach of this respective topic on Agriculture hub. Qualitative analysis is followed during the process.

The approach of the methodology is primarily the reliability of journal research in terms of technical and cognitive rationalization. The first review is a case-study specific review while second review is chosen in superficial concept level to achieve the clear idea of philosophy and execution level.

b. Case study

Case studies were one of the first types of research to be used in the field of qualitative methodology. A case study is a research method that involves the documented history and comprehensive analysis of a situation concerning subjects such as industries, organizations, and markets. The distinguishing factor of the case-study methodology is that it aims to bring out unique characteristics and interesting differences in the situation under observation. The case study approach is typically used for idiographic research, which means it focuses on atypical circumstances and distinctive outcomes as a subjective phenomenon. Another application of case studies is for nomothetic research aimed at building new theory, typically through the analysis of multiple cases and large sets of data within each case (McGee, 2017).

Basically, there are nine steps to standardize case study are:

1. Knowing aim of the study.
2. Identification of the case study.
3. Appraise the case.

4. Review the literature.
5. Develop the standardized framework.
6. Develop facility documentation methodology.
7. Collecting of data
8. Analyze data.
9. Interpret data and present result.

Usually, there are two types of data.

- Qualitative data: it doesn't involve numbers and figure but actual quality of cases.
- Quantitative data: it is generally in number and figures.

The researcher carefully emphasized case study as a tool for effective teaching, studying practice and architectural research. In major cases, case study is supposed to take the lead in architectural inquiry and research. Data collection is conducted by two major methods:

- Primary method: Direct survey, interviews
- Secondary method: books magazine, journal, articles, internet etc.

Chapter 3. Literature review(A)

1. Agriculture

Agriculture or farming is the practice of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. The history of agriculture began thousands of years ago. After gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Pigs, sheep, and cattle were domesticated over 10,000 years ago. Plants were independently cultivated in at least 11 regions of the world. Industrial agriculture based on large-scale monoculture in the twentieth century came to dominate agricultural output, though about 2 billion people still depended on subsistence agriculture (Agriculture, 2022).

Figure 7; How India and Africa Can Start A Revolution In Agriculture And Food Security | Outlook Poshan (outlookindia.com)

The major agricultural products can be broadly grouped into foods, fibers, fuels, and raw materials (such as rubber). Food includes cereals (grains), vegetables, fruits, oils, meat, milk, eggs, and fungi. Over one-third of the world's workers are employed in agriculture, second only to the service sector, although in recent decades, the global trend of a decreasing number of agricultural workers continues, especially in developing countries, where smallholding is being overtaken by industrial agriculture and mechanization that brings an enormous crop yield increase (Agriculture, 2022).

Modern agronomy, plant breeding, agrochemicals such as pesticides and fertilizers, and technological developments have sharply increased crop yields, but cause ecological and environmental damage. Selective breeding and modern practices in animal husbandry have similarly increased the output of meat but have raised concerns about animal welfare and environmental damage. Environmental issues include contributions to global warming, depletion of aquifers, deforestation, antibiotic resistance, and other agricultural pollution. Agriculture is both

a cause of and sensitive to environmental degradation, such as biodiversity loss, desertification, soil degradation, and global warming, all of which can cause decreases in crop yield. Genetically modified organisms are widely used, although some are banned in certain countries (Agriculture, 2022).

1.1. Start of agriculture

Over centuries, the growth of agriculture contributed to the rise of civilizations. Before agriculture became widespread, people spent most of their lives searching for foodhunting wild animals and gathering wild plants. About 11,500 years ago, people gradually learned how to grow cereal and root crops, and settled down to a life based on farming. By 2,000 years ago, much of the Earth's population had become dependent on agriculture. Scholars are not sure why this shift to farming took place, but it may have occurred because of climate change. When people began growing crops, they also began herding and breeding wild animals. Adapting wild plants and animals for people to use is called domestication. The first domesticated plant was probably rice or corn. Chinese farmers were cultivating rice as early as 7500 BCE. The first domesticated animals were dogs, which were used for hunting. Sheep and goats were probably domesticated next. People also domesticated cattle and pigs. Most of these animals had once been hunted for hides and meat. Now many of them are also sources of milk, cheese, and butter. Eventually, people used domesticated animals such as oxen for plowing, pulling, and transportation. Agriculture enabled people to produce surplus food. They could use this extra food when crops failed or trade it for other goods. Food surpluses allowed people to work at other tasks unrelated to farming (Wikipedia, the free encyclopedia, 2022).

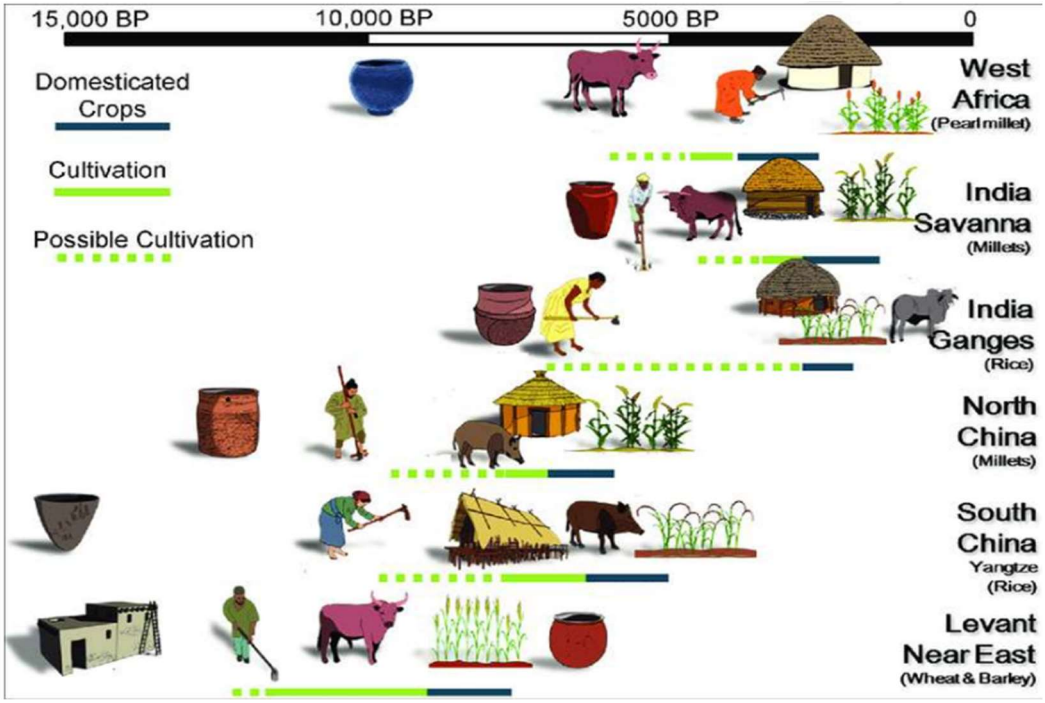

figure 8; Evolution of agriculture

Agriculture kept formerly nomadic people near their fields and led to the development of permanent villages. These became linked through trade. New economies were so successful in some areas that cities grew and civilizations developed. The earliest civilizations based on intensive agriculture arose near the Tigris and Euphrates Rivers in Mesopotamia (now Iraq and Iran) and along the Nile River in Egypt (Wikipedia, the free encyclopedia, 2022).

1.3. Types of farming system

4 Important Systems of Farming

i. The Traditional System:

This is a system which is generally prevalent in a backward, segment of agriculture. The main feature of this farming system can be traced to the characteristics of an overall backward economy. Industrial sector is non-existent and therefore the population mainly depends upon agriculture. Population pressure on agricultural, has resulted in perpetual sub-division of holdings and therefore, size of the farm is very small. In some cases, the size of the farm is so small that it is difficult for the farmer to use the family labour and other resources optimally on the farm (Harsh Aditya, 2021).

figure 9; traditional farming

ii. Commercial Farming:

Commercial farming represents, as against the peasant farming. The other extreme of farming system. Here, as against the private ownership of a farm by a single farmer, the ownership is generally in the hand of a large number of personal who form a joint stock company to won the form. (However, commercial farming is compatible even a single owner if he can own a large farm-large enough, as to necessary the use of hired labour), so far as the control of over production i.e. decision making power with regard to production is concerned it is generally in the hands of employed managers. The hired labourers operate the farms (Harsh Aditya, 2021).

figure 10; Commercial farming

They constitute a class different from that of the managers who supervise the work. In India, various tea and coffee plantations are the fine examples of commercial farming. Commercial farming is quite popular in U.S.A. Australia and U.K. Commercial farming is also known as estate farming or corporate farming in case a joint stock company owns the farm. Another name for commercial farming is capitalistic farming simply because, in this, case production is carried on with the help of machinery which is generally hired (Harsh Aditya, 2021).

And this system is called commercial farms because, unlike in subsistence farming, the production is meant for the market. Almost the whole of the product (except that which is necessary for seeds etc.) is marketed (Harsh Aditya, 2021).

Advantages of Commercial Farm:

A commercial farm is free from the main disadvantages from which a subsistence farm suffers.

- It can resource for the purpose but also because the large size of farm can use reduce their cost per unit of output. Fencing, drainage and leveling of land can be taken up. Rotation of crops can be introduced Wells can be dug up. Farm building and roads can be built on the farm
- the commercial farms provide much marketable surplus of food grain to the industrial sector, too, are produced on the commercial farms.
- commercial farms thus encourage the development of the industrial sector, Various commercial economies in marketing etc.
- As the commercial motive on such farms is quite strong the crop pattern responds to price changes and the allocation of resources becomes optimum (Harsh Aditya, 2021).

Disadvantages of Commercial Farming:

Commercial farming is not free from certain drawbacks.

- The most important flaw with this farm organization is the displacement of labour that takes place due to excessive use of machinery on the commercial farm.
- The size of the farm is quite large to permit the use of sophisticated machinery and at the same time, 'free' family labour is not available.
- Labour has to be hired and, to be paid for. Use of commercial displaces hired labour and becomes attractive alternative.
- A commercial farm is also likely to suffer from the malady of poor supervision.
- A large farm will have to employ a large number of supervisors to look after the workers of agricultural labourers whose area of operation is quite large. As they themselves have an incentive of ownership, they may not be fully devoted to their job (Harsh Aditya, 2021).

iii. Collective Farming:

This is another farming system which was introduced in U.S.S.R. Sometime after 1917 revolution. This system replaces the feudal system of farming enforced by a communist regime. The revolutionary regime decided that in place the feudal lords owing the land, henceforth the village community, as a whole would own the land (Harsh Aditya, 2021).

figure 11; Collective Farming

iv. Cooperative Farming:

The traditional system of farming no doubt has certain advantages like higher intensity of cropping, higher employment level and higher productivity per acre, it suffers from certain disadvantages due to the small size of the holding some improved crop practices e.g. rotation of crops and difficulties in carrying out some developmental operation like fencing, digging of a well, weak bargaining power in the market etc. To overcome these difficulties associated with small farms

and at the same time, to reap the incentives of ownership, a new system of farming has been suggested. It is known as cooperative farming (Harsh Aditya, 2021).

figure 12; Cooperative farming

1.4. Importance of Agriculture in Nepalese context

According to the International Labor Organization, agriculture provides livelihoods for 68 percent of Nepal's population, accounting for 34 percent of the GDP. A subsistence oriented agrarian economy is predominant in Nepal. 65.8% of total population is engaged in agriculture in which 60.2% are male and 72.8% are female. Because of the diversified climatic condition Nepal has got high potentiality of producing major cereal crops, legumes, fruits and vegetables. About 80% population is concentrated in rural areas and the farming population is about 65.8%. (Pokharel, 07 may, 2013)

Of the total agricultural GDP, the crop sector takes up almost half, while livestock accounts for one-quarter, followed by vegetables (10 percent), forestry (8 percent), and fruits and spices such as ginger and cardamom (7 percent) in 2015 (Figure 1). Integrated crop and livestock subsistence farming systems along with the predominance of smallholder farmers (with less than 0.5 hectares of land holdings)4 are the main features of agriculture in Nepal. Two-thirds of the population still depends on agriculture as their main occupation. Of the total number of households (5.42 million) in the Population Census of 2011, 71 percent legally own agriculture holdings with livestock and poultry.

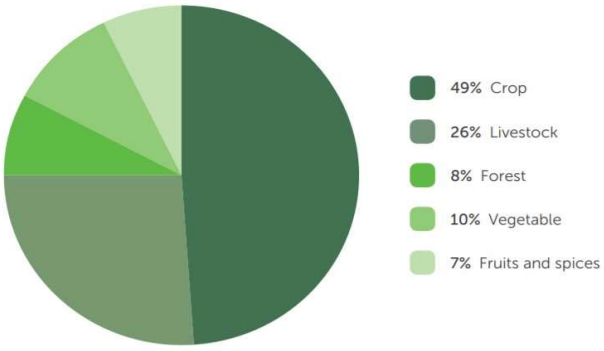

figure 13 PI Chart of agricultural product

Nevertheless, Nepal struggles to produce an adequate supply of food for its citizens. Farmers have limited access to improved seeds, new technologies, and market opportunities. Declining agricultural production has depressed rural economies and increased widespread hunger and urban migration. Thirty-six percent of Nepali children under the age of 5 years suffer from chronic malnutrition, or stunting, which causes debilitating effects such as blindness, brain damage, and infectious diseases, which can result in lifetime damage. (USAID, January 22, 2021) Why is Agriculture crucial force in Nepal?

1.5. Agriculture Marketing

agricultural marketing comprises all the operations, and the agencies conducting them, involved in the movement of farm produced foods, raw materials and their derivatives, such as textiles, from the farms to the final consumers, and the effects of such operations on farmers, middlemen and consumers.

According to the National Commission on Agriculture – Agricultural Marketing is a process which starts with a decision to produce a saleable farm commodity, and it involves all the aspects of market structure or system, both functional and institutional, based on technical and economic considerations, and include pre- and post-harvest operations viz., assembling, grading, storage, transportation and distribution (Saibarani S).

It includes handling of product at the farm, initial processing, grading and packing in order to maintain and enhance quality and avoid wastage. Unfortunately, the present system of marketing of agricultural goods in India is extremely defective and needs a thorough overhauling. The close inter-relationship between agricultural production (farming), agricultural finance (credit), and agricultural marketing (sale of farm products) has been recognized by the Government as well as by the experts on agricultural problems (Saibarani S).

Characteristics of agricultural produce

The peculiar characteristics of agricultural produce, result in a very complicated marketing system.

(a) Bulkiness
(b) Perishability
(c) Wide varietal differences
(d) Seasonality
(e) Dispersed production
(f) Processing needs for consumption.

These characteristics make the agricultural marketing a complicated system. Generally, the farmers sell their agricultural produce immediately after harvest in raw form without any

processing. Since, only raw produce is marketed there arises a need for many intermediaries to operate between the producer and consumer (Saibarani S).

2. Historic Markets

Markets have existed for as long as humans have engaged in the trade. The earliest bazaars are believed to have originated in Persia, from where they spread to the rest of the Middle east and Europe. Over the time and locations, marketplaces have gone through evolutions. Majorly, the Persian Bazaars, the Arabic Souqs, the Greek Agora, the Roman Forum remains in peak among the historic market architecture representing their respective cultural identity and have great influence in the evolution of market architecture around the globe.

Though the difference in architectural character of the historic market around the globe, they possess some similar significance – Functional diversity and social sustainability. Traditional markets have its significant cultural, functional, and socio-economic values, which reflects the main pillars for effective sustainable development. Traditional markets are places which show the community lifestyle, culture and heritage that's why it has a strong rootedness to its local people.

2.1. Classification of market

a) On the basis of frequency with which they are held, markets can be classified into

- daily markets,
- weekly markets,
- biweekly markets and
- monthly markets.

b) Based on the types of products traded,

- grain markets,
- cotton markets,
- fish market,
- fruit and
- vegetable markets etc.

c) Based on the types of transactions held,

- spot markets and
- forward markets.

d) Based on the marketing functions performs, agricultural markets may be classified as

- Assembling,
- Wholesale and
- Distribution Markets. (Saibarani S)

On the basis of location

1. Local market/village market
2. Primary markets
3. Secondary market
4. Terminal markets.

i. Local market

This market is confined to a particular village, where producers and intermediaries or consumers meet for the purchase and sale of farm products. The products produced in that village are brought for sale in these markets.

The local market is also known as growers' market and is available in the vicinity of rural areas. They are generally located in small towns and at their convenient places, where rural producers bring their produce and sell to the buyers (Saibarani S).

figure 14; local market

Functions of Local Markets:

- Assembling of Products – The primary function of local market is to assemble the farm produce at a single place.
- Availability of convenient place – As the producers and buyers meet at a nearby place, this type of market act as a convenient place for producers as well as buyers. This helps the producers and relieves them from the headaches of transportation and save other costs of carrying it to the towns.
- Immediate Cash Payment – In these types of markets the village producers get immediate payment after the sale of their produce (Saibarani S).

ii. Primary Markets:

Primary markets are periodical markets locally called as "Shandies or Haats". They are generally held once a week on a particular day. They are generally held in the open place or in roadside groves in centrally situated areas. Generally, these markets are situated in the producing areas, commodities produced in the nearby surrounding areas are brought here and sold in these markets (Saibarani S).

The agricultural produce is purchased by intermediaries, which later they sell it into wholesale markets. Besides agricultural produce, a number of other articles required by rural folks such as locally made agricultural inputs such as threshers, hannovers, winnovers are available and consumables such as pulses, salt, jaggery, oil, fruits and vegetables, spices, cloth, hosiery products and ornaments of cheap metal are also sold in these markets (Saibarani S).

figure 15; picture of primary market

Functions of Primary Markets:

The main function of these markets is to serve as assembling centres for the local produce, but they also function as distributive centres for local consumption.

iii. Secondary Markets:

These markets are situated at district headquarters and other towns. They are also known as 'Mandis' or 'Gunjs'. These are regular wholesale markets and provide a permanent place for daily transaction. The quantum of commodities transacted is in bulk. Large quantities of commodities arrive from other markets into these markets.

Therefore, there are middlemen, market agents, weighmen and commission agents are involved in the marketing system. These markets also have grading, packing, warehousing, loading, transportation, telephone and banking facilities. These facilities available in 'Central Markets' make it possible to handle business at large scale (Saibarani S).

figure 16; secondary market

iv. Terminal Markets:

A terminal market is a market where the produce is either finally disposed of to the consumer or to the processor or assembled for export. In these markets, merchants are well organized and use modern methods of marketing. In this market the price locating activities operate and buyers and sellers represent the different regions or nations sometimes meet to adjust the supply and demand (Saibarani S).

It is the combination of three processes of marketing such as concentration, dispersion and equalization. These markets handle large scale business with large number of buyers and sellers and the facilities such as grading, transportation, information, packing, weighing, loading, etc., are available in these markets, which are required to boost the volume of trading. The terminal markets are located in highly populated cities (Saibarani S).

figure 17; terminal market

2.2. Markets in Nepal

i. Primary or Local Markets:

Primary markets, known as Hatts or Shandies are held once or twice a week in the neighbourhood of a group of villages. Most of the agriculturists sell their farm products in these markets. More than 50% of the total marketed surplus is sold in these markets. These markets are organized by community who charge some rent from shopkeepers for the space occupied. Haggling and bargaining is a common feature of these markets.

ii. Secondary Markets:

These are also known as ‘wholesale’ or ‘assembling’ markets and are called ‘mandis’ or ‘gungs’. hese markets are permanent in nature; business in the markets is transacted regularly throughout the year.

The produce is handled in large quantities and specialized operators become necessary for the performance of different services. The markets provide facilities of storage, handling and banking services and are well-served by roads and railways. A number of middlemen operate in these markets.

iii. Terminal Markets:

hese markets perform the function of carrying goods to consumers, final buyers or to places of processing. Such markets are to be found in big cities or at ports. The area of their operation extends over a state.

iv. Fairs:

Fairs held on religious occasions at pilgrim centres are important sources of marketing of agricultural produce in nepal. Such fairs are held annually and are organized by district officers, local bodies or private agencies.

v. Regulated Markets:

These have been set up by the Government with the purpose of checking fraudulent practices which are generally practiced by traders in the primary and secondary markets. In these markets, the rules and regulations are prescribed by the Government marketing practices.

vi. Co-Operative Marketing:

The markets function on the basis of principles of cooperation. A cooperative marketing society carry the agricultural produce direct to the consumers thus eliminating a large army of middlemen and intermediaries.

vii. State Trading:

State trading in agricultural produce has become an important element of agricultural marketing in nepal

3. Farmers' market

"Farmers' markets are generally considered to be recurrent markets at fixed locations where farm products are sold by farmers themselves". - Allison Brown's

Today, farmers' markets also sell value-added products and food items. Some of these markets are much more than outlets for produce; they function as restaurants and grocery stores. Reflecting the seasonality and distinctiveness of the regional landscape and climate, farmers' markets are inherently ephemeral in time and place. Most markets evolve over time as the number of vendors and products shrink and expand with the seasons. These temporal aspects exemplify what Seamon called "place ballet" - an everchanging event in which the market is transformed into a convivial space (Seamon & Nordin, 1980). Accordingly, a farmers' market is both a place of economic exchange and a socially transactive place where people interact to varying degrees and formulate meanings for themselves and as a group. (Francis & Griffith, 2011)

Similar to community gardens and other unplanned, publicly appropriated spaces, farmers' markets struggle for permanency. Recently though, city officials and planners have begun to recognize the larger economic, social, and ecological values of markets (Feenstra, 2007) and are using markets as a catalyst for community development and other revitalization strategies.

3.1. History

The current concept of a farmers' market is similar to past concepts, but different in relation to other forms – as aspects of consumer retailing, overall, continue to shift over time. Similar forms existed before the Industrial Age, but often formed part of broader markets, where suppliers of food and other goods gathered to retail their wares. Trading posts began in 1930s, a shift toward retailers who sold others' products more than their own. General stores and grocery stores continued that specialization trend in retailing, optimizing the consumer experience, (Pyle, 1971) while abstracting it further from production and from production's growing complexities.

Modern industrial food production's advantages over prior methods depend largely on modern, cheap, fast transport and limited product variability. But transport costs and delays cannot be eliminated. So, where distance strained industrial suppliers' reach, where consumers had strong preference for local variety, farmers' markets remained competitive with other forms of food retail. Starting in the mid-2000s, consumer demand for foods that are fresher (spend less time in transit) and for foods with more variety—has led to growth of farmers' markets as a food-retailing mechanism.

3.2. A Market Renaissance

In the past two decades, farmers' markets have grown dramatically in number and popularity within the United States. The U.S. Department of Agriculture (2009a) reported 1,755 farmers' markets operating in 1994. Fifteen years later in 2009, the total grew threefold to 5,274 market. Markets have enjoyed a long and rich history embedded in the life and development of towns and cities around the world. Places of commerce and social life, they have historically been the center of urban life.

Passage of the Direct Marketing Act of 1976 by the United States Congress brought about a more modern version of the agora and the number of farmers' markets began to surge. The markets of the 1970s were economic experiments operated as temporary events in leftover spaces. Often disassociated from the planning of official public open- space systems, these vernacular markets rarely fell under the auspices of landscape architecture or urban design. Located in parking lots, on streets, under freeways, and in abandoned lots, many markets were, and remain today, vulnerable to displacement from development pressures and the high cost of urban lands. O'Neil argues, "preserving the market means preserving its use and its ecology. Markets require constant vigilance and protection from exploitative forces like rising real estate values and politics" (Francis & Griffith, 2011).

figure 18 why farmers market

3.3 Benefits of Farmers' market

i. To farmers

Farmers' markets can offer farmers increased profit over selling to wholesalers, food processors, or large grocery firms. By selling directly to consumers, produce often needs less transport, less handling, less refrigeration and less time in storage. By selling in an outdoor market, the cost of land, buildings, lighting and air-conditioning is also reduced or eliminated. Farmers may also retain profit on produce not sold to consumers, by selling the excess to canneries and other food-processing firms. At the market, farmers can retain the full premium for part of their produce, instead of only a processor's wholesale price for the entire lot.

Some farmers prefer the simplicity, immediacy, transparency and independence of selling direct to consumers. One method noted by the special interest group Food Empowerment Project promotes community-supported agriculture programs (CSAs). In this scheme, consumers pay farms seasonally or monthly to receive weekly or biweekly boxes of produce. Alternatively, they may be required to pay for an entire season's worth of produce in advance of the growing season. In either case, consumers risk losing their money if there is a crop failure.

ii. To communities

Among the benefits often touted for communities with farmers' markets:

- Farmers' markets help maintain important social ties, linking rural and urban populations and even close neighbors in mutually rewarding exchange.
- market traffic generates traffic for nearby businesses
- buying at markets encourages attention to the surrounding area and ongoing activities
- by providing outlets for 'local' products, farmers' markets help create distinction and uniqueness, which can increase pride and encourage visitors to return.
- Reduced transport, storage, and refrigeration can benefit communities too:
- lower transport & refrigeration energy costs
- lower transport pollution
- lower transport infrastructure cost (roads, bridges, etc.)
- less land dedicated to food storage

Farmers' markets may also contribute to innovative distribution means that strengthen civic engagement by reducing the social distances between urban and rural communities. With fewer intermediaries, the support of independent growers by local community members can enhance local economic opportunities and health & wellness in poor communities.

iii. To consumers

- Some consumers may favor farmers' markets for the perceived:
- reduced overhead: driving, parking, etc.

- Fresher, Seasonal and healthier food
- a better variety of foods, e.g.: organic foods, pasture-raised meats, free-range eggs and poultry, handmade farmstead cheeses, heirloom produce heritage breeds of meat and many less transport-immune cultivars disfavored by large grocers
- a place to meet neighbors, chat, etc.
- a place to enjoy an outdoor walk while getting needed groceries

Evidence seems to show that overall prices at a typical farmers' market are lower than prices at a supermarket because the process of production is more concise; there is less distance to travel and fewer middlemen.

3.4 Roles of Farmers Market

Social: Communal hub to develop consumer and producer relationship.

Economical: Gives farmers, producers a source of

income for their hard work through transparency

Cultural: a cultural hub where people get to promote the cultur$_1$e$_0$of the community

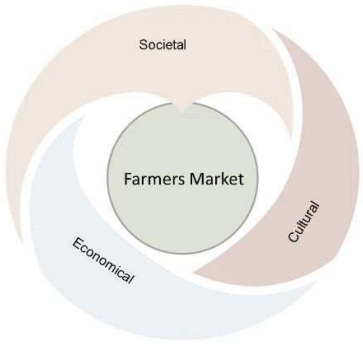

figure 19 Roles of farmer market

3.5. 4 Realms of the Farmers' Market (Francis & Griffith, 2011)

The integration of the social meanings of farmers' markets into the built environment results from a combination of policy, program, planning, design, and management. The four physical realms of the market place- the promenade, the working market, the market landscape, and the market neighborhood - as a conceptual framework to better understand the ecology of farmers' markets and their larger landscape.

figure 20 4 Realms of the Farmers' Market

i. The Promenade

Fundamental to any market is a central movement corridor where patrons and visitors stroll past products on display and mingle. While not necessarily hierarchical, there is a sequence of pedestrian flow from the entrances to the market center. As the primary circulation corridor, the promenade typically varies from 12 to 40 feet and is enclosed on both sides by colorful displays of goods offloaded onto tables or displayed on the back of trucks. More intimate promenades typically reduce the aisle width to create a socially interactive atmosphere where people rub elbows and neighbors say hello to one another. Another advantage of reduced aisle width is comparative shopping where patrons can see both sides of the aisle. The promenade may lose its linear quality when the width expands beyond a certain threshold and becomes more of a plaza than a promenade.

The orientation of the promenade establishes the fundamental spatial quality of the market. The linear quality of the promenade can be configured into a variety of geometries symbolized by the following alphabetic shapes: the linear "I," the angled "L," the looped "O," and the gridded "E" and "B." Some market managers prefer circulation patterns that cycle patrons repeatedly through the market, a technique also employed in the design of retail centers. Regardless of configuration, most promenades have a beginning and end and an entry and exit sequence marked by subtle transitions or formal gateways.

As the circulatory space, the promenade also serves a central social function as a primary social space of the market. The promenade is the space where strangers occupy a common space. Repetitive landscape features such as pedestrian lights, tree plantings, and outdoor furniture enhance the sequential aspect of the promenade and punctuate the moments along the way. Paving patterns also contribute to this sequence of events.

ii. The working markets

The pragmatic considerations of farmers' markets are reflected in the realm of the working market and include a variety of vending spaces and associated backstage areas. The vending space for most farmers' markets is most commonly laid out as a 10'×10' grid of vending plots arranged around the main circulatory pattern or 'promenade.' Bountiful displays of fresh farm produce separate the working market from the promenade. These displays also serve as advertisements for each vendor. Behind these displays is a 'backstage' area for loading and unloading. Public health standards govern the regulatory aspects of the working market and influence the spatial distribution of vendors within the market. The working market is a delineated space with distinctions between prepared foods, value- added products, arts and crafts, and fruits and vegetables.

An important consideration in the planning of any market is vehicle access for loading, unloading, and parking. Vendor parking and access to electricity and water are important aspects for a properly functioning market. Additional overflow parking for customers is an important consideration for any market but need not be located within the actual market space. The working market also includes storage for chairs, tables, and benches as well as signage specific to public health regulations and general market information. Other functional elements of the working market include the provision of public restrooms, informational kiosks, waste, composting and recycling programs, and bicycle parking.

A well- balanced working market also includes performance space for music and theater, as well as food courts and other open areas for social programs. Food courts and other programmable spaces are typically located at the end of a promenade away from the fruit and vegetable core. Open- air pavilions provide practical solutions for shelter from summer heat and winter rain or snow while also accommodating other programs such as art shows, dog- training classes, and community festivals on non- market days.

iii. The market landscapes

The market landscape is composed of the open space adjacent to the working market and the promenade and provides additional opportunities for leisure and relaxation not always associated with buying and selling. Successful markets frequently provide a variety of comfortable spaces for people to relax as well as actively participate in public life. Similar to the design principles associated with good urban spaces, a successful market landscape provides benches, movable chairs, and other seating provisions in the form of steps, seat walls, and lawn areas. The market landscape expands the market into a larger public

landscape by including children's play areas, thematic gardens, and other landscape features.

iv. The market neighborhood

Another physical realm of the market place is its larger urban context or neighborhood. Successful markets respond to the surrounding neighborhood in their planning, design, and operation by integrating community groups and their culture into the market. In some cases, adjacent civic institutions and retail activities connect to the market through well- planned pedestrian walkways, bicycle routes, and open space networks. Other neighborhood attributes to be considered in planning a market include regional transportation systems, public transit, overflow parking, and other relevant aspects of the regional landscape.

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3.6. Four Design Principles in Making Farmers' Market as Public Space

figure 21 design principles in making farmers' market as a public space

i. Permanency of Design

The permanency of program through the design of public space is an overarching principle for the preservation of farmers' markets over time. Landscape features such as entry structures, bandstands, gazebos, fountains, market pavilions, mature groves of trees, socially interactive plazas, pedestrian scaled lighting, and thematic gardens can establish the market's permanency through design. Without the permanency of design, farmers' markets remain as programmatic events in public space, vulnerable to displacement by other uses. (Francis & Griffith, 2011)

ii. Flexibility

While the permanency of design is important, the design should also be flexible. A resilient market design must be adaptive and accommodating. Seeing the marketplace as a dynamic process is an essential aspect of any successful design and management process. The design should work with regional climate and allow the market to adapt to seasonal variation and fluctuations in market patronage. As the needs of the market change, so should the market space. Each of the five case studies continues to evolve with and reflect the market community. Ongoing evaluation is redesign are also a hallmark of long- lasting successful markets. Without flexibility, design can remain static and become outdated. (Francis & Griffith, 2011)

iii. Wholeness

Most markets possess a wholeness or centeredness, a quality of being in place. They typically include an inner market space that is simultaneously distinguished from and reflective of the adjacent urban context; the market landscape relates to and reinforces the market neighborhood. The patterning of the working market realm along the periphery of the market landscape is an important spatial consideration in the realization of this centeredness. The functioning market can also reinforce the wholeness of the park or open space, enhancing the prospects of the market neighborhood while emphasizing its refuge as public space. A participatory design process is essential to the realization of a market place that is whole and centered and should engage adjacent communities in the identification of design values to be integrated into market's design program. (Francis & Griffith, 2011)

iv. Social Life

Successful markets foster social interaction and support diverse social meanings. Special design attention should be given to supporting socialization. The spaces of movement and social encounter, the interplay between the promenade and the market landscape, should be coordinated with the sedentary spaces of reflection. Social spaces should be provided for socializing where people do not feel compelled to buy things but rather encouraged to enjoy the market as a more spontaneous public space. Adequate seating of both the fixed and movable variety is critical for social interaction. A diversity of age, gender, and cultural background should be accommodated to assure an inclusive social space. Children's play and activity needs to be integrated into the design. Social programs in addition to the market function will further enhance the social life of the space and enliven the space with additional layers of social life. Again, a participatory design process can be helpful in meeting this goal. (Francis & Griffith, 2011)

3.7. Farmers' market as mixed-life places

The rise in number and popularity of markets is reflective of social values that go well beyond the simple conceptualization of a market as an economic opportunity for small farmers to sell locally or regionally produced fruits and vegetables. Within the United States, the current farmers' market movement marks a return to an historical means of food distribution and a rediscovery of the value of locally or regionally produced foods. The farmers' markets movement parallels the increased concern for healthy organic foods, the resurgence of culinary arts and slow food, and the rise in popularity of urban and community gardening. (Francis & Griffith, 2011)

This resurgence reflects a greater awareness of the regional landscape and practice of sustainable agriculture. The large number of advocacy organizations associated with markets is further evidence of the farmers' market movement (Sommer, 1980). Studies conducted by environmental psychologists and agro- economists have documented the social, economic, and environmental benefits of farmers' market. There is empirical evidence that markets have significant economic benefits and contribute directly to social and environmental justice. The farmers' market resurgence also exemplifies the city landscape as space for leisure, relaxation, and community development. Farmers' markets are recognized as important contributors to healthy cities.

Markets today also reflect a demand and appetite for new types of civic space. (Shafttoe, 2008) (Tangires, Helen, 2003) They offer opportunities for social interactions that are less prevalent in contemporary public space and bring a diversity of people together in public space. Markets serve as a new setting for local protest, celebration, and personal and cultural expression. (Francis & Griffith, 2011)

4. Place making theory

Placemaking inspires people to collectively reimagine and reinvent public spaces as the heart of every community. Strengthening the connection between people and the places they share,

placemaking refers to a collaborative process by which we can shape our public realm in order to maximize shared value. More than just promoting better urban design, placemaking facilitates creative patterns of use, paying particular attention to the physical, cultural, and social identities that define a place and support its ongoing evolution. With community-based participation at its center, an effective placemaking process capitalizes on a local community's assets, inspiration, and potential, and it results in the creation of quality public spaces that contribute to people's health, happiness, and well-being (Handa, 2017).

Public space around the world shares the following four qualities.

- They are accessible.
- People are engaged in activities there.
- The space is comfortable and has a good image and
- It is a sociable place: one where people meet each other and take people when they come to visit.

4.1 Public realm

The public realm is defined as the publicly owned places and spaces that belongs to and are accessible by everyone. These can include municipal streets, lanes, squares, plazas, sidewalk, trails, parks, open space, waterfronts, public transit system, conservation area, and civic buildings and institutions.

Public realm is defined as any publicly owned streets, pathways, right of way, parks, publicly accessible open spaces and any public and civic building and facilities. The quality of our public realm is vital if we are to be successful in creating environment that people want to live and work in,"- United Kingdom, local plan issues and option consultation, Appendix1 glossary.

Many public Realm like waterfront, Squares, malls etc. gives the people a memory which later adds meaning to the space that ultimately makes the place. Food culture has been most interactive part of people in public realm that communicates with community and culture in beautiful ways

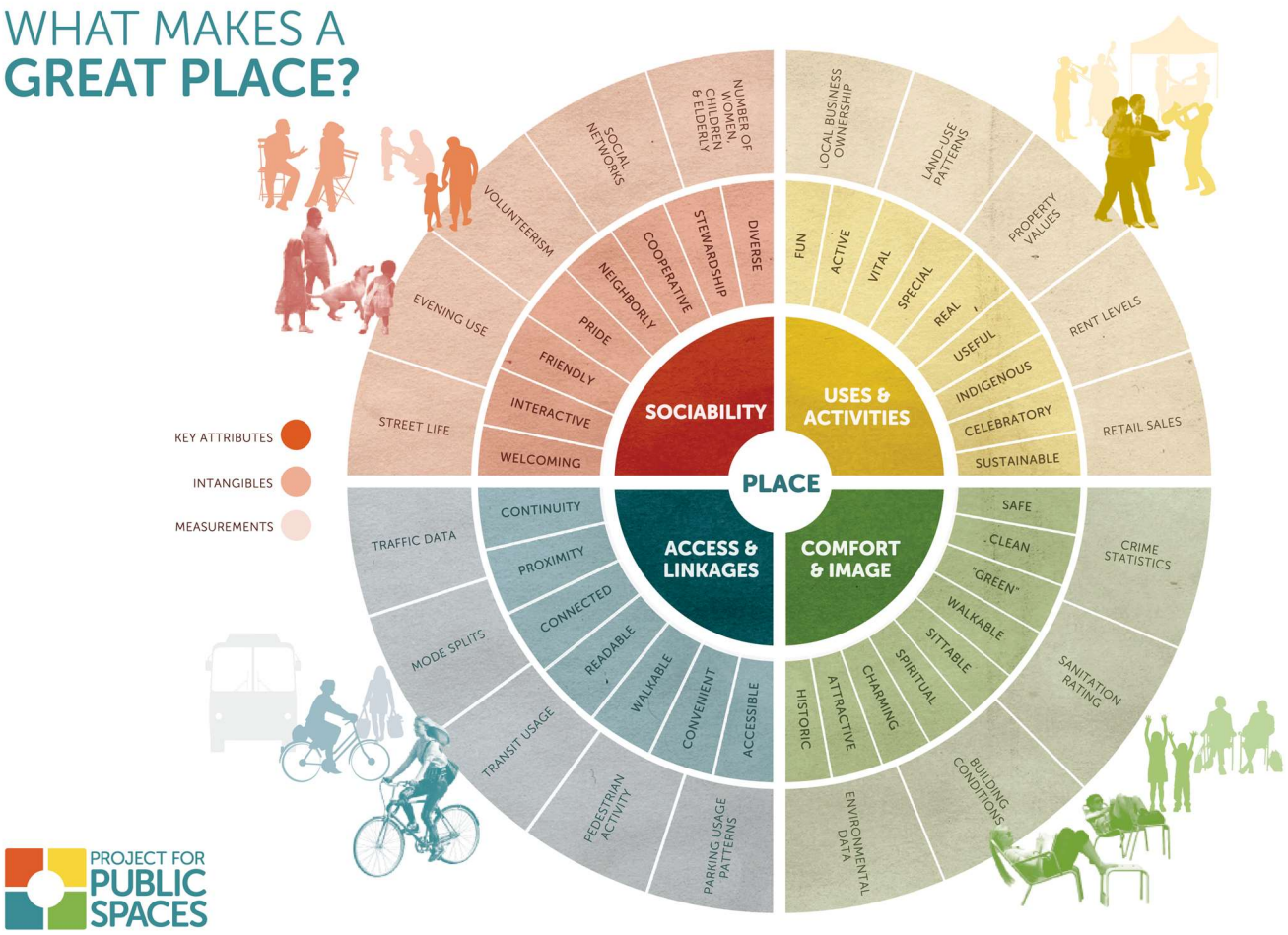

figure 22; Place making elements

Access & Linkages

A successful public space is easy to get to and get through; it is visible both from a distance and up close. The edges of a space are important as well; For instance, a row of shops along a street is more interesting and generally safer to walk by than a blank wall or empty lot. Accessible spaces have a high parking turnover and ideally, are convenient to public transit.

figure 23; city access and linkage

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Comfort & Image

Whether a space is comfortable and presents itself well - has a good image - is key to its success. Comfort includes perceptions about safety, cleanliness, and the availability of places to sit - the importance of giving people the choice to sit where they want is generally underestimated.

figure 24; comfort and image

Uses & Activities

Activities are the basic building blocks of great places: They are the reasons why people visit in the first place, and why they continue to return. They are also what makes a place special or unique. When there is nothing to do in a place, it will sit empty and unused—a sure sign something needs to change.

figure 25; uses and activities in city area

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Sociability

This is a difficult quality for a place to achieve, but once attained it becomes an unmistakable feature. When people see friends, meet and greet their neighbors, and feel comfortable interacting with strangers, they tend to feel a stronger sense of place or attachment to their community - and to the place that fosters these types of social activities. (Handa, 2013)

figure 26;Sociability

4.2. Resilience in architecture

the resilience design principles (resilient design institute,2019)

1. **Resilience transcends scales:** strategies to address resilience apply at scales of individual buildings, communities, and larger regional and ecosystem scales; they also apply at different time scales from immediate to long term.

2. **Resilient system provides for basic human needs**; these include potable water, sanitation, energy, livable conditions (temperature and humidity), lighting, safe, air, occupant, health, and food; these should be equitably distributed.

3. **Diverse and redundant systems are inherently more resilient**. More diverse communities, ecosystem, economics, and social system are better able to respond to interruptions or change, making them inherently more resilient. While sometimes in conflict with efficiency and green building priorities, redundant system for such needs as electricity, water, and transportation, improve resilience.

4. **Simple passive, and flexible systems are more resilient**: passive or manual- override systems are more resilient than complex solutions that can break down and require ongoing maintenance. Flexible solutions are able to adapt to changing conditions both in the short and long term.

5. **Durability strengthens resilience. strategies that increase durability enhance resilience.** Durability involves not only building practices, but also building design (beautiful building will be maintained and last longer), infrastructure, and ecosystem.

6. **Locally available, renewable, or reclaimed resources are more resilient.** Resilience on abundant local resources, such as solar energy, annual replenished groundwater, and local food provides greater resilience than dependance on nonrenewable resources or resources from far away.

7. **Resilience anticipates interruptions and dynamic future**. Adaptation to a changing climate with higher temperatures, more intense storms, sea level rise, flooding, drought, and wildfire is a growing necessity, while non-climate-related natural disasters, such as earthquake and solar flares and anthropogenic actions like terrorism and cyberterrorism, also call for resilient design, responding to change is an opportunity for a wide range of system improvement.

8. **Find and promote resilience in nature.** Natural systems have evolved to achieve resilience; we can enhance resilience by relying on and applying lessons from nature. Strategies that protect the natural environment enhance resilience for all living systems,

9. **Social equity and community contribute to resilience.** Strong, culturally diverse communities in which people know, respect and care for each other will fare better during times of stress or disturbance. Social aspects of resilience can be as important as physical responses.

10. **Resilience is not absolute**. Recognize that incremental steps can be taken and that total resilience in the face of all situation is not possible. Implement what is feasible in the short term and work to achieve greater resilience in stages.

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4.3. Spatial encloser

Studying the relationship between the height of an open space to the width of the space, Triebs group found the following results:

Table 4: spatial encloser table

S.N.	RATIO	SPATIAL QUALITY OF THE OPEN SPACES (SQUARE AND PLAZA)
1	1:1	The wall will be seen only half of its height, the spaces can only be used as a front yard of buildings
2	1:2	The entire height of the wall can be seen, the space is enclosed and as an open space it was felt as narrow
3	1:3	The entire wall is only a part of the view, the rest is a part of the sky. The space is not fully enclosed anymore. This is the optional condition for an open space
4	1:6	The relationship between the wall and sky is reversed. The open space is felt very wide.

These proportion are dependent of the condition of location, climate, tradition and behaviour of the people, e.g. the street are narrower in the southern countries around Mediterranean than those in Germany whereas they require a wide to get sun and air on the north; parks do not need to follow the above mention ratio and natural features of large trees and undulating terrain diminish the spatial effect of the surrounding walls(Triebs,n.d)

4.4. Distance related to perception ability

Table 5; distance related to perception ability

S.N.	**FEET**	**METER**	**PERCEPTION**
1	4000	1219	Know that there is a person
2	400-500	122-152	Distinguish the gender, between man and woman
3	75	23	Recognize who the person is
4	45	14	The face of the person clearly seen
5	3	0.9	The distance for social contact
	Outdoor space		

1	3	0.9	With stranger is intolerable
2	40	12	Intimate sphere
3	80	24	Human scale

(Hall, 2014)

4.2. Placemaking strategies for markets

i. Selection the right location

Historically, markets have always been in or near the center of town and there is still a need for that today. The location, visibility and accessibility of a market are very important to its success. Most market customers do not typically travel (walk, bike, drive, transit) more than 15 minutes to visit it, and travel even less for small markets so locating in or near a place that is convenient to a lot of people is best. Ideally your market site will be:

In a high-traffic location, easy to walk and bike to, have good transit access and plenty of parking.

A site with existing activity – and the space and potential for more – whether a park or small plaza and/or a site that is adjacent to a busy bus stop, community institution or retail shopping area is often a great place to locate a market. This enables the market to become a key element of a multi-use destination where other activities already take place or could take place.

A location with a strong sense of place already is ideal, however in some cases, a market can help create that place. (Project For Public Spaces, 2016)

ii. Design the Market as a public Space

While the primary function of a market may be commerce, the busiest, most successful markets are places where people want to spend time together. A market is a place for meeting and catching up with neighbors, accessing services, and becoming part of the daily life of a community. Through programming, layout, and amenities, markets can provide many opportunities for visitors to enjoy themselves.

In addition to shopping, sitting, and eating, the market's layout should include spaces for performances, play or even learning that will give people multiple reasons to return to your market.

Comfortable places to sit will foster a dynamic hub of activity and allow people to spend time people watching, which is a favorite activity at markets. Moveable tables, chairs and umbrellas along with a food cart are a common LQC market addition.

Strengthen connectivity to existing destinations near the market space and extend programming and activation into the space, i.e., playgrounds, sports fields, a shed, a café, library, etc. (Project For Public Spaces, 2016)

iii. Promote the Market as A Community Destination

To attract people to your market and reinforce it as a community destination you need to develop and maintain a strong promotions strategy. Most markets do not have large promotional/advertising budgets, and some don't have a budget at all, but fortunately markets are full of good news and unlimited programs and events that help drive customers to a market – many of which are free such as samples, music and space for dancing, board games, etc.

Develop a strong social media presence, including Twitter, Facebook and Instagram, and good connections with local press. Program the market every day with a demonstration of how a market product can be used or made, live music, kid's events, etc. You won't know what is the best special event or activity for your market until you try it out so experiment and see what people like.

Create simple, clear marketing materials such as signs, banners, a-frames and fliers. Customers only care about when the market is open, where it is located, what they can buy and what they can do there. (Project For Public Spaces, 2016)

iv. Make the Market Inclusive

A great market makes visitors feel like they are experiencing something special. Your market should be a place where neighbors can be proud of their history, culture, people, and community. Over time, residents should understand that their market space is unique to their town because of the types of food and merchandise that is for sale, the types of music that is played, the types of special events that are held there and who is hosting them.

Communities across the U.S. are becoming increasingly diverse, and markets have an opportunity to reflect that diversity and become spaces of inclusion by increasing market access for low and moderate income and non-English speaking individuals and families. This may not be something that happens automatically, so markets may need to take some specific steps to make all people feel comfortable and welcome.

Focus your promotional materials on what makes your market unique – highlight vendors and products that can only be found in your community and promote that this market is of, for and by the community.

Invite a diverse array of talent from the community and highlight local culture, including musicians and local cooks to share their talents at the market.

Provide products and recruit new growers and vendors to more accurately reflect the demographics of the community. (Project For Public Spaces, 2016)

5. Inference

The major objective of the literature review was to better understand the historical standpoint of marketplaces, have clear picture on existing problems, conflicts, issues and strategies to establish markets at the centrality of urban fabric as public spaces. Various fields of study and subject of inferences to better understand the ecology of marketplaces as the public spaces are tabulated below:

Table 6 Theoretical Inference Table

4 Realms of farmers' market	
Realms	**Elements**
1. Promenade	Circulation corridor, circulation patterns, configuration
2. Working market	Vending pavilions and spaces, furniture, loading and unloading areas, public restrooms, informational kiosks, waste management, parking, recreational spaces.
3. Market landscape	Benches, outdoor amphitheatre, thematic gardens, sat walls and other landscape features
4. Market neighborhood	Urban context, regional transportation system, public transit, overflow parking, Inclusiveness
4 Placemaking Attributes	
Attributes	**Indicators**
1. Access & Linkages	Proximity, walkability, accessibility, visibility
2. Uses & Activities	Multiplicity of activities; shopping, recreation, food, relaxation, children play area,
3. Comfort & Image	Greenery, Water bodies, Pavilions, seating, historicity, attractive, aesthetic character, landscape furniture
4. Sociability	Opportunities for interaction; gathering places, interactivity, Street Life, Evening Use, triangulation, diversity and permeability

B. Literature review Technical Foundation(B)

1. Site Location Strategy (White J. T., 1999)

The preferred location for markets is one with good access to a main road system and with compatible adjacent land uses (such as catering and agribusiness industries).

Sites should ideally be located within or near to high density residential areas, rather than in areas with low density or non-residential uses (e.g., industry).

Proximity to other facilities, such as shops, post office and banks is essential.

A site around a public square or adjacent to busy streets with wide pavements is better than one in a cul-de-sac or in an area of static or declining trading opportunities.

2. Traffic circulation (White J. D., 1995)

For larger markets a higher level of access will be needed and this is preferably obtained by a system of looped roads which are neither short cuts to other destinations nor dead-ends (such as cur-de-sacs). To avoid traffic conflicts, junctions of the loop roads to main roads should be T-junctions (i.e., having only three potential collision points compared with the 16 that occur with cross roads.) The T-junctions should be as near as possible at right angles so that maximum visibility at corners is obtained.

In preparing plans for the central area of towns it is frequently the practice to separate cars and pedestrians. However, total pedestrianization rarely works and the most intense urban activities tend to occur where the two systems meet. An alternative approach is to develop a system of intersecting pedestrian paths and roads, with the paths roughly at right angles to the roads.

Visitors' vehicles are parked in separate parking areas. Delivery vehicles have direct access to the market stalls, but to reduce the impact of traffic in the market area it is normal practice to arrange for deliveries to be made during a restricted period before trading starts (usually the early hours of the morning) and for rubbish collection and cleaning-up to be undertaken at the end of the working day. Traders are sometimes allocated separate parking for their vehicles.

3. Site Planning Strategy

3.1. Internal Traffic Flows and Congestion (White J. T., 1999)

- Problems often occur where access is limited to only one operating entry and exit and where the market authority uses the gate to control entry in order to maximize revenues.
- If the lead-in length of the internal access road is also very short and the parking of vehicles is not rigorously controlled, congestion is inevitable.
- Altering the road pattern to work on the basis of a one-way system and extending or changing market trading hours may solve the problem, but this will not help if the parking of vehicles inside the market is uncontrolled and there is a lack of traffic management.

3.2. Market Lay-out

Market operations are influenced by management methods and by the physical lay-out. They need to achieve:

- An unobstructed traffic circulation pattern and effective parking control with adequate parking facilities being provided;
- Maximum possibility for interaction between the market users leading to the possibility of optimum price formation;
- Provision and full utilization of support facilities;
- Adequate arrangements for display and sale of produce to maintain produce quality; and
- Efficient produce handling (such as by pallets and forklifts). (White J. T., 1999)

3.3. Organization of market land uses

3.3.1 Grouping of sales outlets:

One of the basic questions a plan will need to address is whether retailers selling the same products should be grouped together. If stalls are laid out randomly then impulse sales will be promoted, but it will be more difficult to create a competitive selling environment and consumers will not be able to perceive differences in quality and prices. However. if retailers are grouped by line of products, competition will be greater. which will be more beneficial for the consumer. On balance. the grouping of specialized uses is the more effective method. Some uses may not be compatible with each other (e.g., a repair workshop with a butcher's or fishmonger's stall) and they should be located in different sections of the market or at least separated by a main path or aisle.

3.3.2 Customer flow:

The main arrival point of customers will influence the location and grouping of stalls. In open markets, customers will often come from a main point such as a bus stop or from the direction of a more densely populated area. With covered markets there is usually a main entrance from a main street. In both cases, it is preferable for staple products to be located away from these approach points so that customers can be drawn into the market. With street markets, for example, it is common for fruit and vegetable stalls to be located in the centre of the market area.

3.3.3 Facilities for temporary vendors:

In many markets, there are in addition to the permanent retailers, temporary vendors, (often producers) operating during some days of the week or during a limited season. To maximize market convenience for users on non-peak days, it is better to group together sellers operating regularly (i.e., those on long-lease arrangements) and assign them fixed locations. Separate spaces can be allotted to temporary vendors. In this case, and where there are small-scale vendors, it will be necessary to have some form of management system which is able to issue temporary pitch licenses.

3.3.4 Facilities for small vendors:

Small vendors often operate in the area surrounding a market, causing congestion and competing with the permanent retailers It is not desirable to evict them as they would lose their means of livelihood. They should, however, be required to pay daily or weekly market fees and ideally, be allocated space in the market so as not to obstruct the movement of customers and so as to maintain minimum public hygiene standards.

4. Program Formulation Guidelines

4.1 Theoretical urban Catchment Population

Table 7 Urban Catchment Population (White J. D., 1995)

Market typology	**Population Served**	**Minimum distance apart (kms)**
City Centre/main covered market	300000	16.0
District shopping center/covered market	50000	6.5
Neighborhood shopping center/open market	10000	2.9
Group of shops/street market	4000	1.8
Corner groceries/street barrows	1000	0.8

Note: The table assumes an average population density of around 2,000 persons per square kilometer. If the density is said 1,000 persons per square kilometer the distance needs to be

increased to 1.4 times the distance specified in the table. if the density is said 3,000 persons per square kilometers the distance needs to be reduced by a factor of 0.8.

4.2 Future Annual Throughput

Table 8 Future throughput calculation (White J. D., 1995)

Method	**Example**
Projected per caput consumption of fruits and vegetables (in kg)	(5-year projection) Assume per caput consumption of 180 kg per caput
Divided by	Divided by
1,000 (to convert to tons)	1,000 (to convert to tons)
Times	Times
Urban population × growth (growth rate as a Decimal number plus 1.0)	Population of say 1000 x 4% growth rate i.e., 1.04 × 1.04 × 1.04 × 1.04 × 1.04
=	=
Total urban consumption(tons)	Consumption of 2,190 tons
Times	Times
Individual market's projected future % share of the overall retail trade	Share of say 60% (i.e., × 0.6)
=	=
Future throughput	Future throughput of 1,314 tons

4.3 Turn-over Standards

Table 9 Market Turnover Standards (Tracey-White, 1991)

Types of market	**Annual throughput** (Tons per m^2 / annum)
Rural fruit and vegetable open market	Average of 5 tons
Rural fruit and vegetable all-year assembly market	20 – 25 tons
Seasonal assembly market (3 – 4-month peak)	15 – 20 tons

Urban Fruit and vegetable open market	5 – 10 tons
Urban fruit and vegetable covered retail market	15 – 20 tons
Combined urban market (fruit, vegetable, fish, meat)	10 – 15 tons
Semi-wholesale fish, poultry, egg or meat market	5 – 15 tons
Semi-wholesale retail grain, potato or onion market	10 – 15 tons
General urban wholesale market	20 – 30 tons

4.4 Consumption Estimates

The estimated consumption of fresh produce should be derived from the per caput data by relating it to estimates of the existing and future populations for the area served by the market. The following formula summarizes the calculation method:

Annual Supply (tons)	=	Total population served	X	Per capita consumptio	X	0.001

4.5 Program Area Calculation

Based on the turn over standards the sequence for calculating the area of buildings and the overall site, for both an existing and a new market, is as follows:

- Divide the projected annual market throughput/supply (in tons) for a number of target years by the sales space standard in tons per square meter/per annum to obtain the total commercial sales space requirements (covered and open). Adjust the figure to take account of different floor levels.
- Calculation of Gross Market Area (Tracey-White, 1991):

Table 10 Calculation of gross market area

Program	**Area Requirement**
Storages and cold stores	40% of commercial sales area
Circulation of Pedestrians	10% of commercial sales area

Office of market, management staff and basic facilities such as banking, extension services and farm input	5% of commercial sales area
Total	**Gross Market Area**

4.6 Area Standards

- Administrative office space @ 10 - 15 square meters per office worker (often on more than one floor);
- Cleaners' store plus guardhouse @ say 10 square meters for a small market and 20
    - 30 square meters for a larger market;
- Private toilets: 2 square meters @ per 25 market employees (male and female separate);
- Public toilets: 2 square meters @ per 1,000 peak period market users (male and female separate)
- Parking spaces: 3 spaces per 100 sq. m of sales area; 5 for peak period (White J. T., 1999)

4.7 Site Size

- The overall site area required to accommodate the covered space should be in the ratio of between 1: 4 and 1: 3 that is for every square meter of covered sales space an additional three to four square meters of site would be required.
- Exceptionally, this factor can be reduced to 1:2.5 if the site area is very limited and increased to 1: 5 if much of the trading is likely to be undertaken in the open.
- The overall site area in square meters can thus be derived by multiplying the gross market area by a factor of 2.5 to 5 to allow for traffic circulation, parking areas and site landscaping.
- 0.5 hectares per site per 2 neighborhoods (White J. T., 1999)

4.8 Typical Infrastructure Standards

- single lane road width: 3.5 meters
- one-way road width: 7 meters
- two-way road width: 12 meters
- size of car parking areas: 4.8 x 2.4 meters
- visitors' car parking: 2 - 5 spaces per 100 m^2 of sale area
- visitors' car parking: preferred maximum distance from market: 100 meters (absolute maximum distance at peak periods 200 meters)
- size of pick-up parking areas: 8 x 3.65 meters
- size of truck parking areas: 11 x 3.65 meters

- parking for traders and delivery vehicles: one or two per four stalls (in a highly motorized society: equal to the number of stalls)
- sidewalk widths: 2.5 meters minimum (5.2 meters if roadside stalls are to be accommodated)
- Water supply standpipes or tube wells at a maximum distance of 50 meters from users (25 meters preferred)
- Meat and fish stalls with immediate access to water supply (i.e., adjacent)
- Latrines and urinals at a maximum distance of 100 meters from users (50 meters preferred)
- Dustbins or garbage pits at a maximum distance of 50 meters from users (25 meters preferred)
- Lamp standards spaced at an interval of 15 to 25 meters (White J. D., 1995)

4.9 Water Supply

An approximate estimate for water demand at ultimate development of a typical 10,000 m² market, based on Nepal Water and Sewerage Board standards (Drinking water installation and drainage requirements in buildings in Nepal, page 88), is as follows:

Table 11 Basic water supply calculation table (Tracey-White, 1991)

Description	**Daily Demand**
Basic requirement assuming a "medium demand of 4 litres per m^2 of effective floor area for covered markets = floor area of 10,000 m^2 × 4 litres/m^2	40,000 litres
Cool storage requirements at 20 litres per ton = say 500 tons × 20 litres per ton	10,000 litres
Basic requirement	50,000 litres
Add 50 % contingency, incl. produce washing	25,000 litres
Estimated Total Daily Demand	75,000 litres

4.10 Sanitary Services

Table 12 Sanitary standards (Tracey-White, 1991)

Fitting	**Male**	**Female**	**Market yards**

Water closets	1 per 25 persons	1 per 15 persons	2 minimum plus 1 per 50 persons
Ablution taps	1 per wc plus 1 per 50 persons	1 per wc plus 1 per 50 persons	2 minimum plus 1 per 50 persons
Urinals	0 – 6 persons = 0 7 – 20 persons = 1 21 – 45 persons = 2 46 – 70 persons = 3 71 – 100 persons = 4	Not applicable	2 per 50 persons
Wash band basins	1 per 25 persons	1 per 15 persons	Not specified
Drinking foundations	1 per 100 persons	1 per 100 persons	Not specified
Clearer's sink	1 per floor		Not specified

4.11. Color strategy

In general, paler materials are preferred as they reflect light, providing brighter surroundings, and suggest hygienic conditions. The use of color will depend on the type of

produce being sold and the following colors are usually adopted, particularly for the walls dividing sales outlets:

Table 13 Color strategy (White J. D., 1995)

Market spaces	**Preferred Colours**
Fruits and vegetables	Green, yellow, grey or orange
Fish	Blue, turquoise, mauve or grey-blue
Meat and Poultry	Beige, pink or grey
Dairy Products	Blue, white or beige

4.12. Fire Safety

- Fire hydrants, spaced at approximately 30 meters intervals in loop systems encircling the main building and around the site periphery.

- In designing the water supply system, a minimum fire-fighting flow of 34 liters per second (450 gallons per minute) should be aimed for.
- 1 fire bucket per 100 m² of floor area (or part thereof);
- 1 fire extinguisher per 600 m² of floor area (or part);
- first aid kits and tools (asbestos blanket, hatchet, gloves, etc.) for each building or compartmented section; and
- internal fire hydrants to open-market sheds, served from overhead gravity fed tanks to a minimum pressure of 3 kg/cm².
- The hydrants should be provided with wall-mounted hose reels to serve a maximum radius of 30 meters. (Tracey-White, 1991)

Chapter 4. Case study

1. National case study

1.lee-sherpa farmer market.
2.kalimati tarkari bazar.

2. International case study

1. Dili haat,
2. Tofu factory, china
3. Foodport, West Louvillie, USA

3. Secondary case study

1. Campus café, pulchowk campus.

1. Lee-Sherpa Farmers Market

1. Project details

- Location: Lazimpat, Kathamandu
- Site area: 950 Sq.m.
- Design Phase: Completed
- Client: Francois Driad
- Project Year: 2012

Figure 27; view of lee sherpa market

2. Why this Case Study?

This case study is selected in certain criteria like:

- Target Group Relevance
- Physically Resilient Structure
- Functionalism and Material Study

3. About project

Among chaotic urban condition, Lee-sherpa farmers market is set out on a multitiered garden space, adjacent to restaurant. The major emphasis on retail space is given to organic production usually food. The space is activated in periodic manner (from 8am to 12pm). It provides a healthy inclusiveness to farmers around as well as good experience to eateries. Socialization is the major target.

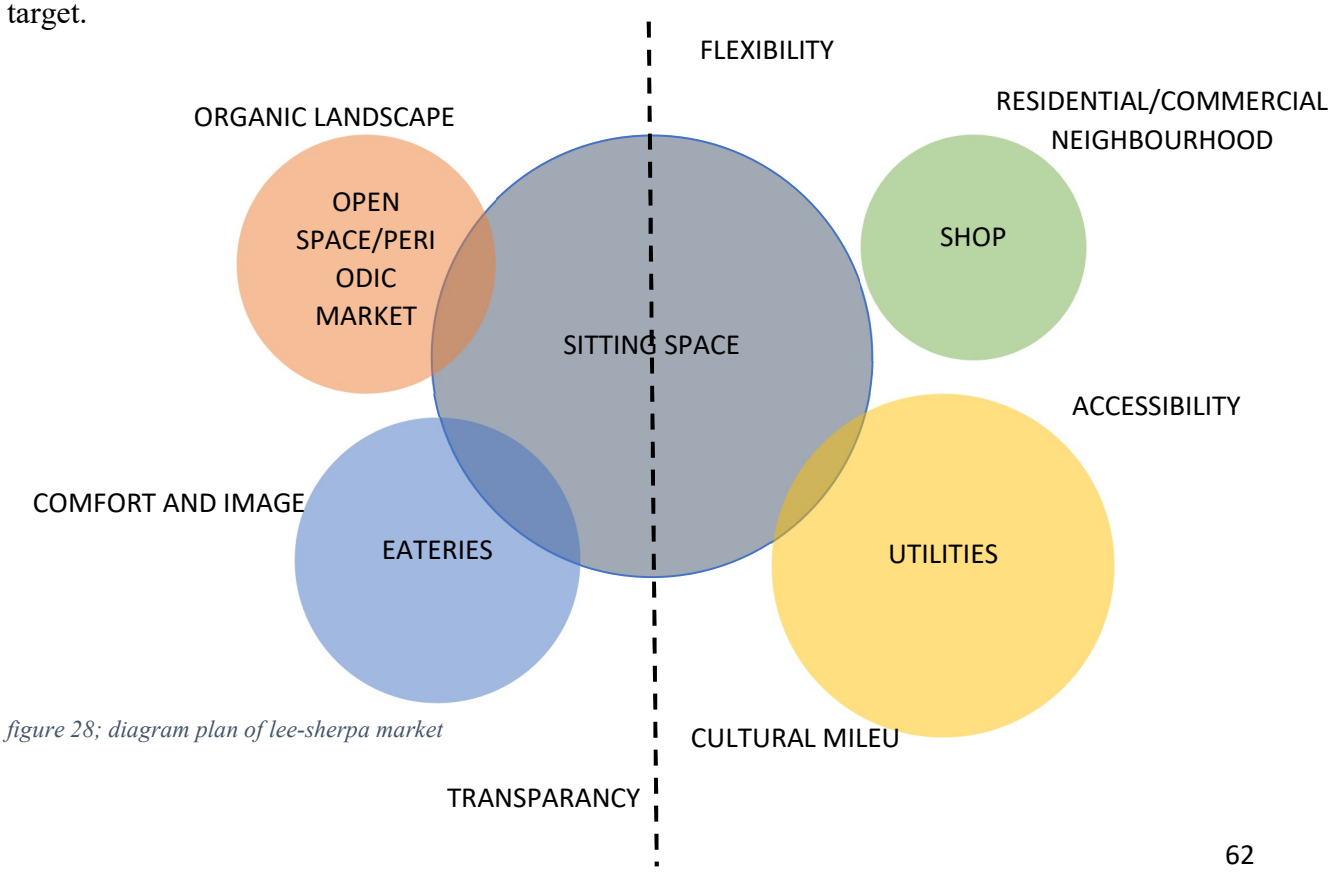


figure 28; diagram plan of lee-sherpa market

4. Major attraction

Concept of **“dampa”** and **“paluto”** in the food court

- **Paluto** “eat all you can concept”
- **Dampa** style concept, when your fresh/raw meat, have it weight and ask what kind of cooking we want, A self-service thing, preparing our utensils, condiment, plates and even get the rice. Giving users the sensory experience throughout the memory and space.

figure 29; view of sitting platform

5. Structure

- Open, flexible, transformable, expandable and dismantlable.
- **Materials**: steel, prefab panels, Rammed earth, Bamboo, straw, fabric, CGI sheet Nut and bolts, concrete, brick, acrylic, glass and mud.

figure 30; view of market

figure 31; view of market

Table 14; inferences

S.N.	INFERENCES	REMARKS
1	Periodic connectivity of society space and food	Multifunctional open space and eateries connectivity
2	Structure and material	Use of reusable, available and light weight material as needed
3	Flexibility and landscape	Emphasis on organic landscape, placement of retails.

2. Kalimati fruits and vegetable market, Kalimati

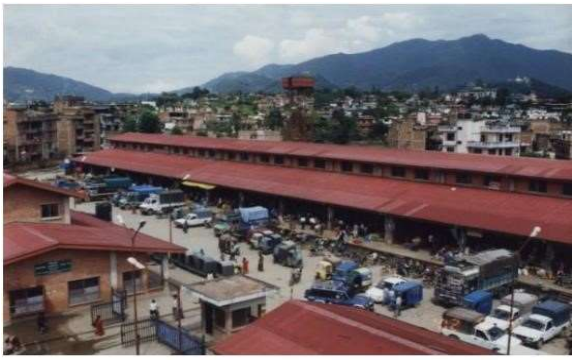


Figure 32; Areal view of kalimati market

1. Project details

- Location: Kalimati, Kathmandu
- Total area: 20370 sq.m
- Phased construction: 1988-2000
- Design population: 7 lakhs
- Market typology: Permanent wholesale market with retailing

2. Selection criteria

- Largest permanent market infrastructure in Nepal
- Professionally designed market with aid from UNCDF
- Standardized by FAO

3. Introduction

Kalimati market has been functioning as a major fruits and vegetable market over 30 years. From 2043 B.S, it started to function with small-scale infrastructure, however most of the current market infrastructure are the result of aid from UNCDF in 1990. For efficient management of market, "Kalimati fruits and vegetable wholesale market board" was formed, under Development Board act-2013, in 2051 B.S.

It consists of different types of market:

1. Wholesale market
    - 322 stalls and 26 allocated for farmers group cooperatives
    - Zoned into different section
    - Monthly rent and permit system
2. Retail market
    - 81 stalls
    - Monthly rent and permit system
3. Farmers market
    - 2 shed at the entrance gate with hard paved open space
    - Is opened 2 times a day
    - Farmers pay minimal amounts of NRs. 10 each time they use stall
    - 75-150 farmers arrive on daily basis
4. Fish market
    - Twelve cages near ice plan is allocated for the fish market

- Initially was at Khichapokhari
- Around 10 MT of fish are imported on daily basis.

5. Others facilities
    - Provision for storing seasonal fruits like orange, papaya and others in vacant space, shed, room and other spaces.
    - Some spaces to sell fruits, seed, fertilizer, dairy products, agro products

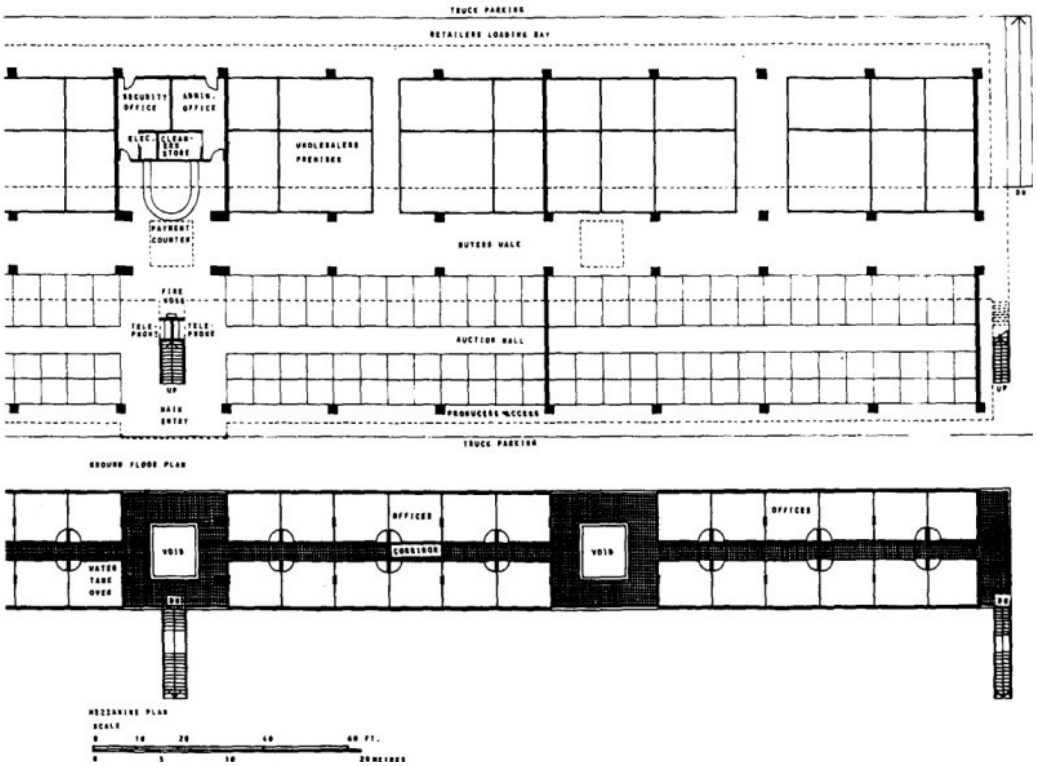


Figure75Kalimati market wholesale building plan

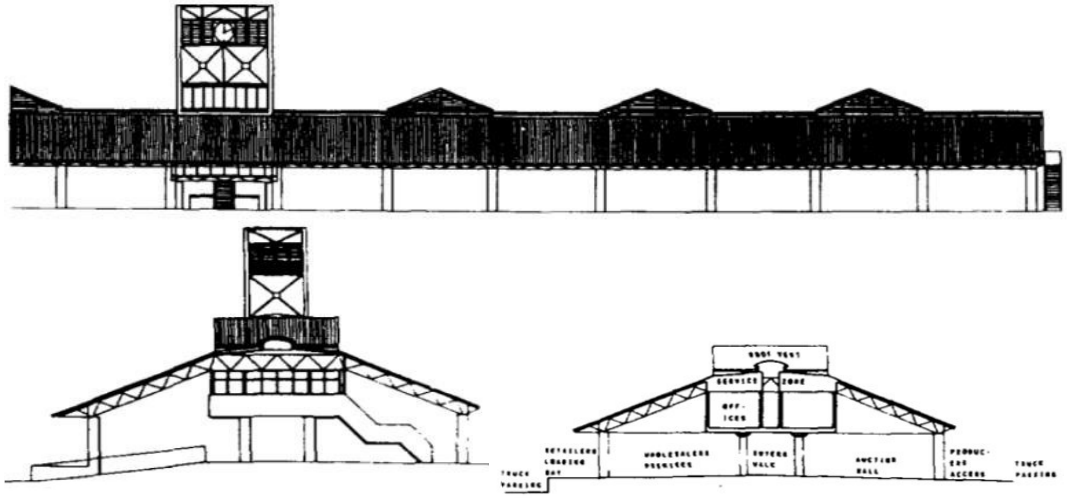


figure 33 section and elevation

Land Use	Area (Sq.m)	% of total
Buildings	6060	29.8
Farmers' Market Area	710	3.5
Roads	5955	29.2
Parking Areas	3570	17.5
Footpaths & landscaped areas	3495	17.2
Drainage & other services	580	2.8
Total site area	20370	100.0

There are various services and facilities provided by the Kalimati market:

- Multipurpose building - 4903 sq.m.
- Wholesale market building (old fish shed) – 508 sq.m.
- Wholesale market sheds – 48 stalls
- Retail market sheds -2 nos.
- Farmers' market – 2 sheds and hard paved open space infront
- Farmers' market shutters – 6 nos.
- Fish market – 12 cages
- Ice-plant 220 sq.m., 15 metric ton daily production
- Cold room 4.5 metric ton storage capacity, Freezer room 9 metric ton storage capacity
- Administration building – 792 sq.m.
- Storing cages – 24 nos.
- Building with 12 shutter shops (near administrative building and farmers' market)
- 53 rooms above Multipurpose building and fish market
- Bank area (currently used as garlic and ginger trading space)
- Restaurant – 1 nos.
- Mesh/ Canteen – 4 nos.
- Electricity station
- Generator – 250 KVA capacity
- Water tank – 160,000 litres capacity; with deep tubewell
- Water purification plant

Table 6 Program area allocation

Land use/accommodation at ground floor level	Completion by end of Phase: II	III	IV	% of total
Buildings:				
· Multi-purpose shed	1,680	2,640	3,600	17.7
· Structural bays (number)	(7)	(11)	(15)	
· Fish shed	-	-	336	1.7
· Cold stores	-	-	880	4.3
· Management and administration	560	560	560	2.8
· Retail unit and hostel	-	308	308	1.5
· Security block	72	72	72	0.3
· Main gatehouse	-	-	24	0.1
· Washing, grading and packing	128	128	128	0.6
· Toilets	152	152	152	0.8
Sub-Total, Buildings	2,590	3,840	6,060	29.8
Site Development:				
· Farmers' market area	710	710	710	3.5
· Roads (on-site only)	3,360	3,640	5,955	29.2
· Parking areas	2,020	2,190	3,570	17.5
· Pavements and landscaped areas+	1,940	2,100	3,495	17.2
· Drainage and other reserves	150	165	230	1.1
· Areas under construction #	3,010	1,135	-	0.0
· Future expansion area (paved)	-	-	350	1.7
Total site area	13,780	13,780	20,370	100.0

Source: FAO Technical Report, GCP/NEP/043/SWI
Notes: + Excluding paved areas associated with buildings, covered arcades and paving to the farmers' market area.
Including temporary construction roads

4. Description

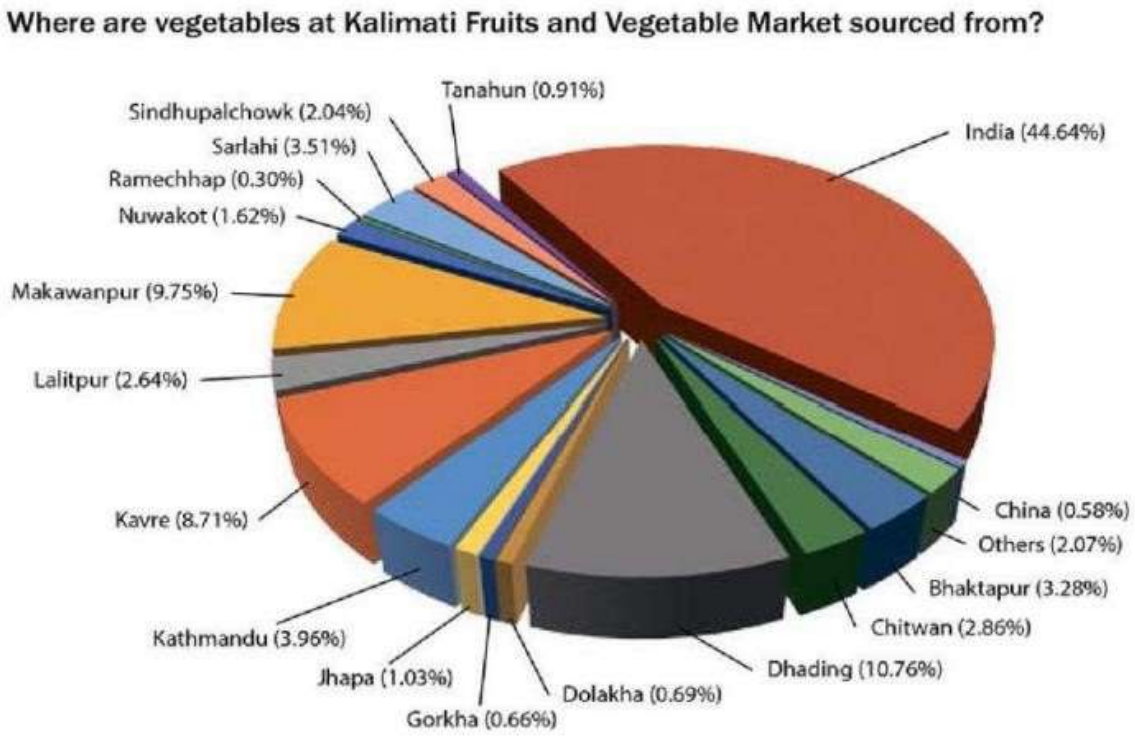
There are 100 parking spaces within the market and 36 spaces outside the market. There is provision of 24 hours security for the committee and market user. Waste water collection and management is being carried out with involvement from private sectors. In order to strive the market towards healthy, competitive and qualitative market, the committee has been carrying out quantity and quality controlling of the produces being traded in periodic basis.

5. Major supply sectors for the market

Most of the produces are supplied nationally: while

24.37% are imported from India,

and 1.67% from China



6. Architectural features

- Style: Contemporary structure Structure : RCC slab
- Waffle slab
- Steel truss with CGI sheets
- Material
- Bricks
- CGI sheet roofs
- Stone pavements
- Black topped roads

7. Inferences

- Highly dense neighborhood
- Limited to food related procurement
- Lacks soft cape, relaxation areas
- Problem of cleanliness, solid waste management, unhygienic and unattractive
- Provide intimate shopping experience but people do not prefer socializing in the premises (Retrieved from: Bibek Himalayan: Urban Marketplace 072BAE209)

1. Dilli Haat, Pitampura, Delhi

1. Project Details

- Site area: 2.9 Hectares (7 Acres)
- Built up area: 29,000 sq. m
- Completed: April 2008
- Client: New Delhi Municipal Corporation

figure 34; Dili haat model

2. Introduction

After the success of the first Dilli Haat, we were commissioned to build the second such crafts market at Pitampura in northwest Delhi. Public space is integrated within the backdrop of a food and craft market to create an ambience reminiscent of traditional Indian bazaars. The project has nearly 100 craft stalls, food courts, a spice market, an art gallery, and amphitheater and conference facility. The buildings are single-storied and built around landscaped courts and plazas. The experience of the space is ever changing based on the crafts, seasons and numerous colorful festivals of India.

3. Description

The Pitampura Haat has a lot of landscaped area with terrace roof garden. A dormitory for visiting craftsman and a basement parking. The basement of haat can accommodates nearly 250 cars and as many of two wheelers. It surely takes care of the taste buds. The variety of dishes available in Indian cuisine is served on the food stall. Diili haat is one beautiful vernacular piece of architecture which is inviting and appeals to the urban clientele.

The design was shaped by two goals. The first was to create as space that is humane and respects the needs of all users – both visitors and the craftspeople working in the haat. The second was to establish a benchmark in the design of similar public spaces in the city.

figure 35; craft stall

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Features

4. Food Plaza

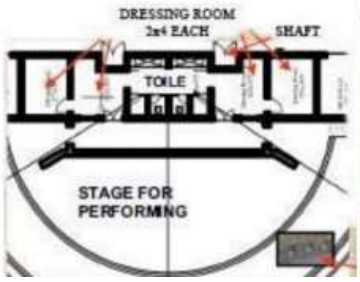
is provided at the back, due to the requirement of hygiene and dust proofing is furnished in kota stone flooring and RCC roof. There are 40 food stalls in whole plaza, with each one specializing in the foods of a particular state, thereby providing food from all states. All the food stalls are simple brick structures with flat RCC roofs and parapet walls are given a treatment of brick jaali. The front façade of different blocks is given treatments in form of traditional arts of their state. Small planters have been created with seats arranged around them and the restaurants are covered under sheds.

figure 36; food plaza

5. Amphitheatre and dressing room

It is a small performance art theatre. The stage has a circular form and there is adequate back stage. There is a central 10'-0" wide walkway towards stage from the center and on sides.

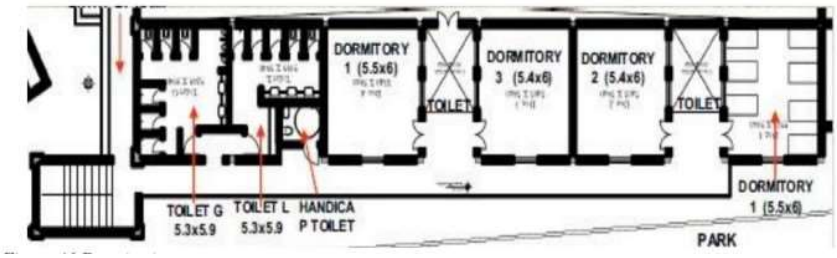
figure 37; Amphitheater



6. Dormitories

Dormitories providing accommodation for the artisans and craftsmen to stay during the exhibition days. Each dormitory of approx. 33sqm is given with space for 4 days. A combined toilet for 2 dormitories and common toilet for all dormitories on each floor. The structure of two stories is made for dormitories. It has a common gallery facing the park on the rear side.

figure 38; Dormitorie



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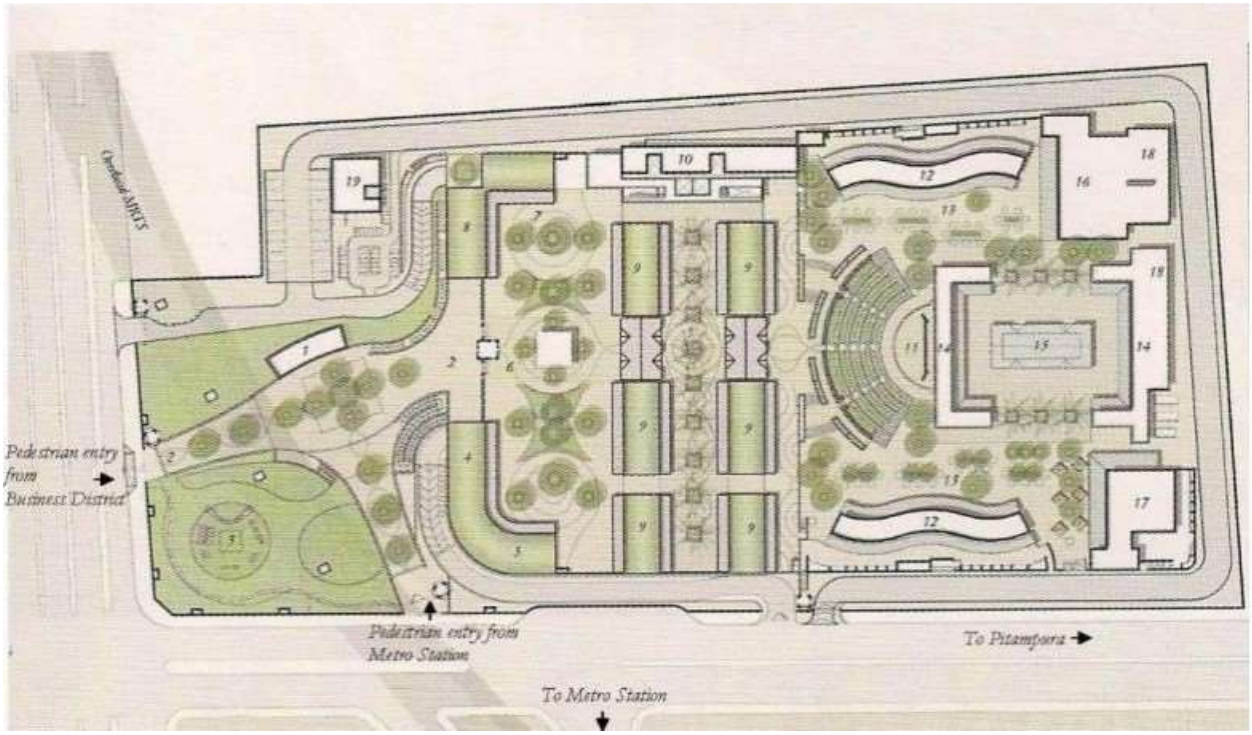
7. Activity lounge

It is located beside amphitheater and provided a space for social activity and performance (Source: *https://www.slideshare.net/nishant011/dilli-haat presentation)*

figure 39; master plan of dili haat



8. Circulation

The circulation is entirely pedestrian. By the use of ramps and steps, lots of levels have been

1. Coffee shop, Information , bank
2. Entrance plaza
3. Children's play area
4. Offices
5. Spice market
6. Upper level plaza with basement car parking
7. Sculpture court
8. Art Gallery
9. Craft Market
10. Dormitory for Artisans
11. Amphitheatre
12. Food stall
13. Food court
14. Craft Market
15. Multipurpose pavilion
16. Conference facilities
17. Restaurants
18. Utilities
19. Sewerage treatment plant

(Source: http://www.psda.in/dilli-haat-pitampura.asp)

created to define buildings more distinctly and also keep provision for basement parking.

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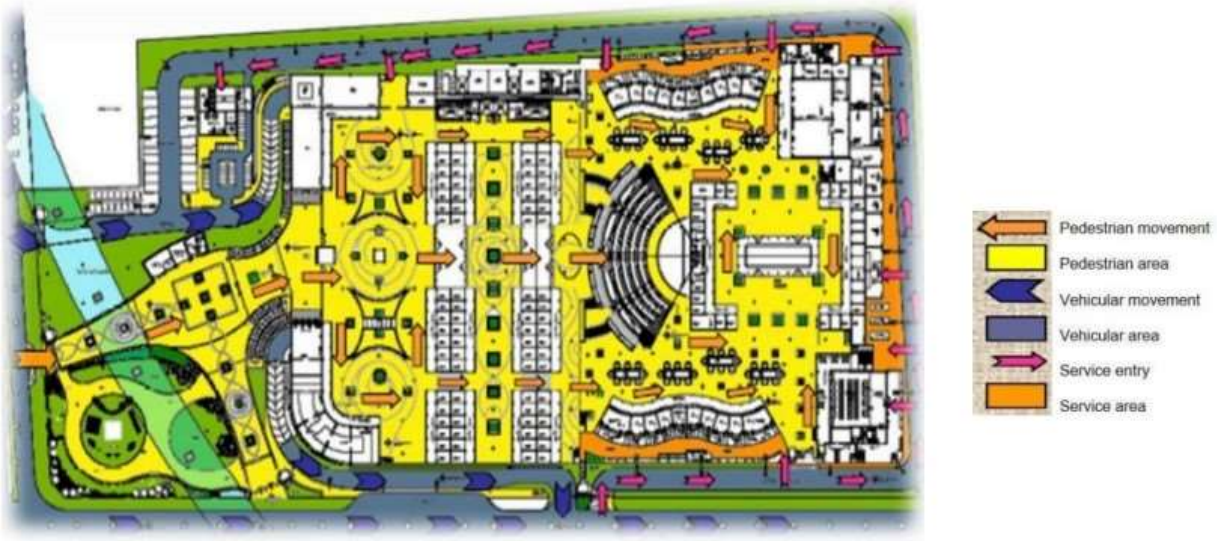
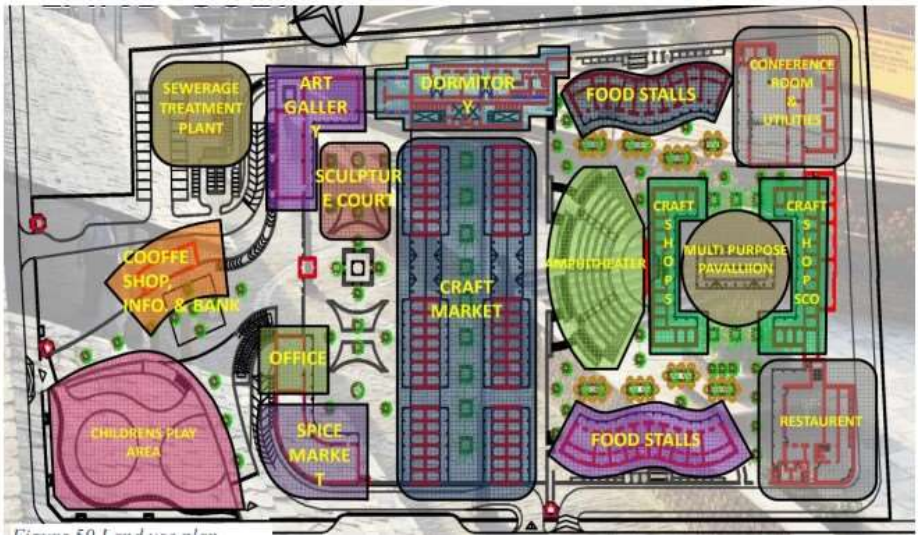
Circulations in front of the shops is through a verandah covered arcade. The spaces also get varied character because the plaza changes character from a large entrance plaza to an informal area. large pockets have been marked for the staff parking area. A proper service lane has been provided around the periphery of the site for service. Parking for visitors (both 2-wheeler & 4-wheeler) has been provided in the basement.

figure 40, circulation plan

9. Land use





10. Construction aspect

The buildings, constructed in exposed brick and stone, with shady verandahs have been inspired by the vernacular architecture of the region. The upper-level plaza buildings have vaulted green roofs a design feature used for the first time in a public space in the city. The green roofs and plazas are irrigated with recycled water produced by an onsite Sewage Treatment Plant.

11. Material selection

The selection of material, construction and layout was made to maximize thermal efficiency and minimize energy consumption. Nearly all areas are illuminated by natural daylight and are naturally ventilated. The brick and stone used in the project have been sourced from the surrounding region. Materials were selected for their durability and enduring qualities. ϖ The building vocabulary has been kept understated and the scale intimate to ensure that the buildings do not overwhelm the crafts being sold.

12. Inferences

- It has provided traditional village markets ambience for more contemporary needs of the people.
- It has provided a whole difference experience of shopping and recreation to people that new modern supermarket has not able to provide.
- It has succeeded to give local experience to other people who come here.

2. Tofu factory, China

1. Project details

- Architects: DnA
- Area: 1211 m²
- Year: 2018
- Location: Songyang, China

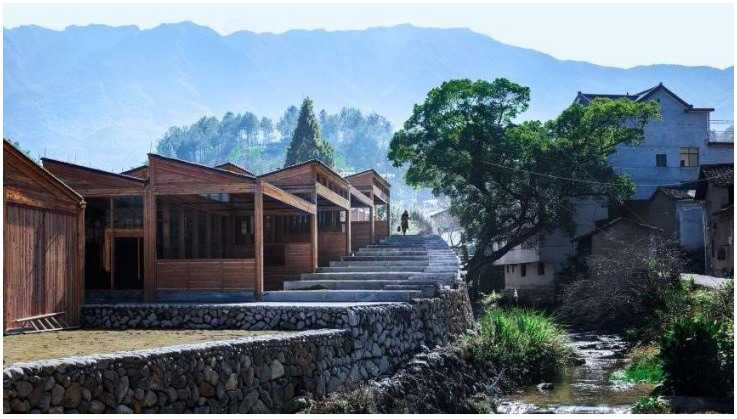


figure 41; tofu factory view

2. Selection criteria

To understand the relation between visitors and workspace in a small rural level. To understand functions and programs of a small-scale processing factory

3. Introduction

Caizhai Village is a traditional mountain village built along both banks of a river over the past two hundred years. The village has always been known for its best tofu production in the county region. But the products from the traditional family workshops could not fit into current food certificate standards to be able to sell in supermarket. A new factory is programmed on a linear slope following the river by the village entrance, as a village collective economic entity on both on soybean supply and a villager union on tofu products, to upgrade the traditional tofu production. The villager union operates the factory to engage family workshops as shareholders of this collective economic entity. In this way, the villagers are the immediate beneficiary and many farmers join the unions as well.

Figure 42 View of tofu Factor

.

4. Description

All the production spaces are designed and equipped to upgrade traditional tofu products fitting with food certificate requirements. This will allow the tofu products to sell in city supermarkets and to increase the village economic revenue. A covered walkway for visitors takes the steps up to observe the traditional tofu making process in sequence, and finally arrive at the tasting hall facing an open plaza to the south and the historical village fabric across the river. Assembly timber structure system is applied to the building as a modern production factory and also creates a dialogue with the vernacular "tenon & mortis" wooden structure in old farm houses in the village. The factory is both production and exhibition space of traditional heritage for Caizhai village, and has already welcomed groups of primary school students to experience traditional tofu making.

5. Zoning

The building is arranged in a linear fashion going up the slope, so visitors can walk up the stairs either side to observe the process from start to finish, then taste the tofu at the end.

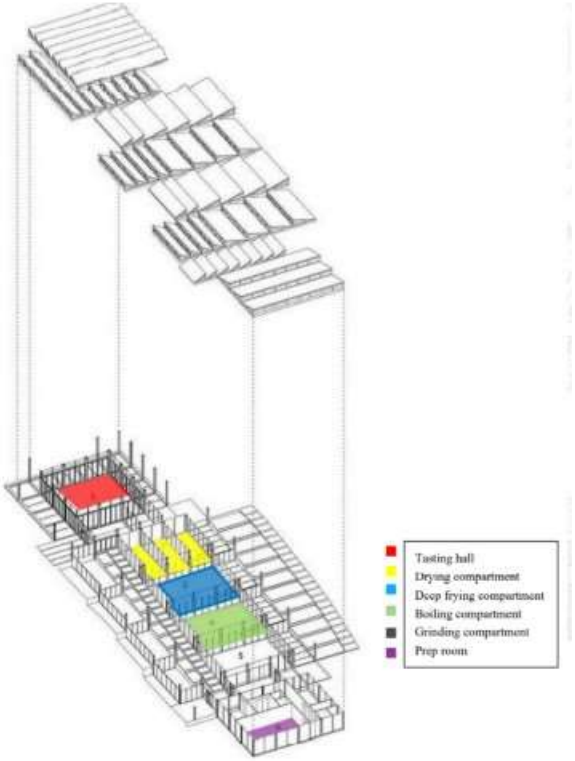


figure 44; axonometric plan

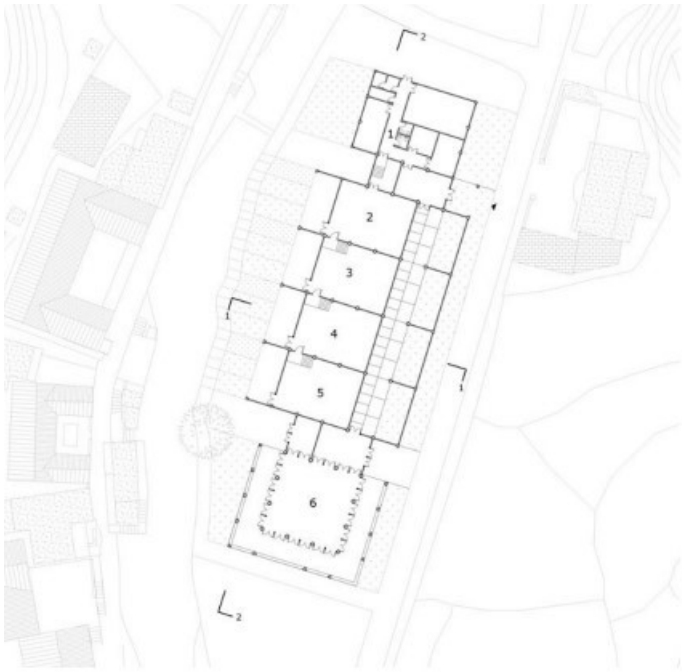


figure 43; plan of factory

1. Preparation room
2. Grinding compartment
3. Boiling compartment
4. Deep-frying compartment
5. Drying compartment
6. Tasting hall

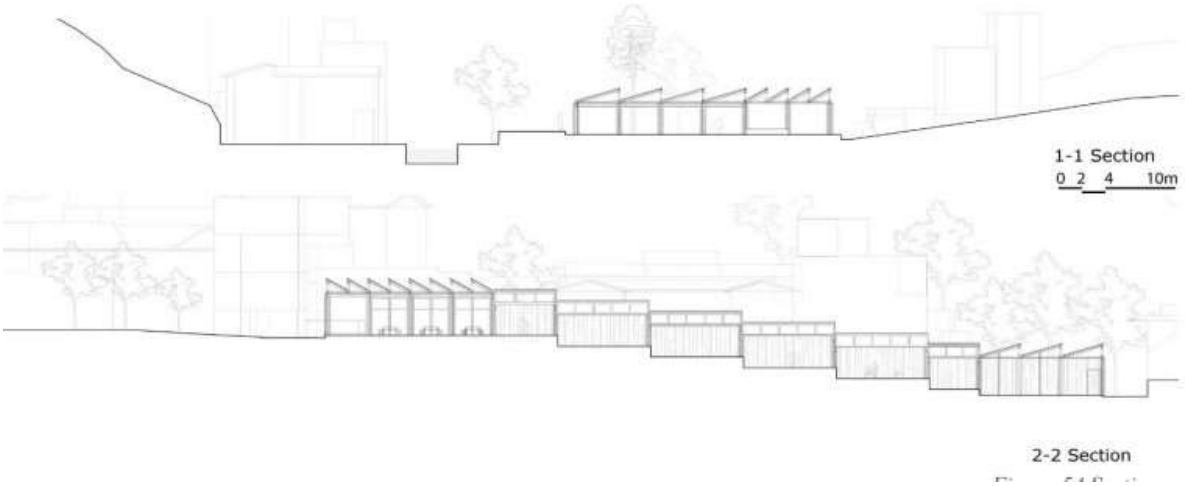


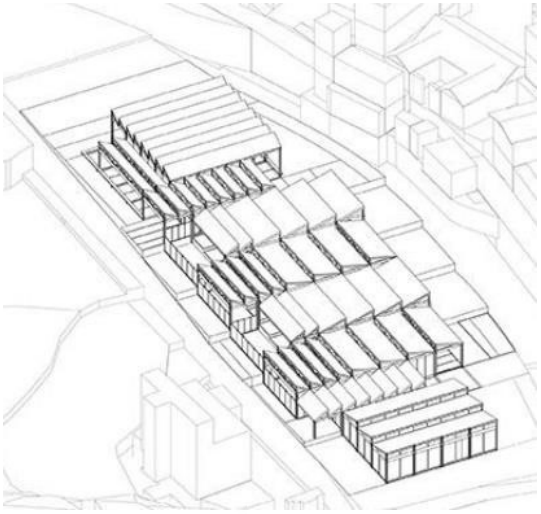
figure 45; section

6. Circulation

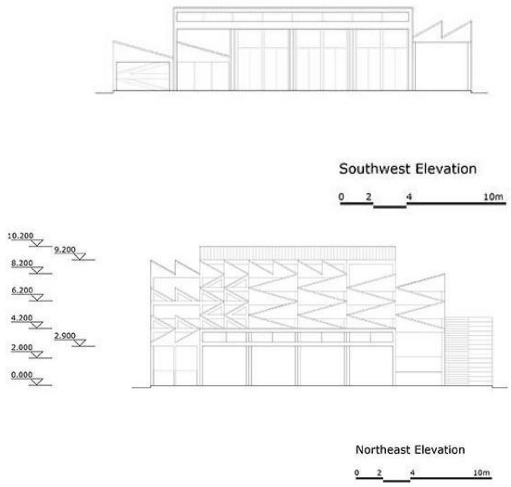
A covered walkway for visitors takes the steps up to arrive at the tasting hall facing an open plaza to the south and the historical village fabric across the river.

(Source https://www.archdaily.com/943412/tofu-factory-dna)

figure 46; Tofu factory view



3D drawings



Elevation

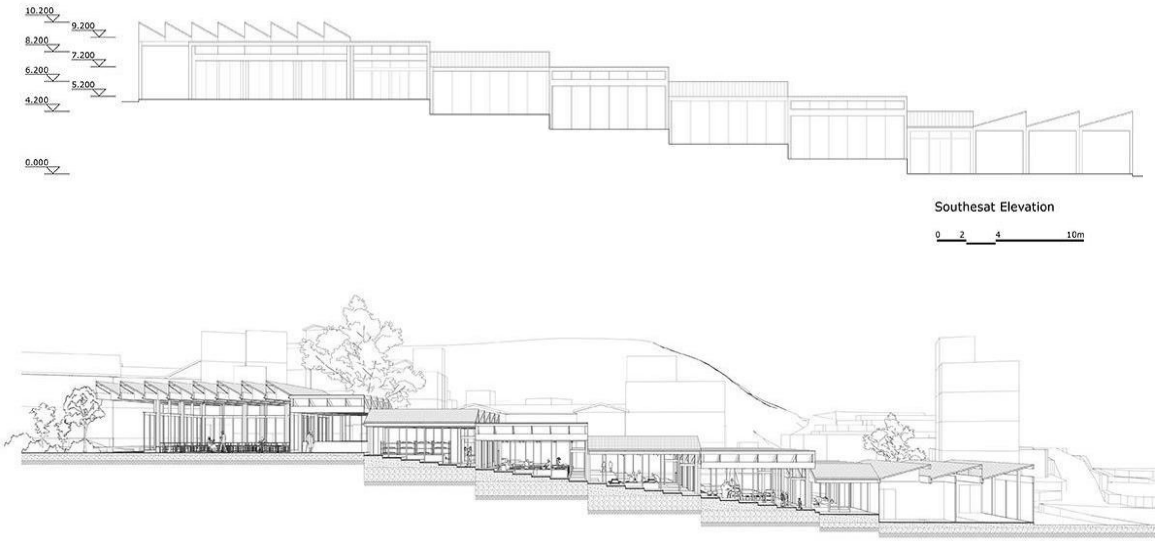


Figure Perspective section

7. Inference

- Connection between visitors and workstation.
- Use of inclined roofing for lighting and ventilation
- Contextualization of design
- Layouts and arrangements of different spaces in a small scale factory Linkage of public spaces, circulation and workspace.
- Use of contour to create spaces for interaction

.

3 Foodport, West Louvillie, USA

1. Project details

- Total developed site area: 132.500 sq. m
- Site area- 25 acres
- Stage- conceptual (not built)

2. Selection criteria

- Not just a typical food hub
- Include logistic and food processing unit
- A community base food hub
- Connecting consumer to producer

3. Introduction

OMA has unveiled plan for a mixed-use project that will consolidate facilities for the growing, selling and distribution of food for local farmers in Louisville. A collaboration with the non-profit Seed Capital Kentucky, the 24-acre "Food Port" will transform a former tobacco plant into an

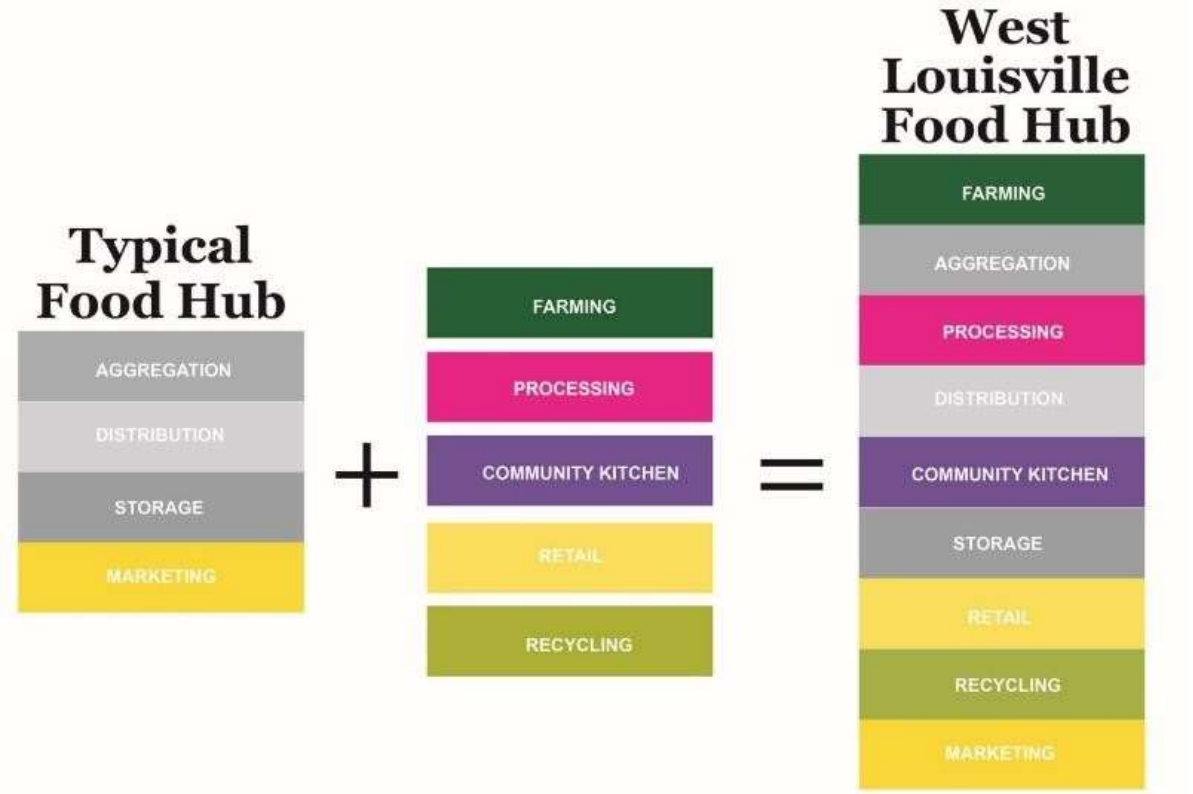
"active economic and community hub" that shapes a "new model between consumer and producer."

> "The diversity of program reflects the full food chain, as well as a new foodscape of public spaces and plazas where producers and consumers meet. "The Food Port acts as a catalyst to activate the surrounding neighborhoods, exemplifying one of the complex urban relationships between architecture and food that our studio is investigating." The expandable campus, which is expected to break ground this summer, will include an urban farm, edible garden, market and food truck plaza, retail space, classrooms, a recycling facility, and more. Continue after the break to learn more.

figure 47; food truck and informal market

4. Description

The West Louisville Food Port operates as more than the typical food hub with the addition of several key programs that serve and provide for all stages of the food chain, from farming, to processing, shared community kitchen spaces, retail, and recycling. The Food Port builds on the city's historic position within the inland waterway network and the city's legacy as a major shipping port by providing a much-needed infrastructural connection between farmers and suppliers and the growing demand for local food. Referencing the street grids of the city which are rotated at different angles from neighborhood to neighborhood to maintain orientation to the Ohio River, the masterplan stitches together the urban fabric.



5. Zoning

The Northeast corner of a building houses retail, a coffee roastery and juicer production facilities. Aggregation and processing facilities are located at the center of the site and demonstration farm below, and directly connected to the Urban Farm. The recycling facility is placed at the Southwest. The outdoor spaces are aligned with surrounding thoroughfare includes Market Plaza, Food truck plaza, edible garden.

The logistically programs such as the recycling facility and processing facilities are oriented toward the elevated railways on the west, while public programs such as retails and educational facilities face the east. The intersection if the programmatic bars take advantages of the unique combination of tenant to introduce shared facilities where private producers and public consumer meets. (Rosenfield)

.

Figure Foodport top view

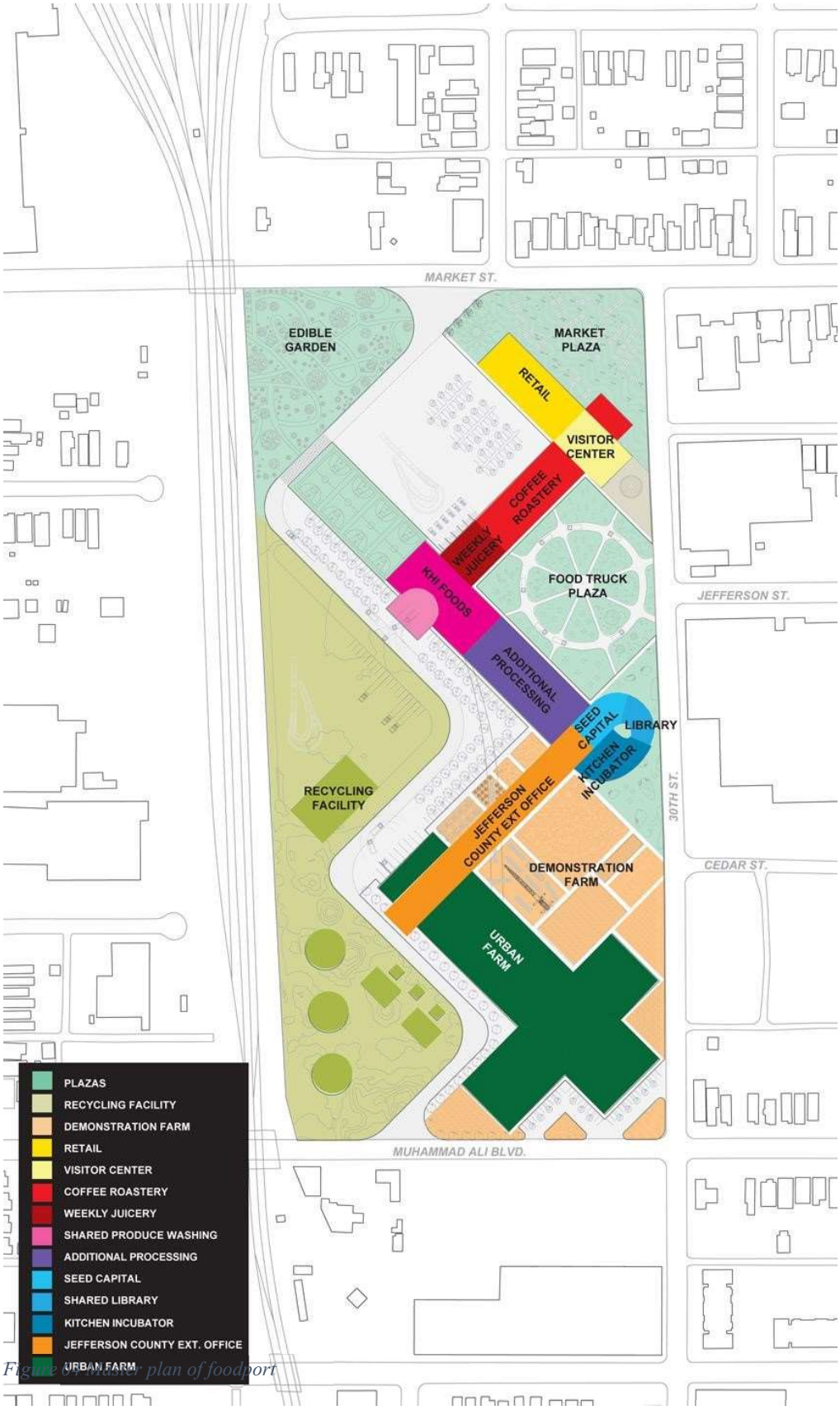


Figure 33: Master plan of foodport

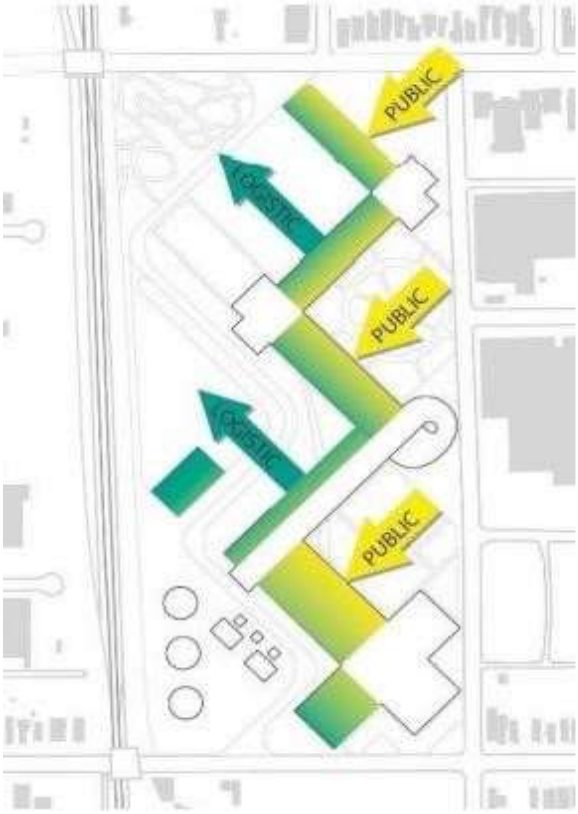


Figure Servicing and public circulation zoning

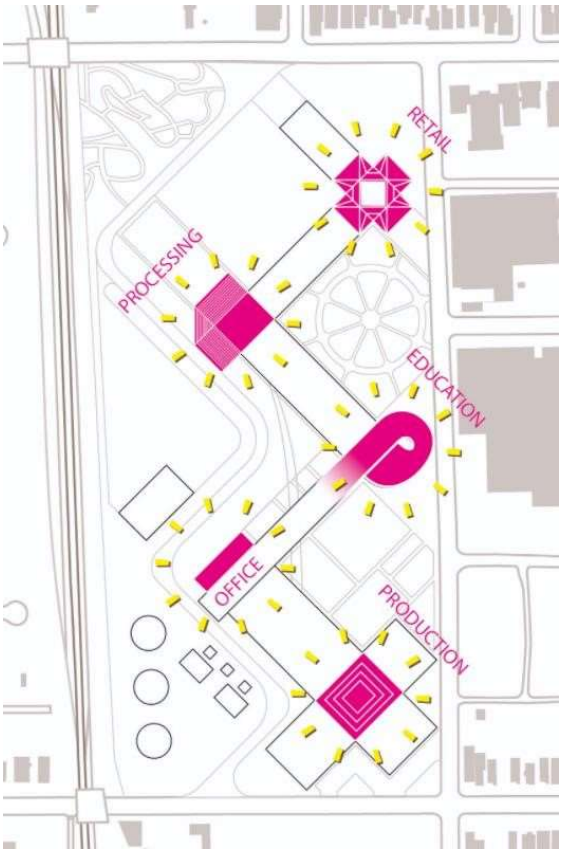


Figure Zoning at nodes

6. Inferences

- There is a very simple and straight division of the public and service circulation. All the public functions have been placed near the public courts whereas admin and processing functions next to service court. This result in uninterrupted flow of both.
- The Public court created give way a lot of informal activities as well as temporal markets and exhibitions to be conducted. The setting up of these courts hence keeps changing and results in an active public space. The built thereby not only supports but provides a fixed setting to this changing public landscape in front of it.

3. Secondary Case study

1.Campus café

- Location: Pulchowk Campus
- Research on: Café as a learning space.
- The campus café of the Pulchowk campus may not be the best design café but knowingly or unknowing it has nice a gathering space. It is located near the wood workshop and straight visible from the Dean office. According to analysis, people who want to come alone or want to eat and go tend to stay in enclosed space and people who want to sit for a longer time and have discussion tend to stay in a open space. Students usually spend their time after class till noon in this café for studying and discussion. Even when the café is closed students come to this café for study or discussion. So, it has been a gathering point for students.

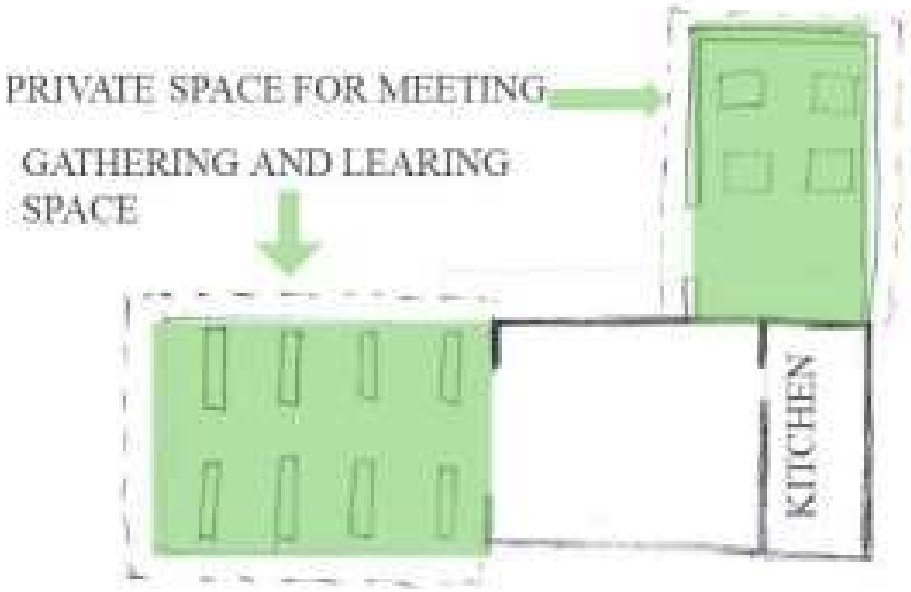
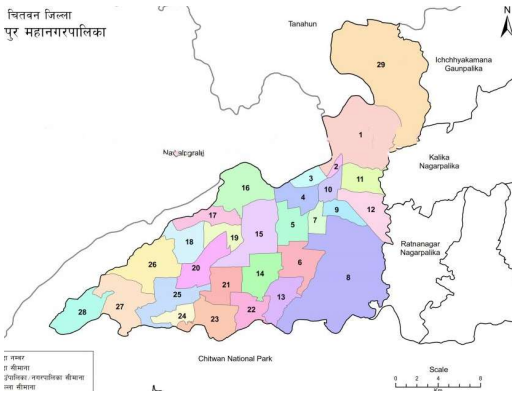


figure 48; campus cafe plan

Chapter 5 (Site Analysis)

1. SITE INTRODUCTION

- District: Chitwan
- Zone: Bagmati
- province: 3
- Total Population (2021): 579,984 (279,087 males and 300,897 females)
- Area: 2,238.39 sq.km



1.1 ABOUT SITE

- **Location:** Lineschowk, Chitwan
- **Latitude:** 27º41’43’’N
- **Longitude:** 84º25’21’’E
- **Altitude**: 186.5493269m
- **Topography:** Flat land with slightly contour at south side of
- **Tentative area:** 55 Around ropanis (28,000 sq.m) The site is irregular shaped with its longest faces facing the south east.
- **Current use:** Vehicular scrap storage, Hardware metal Storage
- The proposed site location is Narayangarh, Bharatpur, Chitwan. The accessibility and urban traffic of the site is quite high. The focused points for proposing particularly this site are:
- Narayangarh is a transit city and the multiple scale of users group can be observed which provides opportunity to deliver sociability through space. Lies in the urban fabric of Narayangarh that connects the places and waterfront which needs to be rejuvenated.
- Agriculture center market lies within the area radius of 7 km.
- The peripheral sub-urban spaces are highly based on agro-economy. The site can boost their market level through designed space.

1.2 SELECTION CRITERIA

- No large buildings and structure nearby for people travelling through the east west highway.
- Lots of greenery area nearby
- Secondary access from main highway.
- **B**us stop.
- Create a hub for local and visitor people.

1.3 PROXIMITY

- Institutions: 4km
- Agro-farming practice: 4km
- Educational: 1 km
- Corporate: Close proximity
- Commercial and retails: Around nearest proximity
- Market: 2km radius

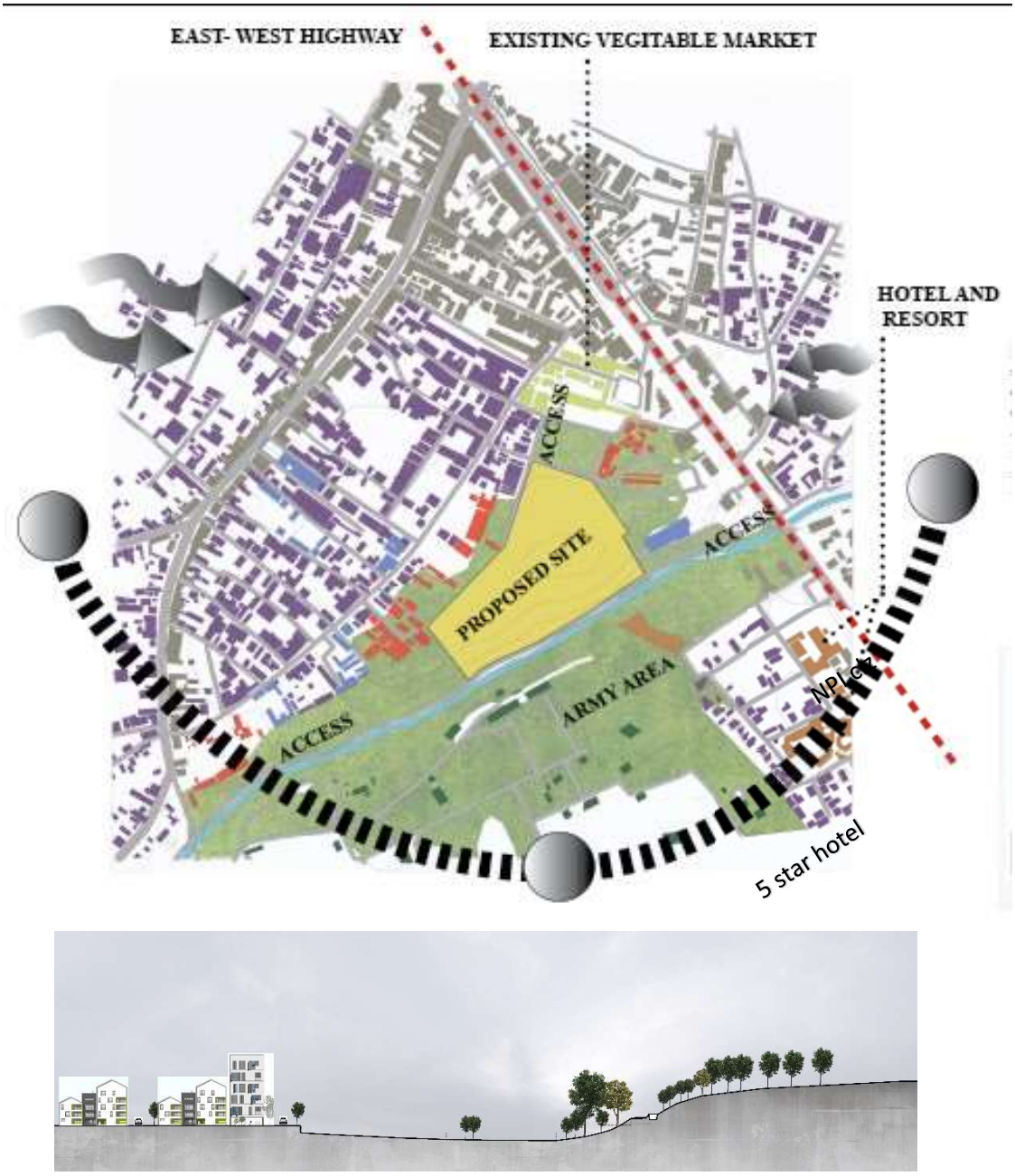


figure 49, Site analysis map and site section

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1.4 SITE PICTURES

figure 50, Site Pictures

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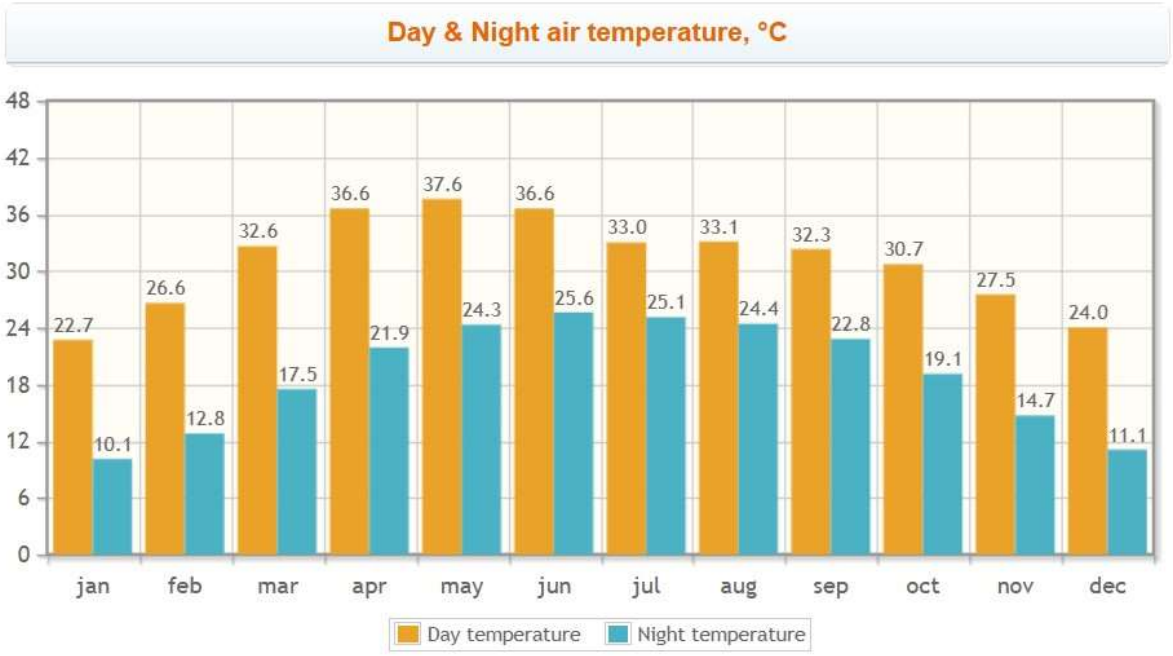
figure 51; Site pictures

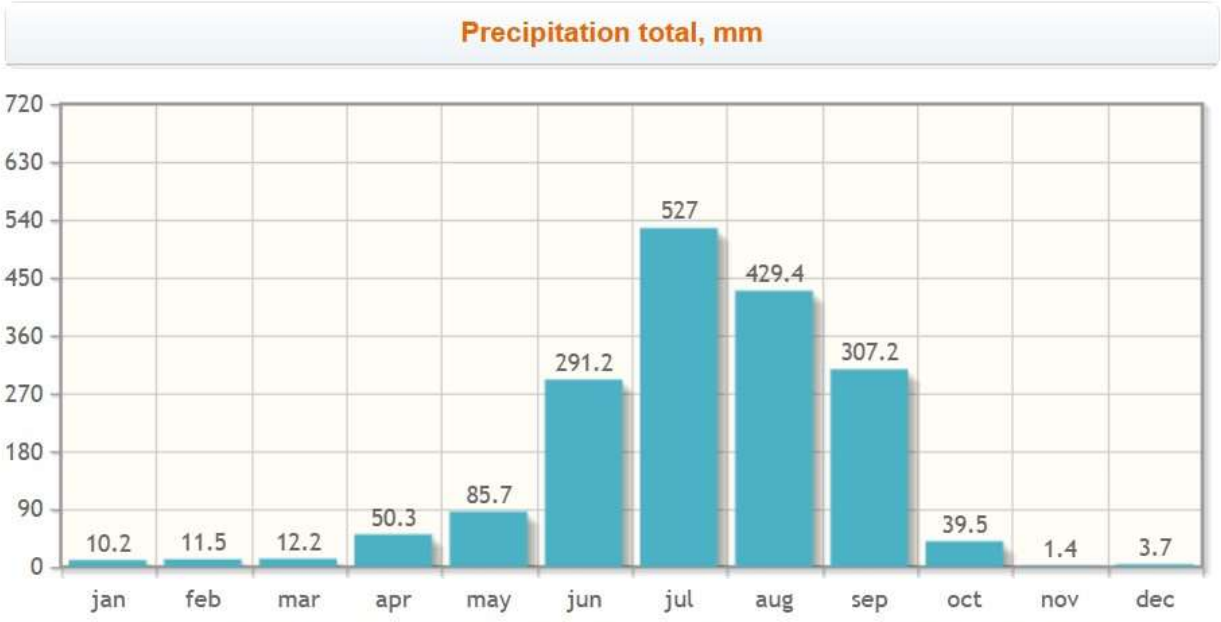
1.5 CLIMATE STUDY

Table 15 Temperature of Chitwan during day and night



The warmest month in Chitwan is may. The average daily temp is **37.6**°C. The average nightly temp is **24.3**°C.

Table 16 Precipitation Table throughout Year



november is the month with least precipitations during the year. The average precipitation totals for this month is **1.4** mm. The month with most precipitation total is july.

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Table 17 Wind Speed throughout year in chitwan

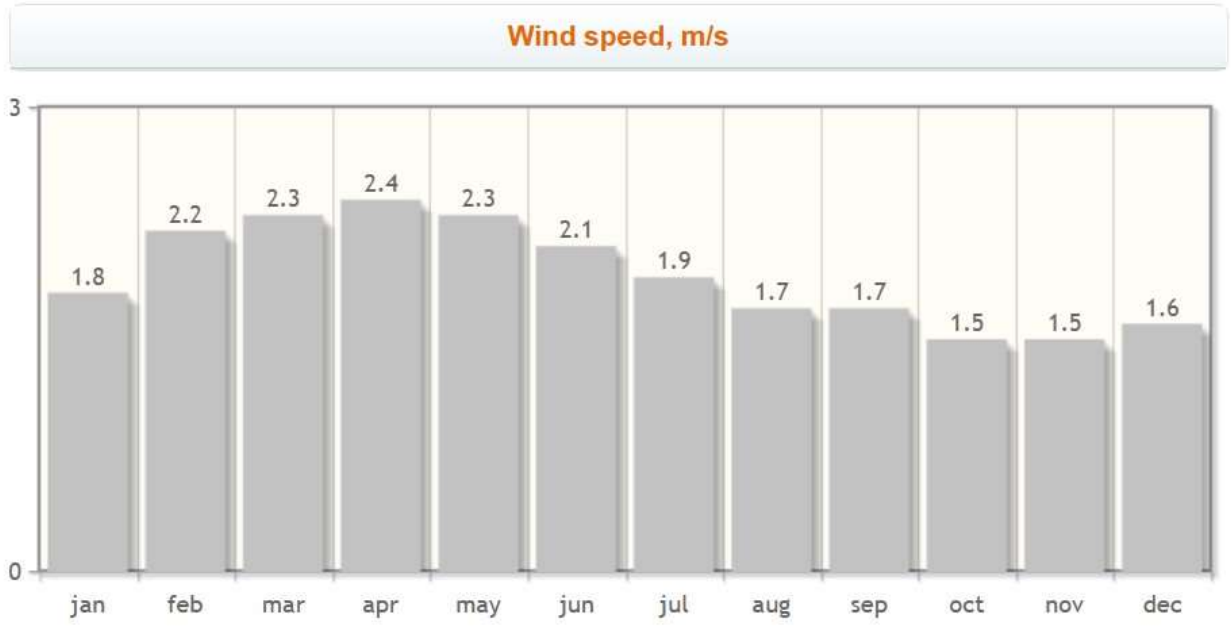
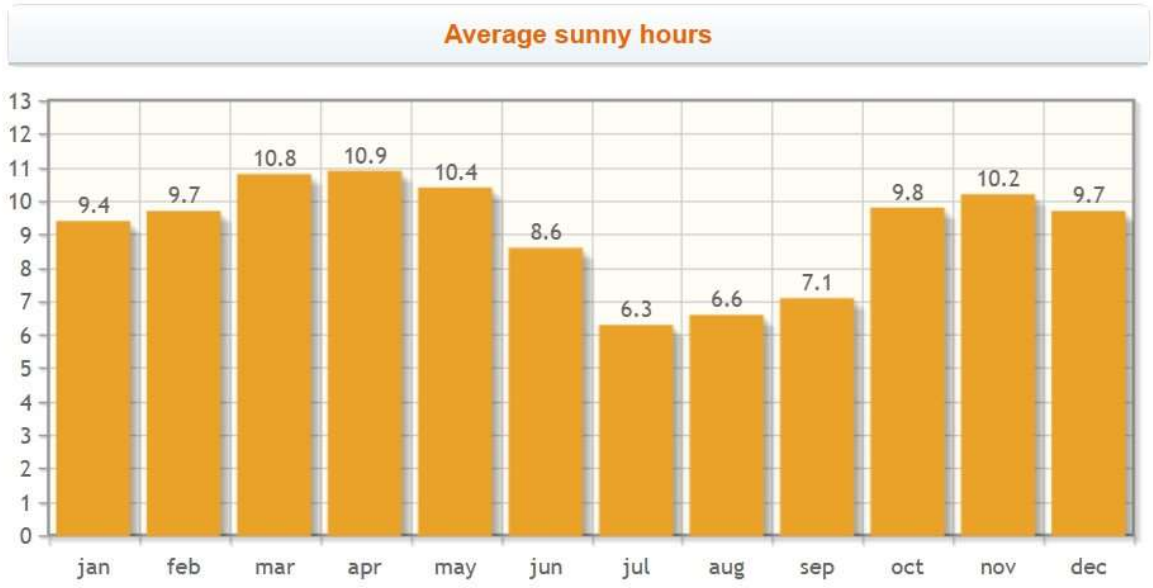


Table 18, Wind Direction of the site

Table 19, Average Sunny day throughout the year in chitwan



Sunny hours are calculated based on the average daily number of hours while sunlight can reach the ground. It depends on day length and cloudiness during the day.

* Charts above show average data for the last 3 years.

SWOT ANALYSIS

STRENGHT

- SITE HAS TWO SIDE ACCESS FROM (NORTH SIDE , SOUTH SIDE)
- AROUND THE SITE HAS VIP HOTELS AND RESORT.
- AROUND 100m DISTANCE FROM EAST-WEST HIGHWAY.
- NORTH SIDE OF SITE HAS NARAYANI IRRIGATION CANEL.
- AMPLE AMOUNT OF GREENERY AROUND THE SITE.
- SITE HAS ELECTRICITY FACILITIES THROUGH NEA TRANSMISSION LINE.
- NEAR SITE ALREADY EXIST OF VEGETABLE MARKET

WEAKNESS

- SITE HAS VERY HOT CLIMATE.
- MIDDLE OF THE SITE HAS EXISTING DRAINAGE CANEL.
- RECENTLY, SITE IS USE FOR STORAGE OF HARDWARE MATERIAL.

THREAT

- THE MAIN THREAT IS HOT CLIMATE .
- NEED TO REPLACE VEGETABLE MARKET.

OPPORTUNITY

- SITE HAS CONTOUR LAND , OPPORTUNITY TO PLAY IN LEVELS.
- CHANCE OF REPLACEMENT OF VEGETABLE MARKET.
- CHANCE TO CREATE THE SOCIAL HUB FOR NARANGHAT PEOPLE.

2. PROGRAM FORMULATION

S.N.	PROGRAMS	UNIT	UNIT AREA(SQ.M)	PROPOSED AREA(SQ.M.)	REMARKS
1	ADMIN			546	
	Reception	1	14	14	
	Waiting hall/lobby	1	25	25	
	Account section	1	15	15	
	Archive	1	12	12	
	Staff Room	1	40	40	
	Executive room with pantry, library and attached toilet	1	98	98	
	Meeting room (35)	1	104	104	
	Production Manager with attached toilet	1	36	36	
	Sales Manager with attached toilet	1	36	36	
	Board Chairman with attached toilet	1	98	98	
	Pantry with small kitchen	1	32	32	
	Restroom	4	4	16	
	IT room	1	20	20	
2	AGRO MARKETING ZONE			3144	
	Production zone			1357	
	Lobby and reception	1	30	30	
	Waiting Space	1	30	30	
	Raw material storage	2	120	240	
	Selection of Product	1	80	80	
	Product Cleaning	1	100	100	
	Product Packaging and sealing	1	140	140	
	Labeling and Quality control	1	140	140	
	changing room	2	28	56	
	Storage	2	110	220	
	Loading Unloading area	1	150	150	
	canteen				
	Kitchen	1	42	42	
	Dining area	1	105	105	
	Toilet(4M+2F)	1	24	24	
	Wholesale Market			936	
	Lobby	1	80	80	
	Shops	1	555	555	
	Toilet	2	18	36	
	Food court	5	15	75	
	Eating space	1	190	190	
	Vegitable Farming			851	
	Storage(mechinery and fertilizer and seeds)	2	80	160	
	Research and testing Laboratories	2	40	80	
	Reception/lobby	1	32	32	
	Staff room	1	40	40	
	Pantry	1	25	25	

	Changing room(boys/girls)	2	28	56	
	Rest room	2	18	36	
	Manager Room	1	32	32	
	Meeting Room (20 Person)	1	40	40	
	Selection of Product	1	80	80	
	Product Cleaning	1	70	70	
	Product Packaging and sealing	1	100	100	
	Labeling and Quality control	1	100	100	
	Faring land/Demonstration farm/nursery				
3	AGRO TRAINING FACILITIES			408	
	Multipurpose hall			182	
	Hall	1	120	120	
	toilet(3m+3F)	2	18	32	
	store	1	30	30	
	Research Zone			226	
	Research Laboritories	3	30	90	
	Researchers room	1	24	24	
	Library with seating	1	72	72	
	Toilet(2M+2F)	2	8	16	
	Office space	1	24	24	
4	Miscellaneous			3662	
	Dormitory	1	200	200	
	service apartment	2	150	300	
	canteen	1	100	100	
	Guard house	2	18	36	
	Public toilet(1wc per 60 per)	2	18	36	
	OAT 1.55sqm/person for 1500	1	2250	2250	
	Green house		340	340	
	restaurant	2	200	400	
5	utilities			1250	
	services such as plant room /hvac unit etc		1250	1250	
	TOTAL			9010	(Variable)
	5% Wall infill			450.5	
	10% circulation			901	(Variable)
	5% contengency			450.5	(Variable)
	TOTAL BUILT UP AREA			**10812**	**(Variable)**
	Total site area			37524	
	Ground coverage			28.81%	

Table 20; Program formulation

Chapter 6

1. CONCEPT AND DESIGN DEVELOPEMENT

1.1 CONCEPTUAL FRAMEWORK/DESIGN INSPIRATION

Design inspiration can be taken from anywhere, From the previous Research of Agriculture and Market gives an idea of conceptual framework for Design development phase. The ideas are compared and tabulated below.

S.N	LITERATURE REVIEW	NATIONAL CASE STUDY	INTERNATIONAL CASE STUDY
1	Functionalism	Real time programs	Contemporary Needs of People
2	Attributes of place making	Material and structure ideas	Local Experience
3		Use and Purpose of space	Food Chain Process
4		Concentric Planning	Spatial Distribution and Linkage
5		Tradition and historic Value of Space	Sustainable Material
6		Attributes of place making	Functionalism,circulation, layout and scale
7			Contextualization of Design
8			Lighting and ventilation

From the previous casestudy and literature review gives the idea to design my AGRO MARKET HUB. AGRO MARKET HUB Typically the public oreinted space where people would come and buy their neccessary product from the market as well as this hubs help to increase the social engagement, Better communal relation within the society, relation between famers and Consumers , so it also help to economy of farmers.

‘CHOWK’- THE HUMANIZED FUNCTIONING OF SPACE

Basically chowks refers to a Traditional ***Public square*** *or* ***Marketplace*** *of eastern Society, in other word it means an intersection or a crossroads where several roads or streets meet. In some places, a chowk may also be a roundabout or a traffic circle.*

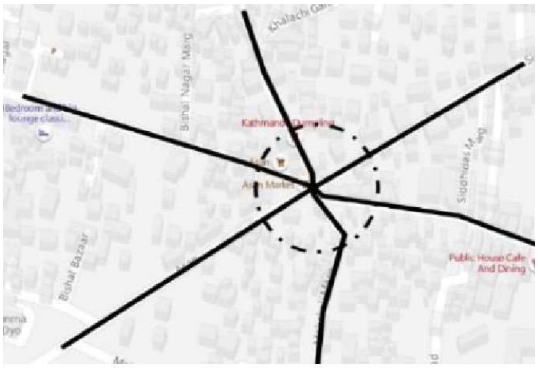
Central or connecting points in neighborhood that have a mix of residential, commercial, and institutional building. Shopping areas, community centers libraries and High-density settlement or simply says a Complete Marketplace. Chowks are often busy and bustling places, with vendors selling various goods and pedestrians going about their daily activities. They may also be important landmarks or meeting places in a city or town.

The Basic idea of the designing of this hubs is to develop as Marketplace and Public Plaza. So I took the concept where Chowks of traditional settlement on terai area whera all the social , comercial and rituals activity happens at that place.

Ideas are

- ***More Public orientated space, where people can hangout or enjoy their time within the space.***
- ***No Social boundary***
- ***Elimination of hierarchical Division of Space.***
- ***Stabilized Market Place.***
- ***Performing center***
- ***Concentric Point of the City/Street.***
- ***As a meeting point and landmark of the city.***

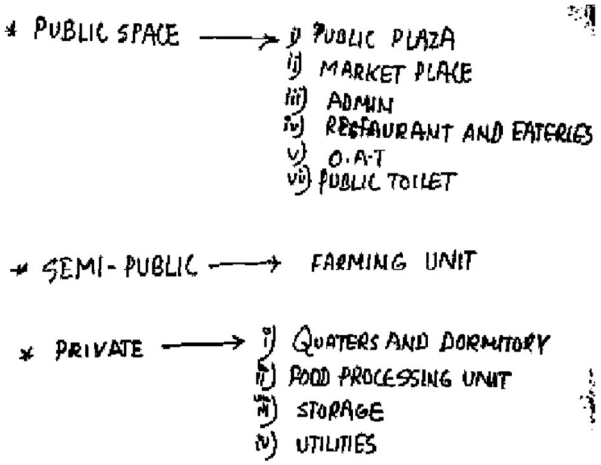
Figure 52 ,

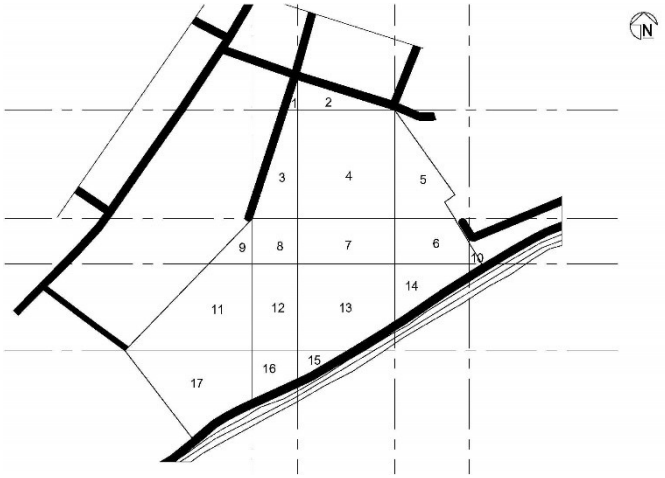


Pictures of Asan CHowk

1.2 ZONING

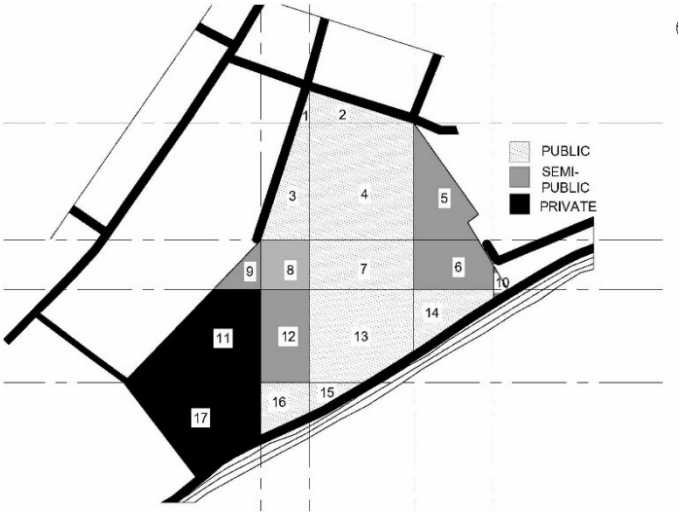
Zoning has been done as per surrounding context of the site and the inspiration/ ideas from research which gives more functional space for my project.



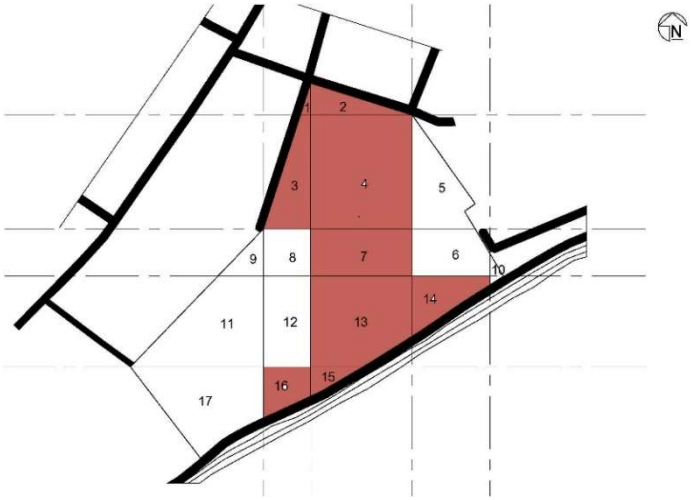


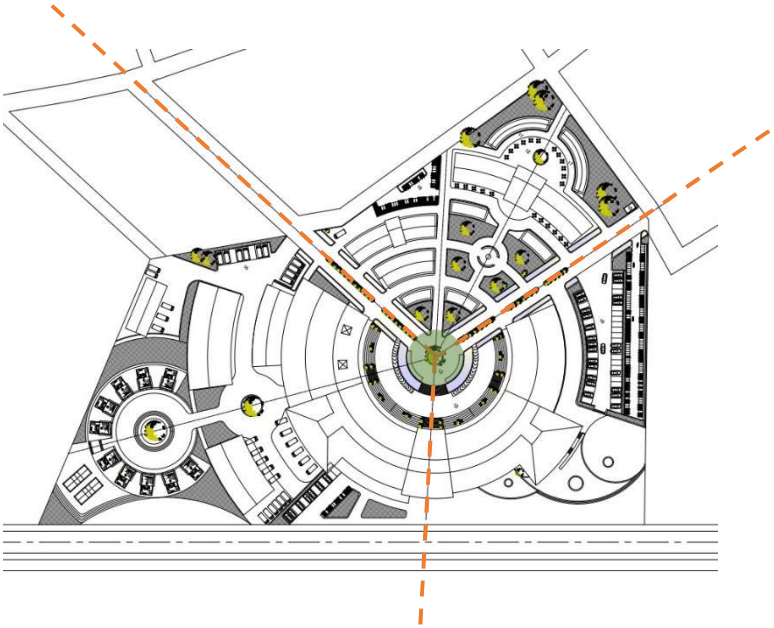
***ZONE 1**: At the first stage create a possible grid from the node point of access road to divide the site into different parts.*

***ZONE 2:** Divide Public, Semi-public and private spaces according to Access and linkage of the site*



***ZONE 3:** Separate the possible most vibrant space of the site.*

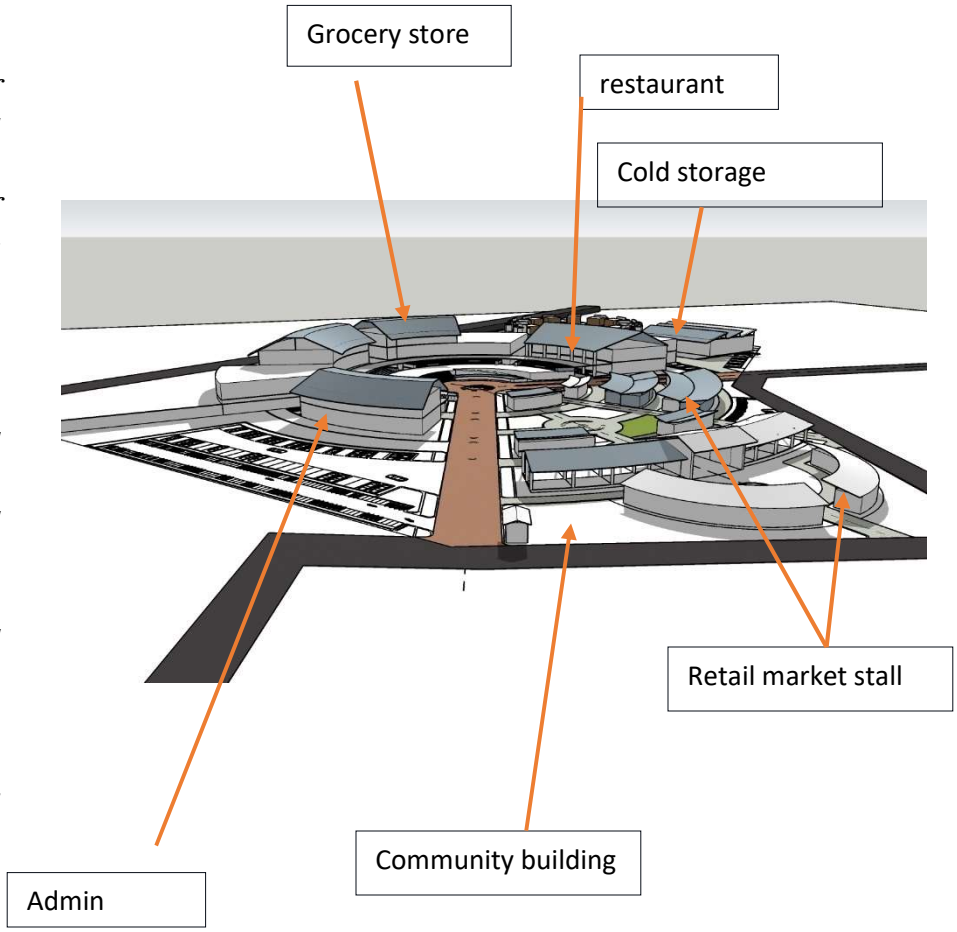




The initial idea was to connect the site with possible access road with the no boundary concept. Here 3 major axes are drawn from the access road and meeting point considered as the Node or chowk where all the spaces of the site will connect to this point. With the varying function as per the easy access and surrounding context.

The main central circular part is the main chowk, which is the main access for all the portion of building. Storage and service facilities are provided from the back of the complex so that it doesn't hamper the public flow. Front part of the site given as the community space as well meeting space for local community,

Variety of function found in this complex, which is different typological agro market, restaurant, cold storage, community building, corporate building, food plaza, as well as other amusement activity space.



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1.3 FUNCTIONAL ZONING

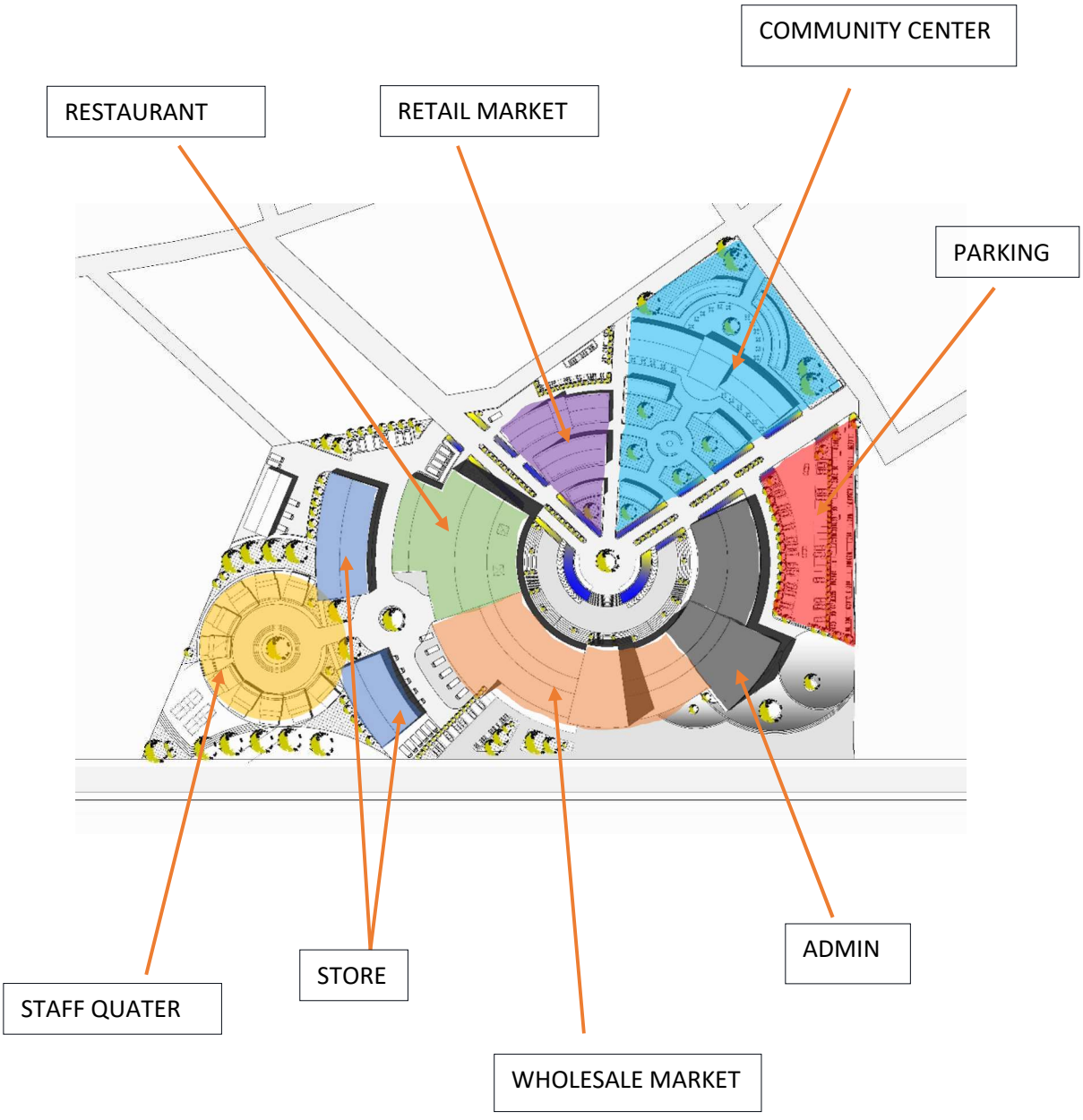

figure 53, functional zoning

1.4 CIRCULATION

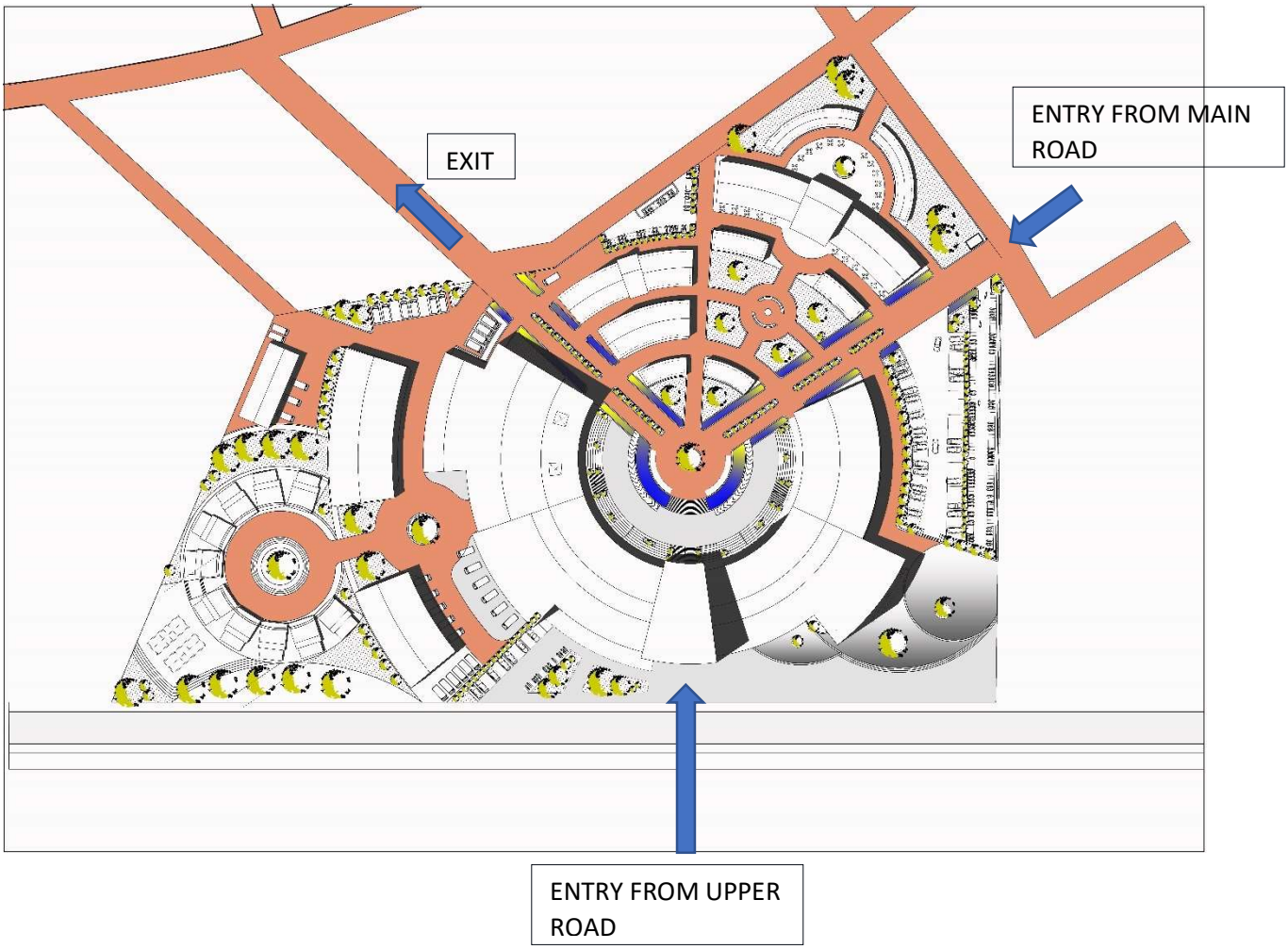

figure 54, Circulation shown in highlighted area.

The circulation was managed in a way that pedestrian public should come from possible access road of site. Whereas vehicular entry from east side of side and exit from the North-west Road. For the Retail and Community space People could access from Main Street Road. Different access Is provided for service and loading and unloading purpose. Wholesale market access in a circular path where it accesses from the parking area and make circular path and end at the exit area of the site. Which gives the proficient circulation For Wholesale market. As well as For the staff quarter Different access is provided.

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figure 55, View from Retail Area

figure 56, View of North-west roadside

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figure 57, View of Main Entrance to Wholesale market

figure 58, View of Central chowk

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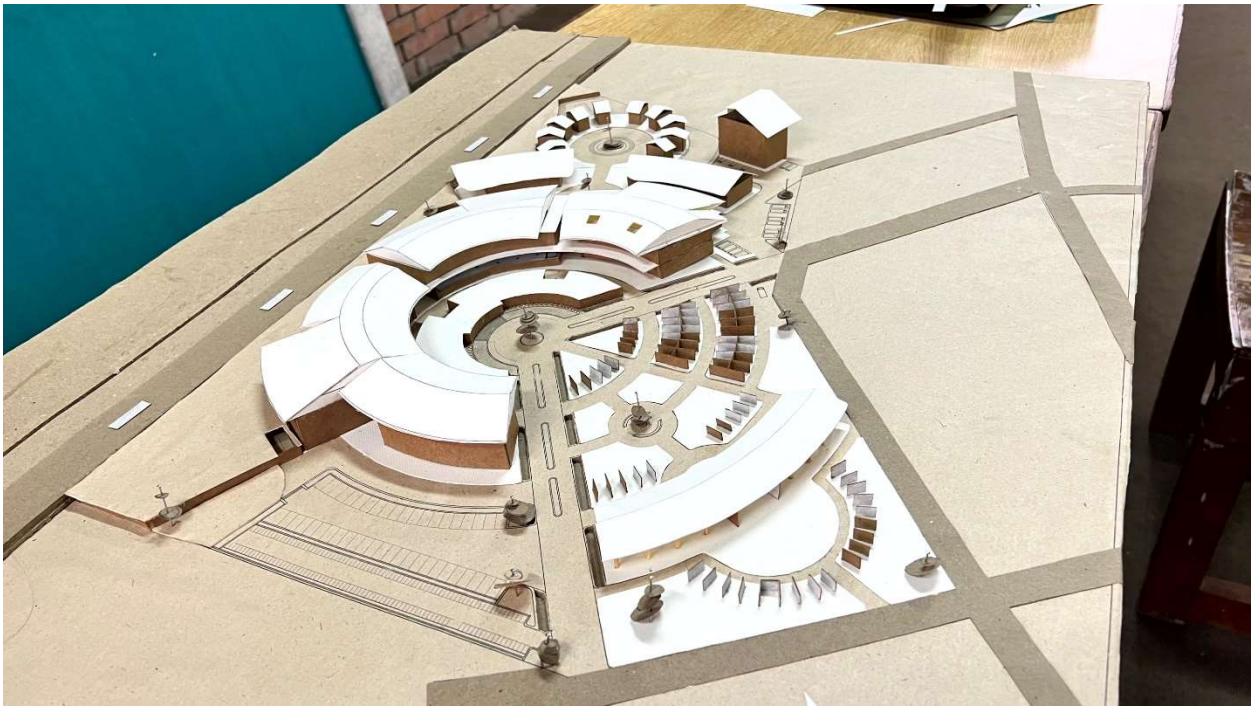

figure 59, Model East side view

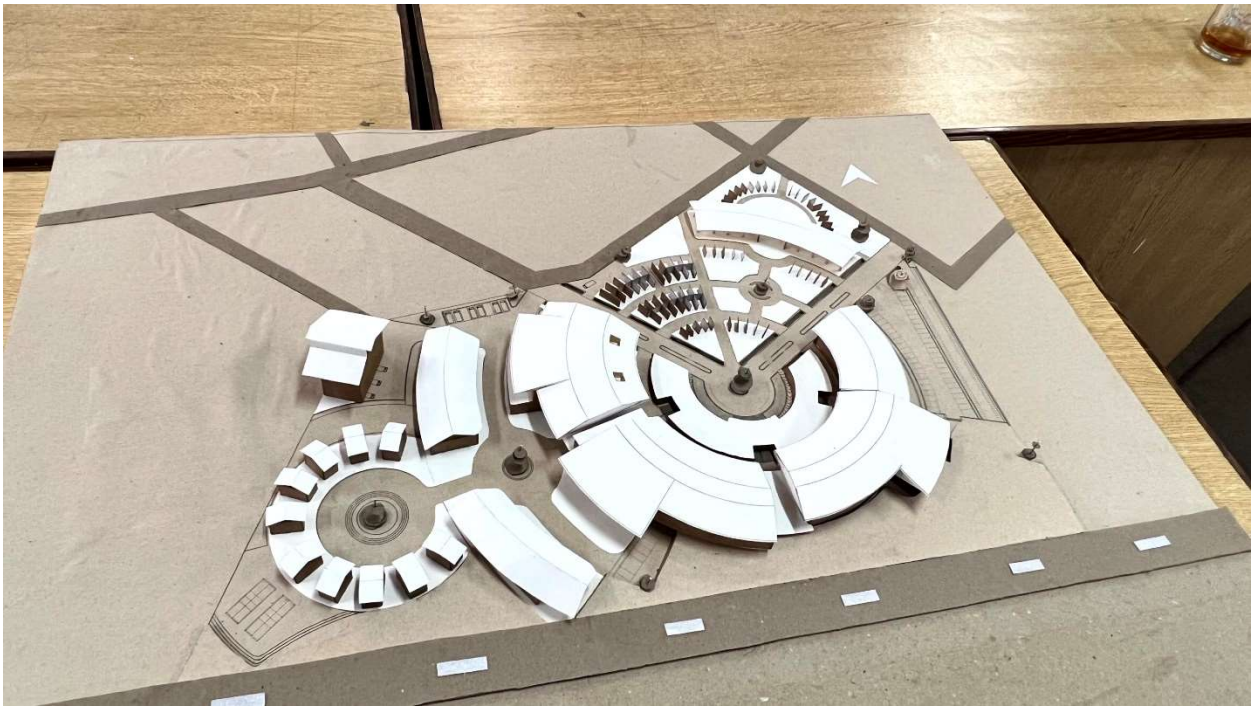

figure 60, Model south side view

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figure 61, Model Top view

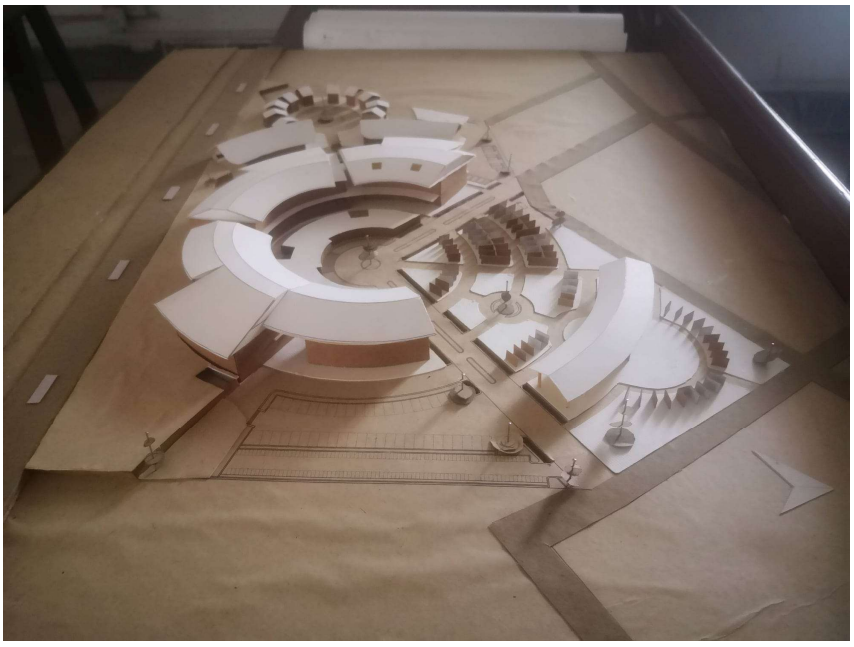


figure 62, Model Photo

1.5 STRUCTURE

In this project, the RCC frame is used in all building blocks. The sizes of structural element used are listed below:

- Column: 4500 mm diameter, ,600mm diameter
- Beam:
  Main Beam: 300x400mm, 230x 300mm
  Secondary beam: 230x300mm
- Slab :125mm
- The remaining details are in the annex attached.

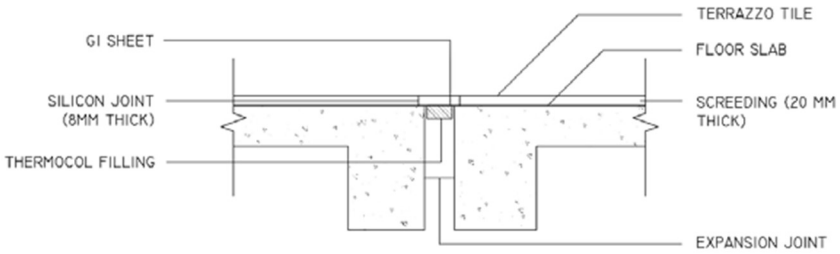


Figure 63 Expansion Joint details

The roads, pathways, parking, etc. used in the design are all paved with permeable materials. Permeable paving is a method of paving vehicles and pedestrian pathways that allows for infiltration of fluids. In pavement design the base is the top portion of the roadway that pedestrians or vehicles come into contact with. The media used for the base of permeable paving may be porous to allow for fluids to flow through it or nonporous media that are spaced so that fluid may flow in between the crack may be used. In addition to reducing surface runoff, permeable paving can trap suspended solids therefore filtering pollutants from stormwater.

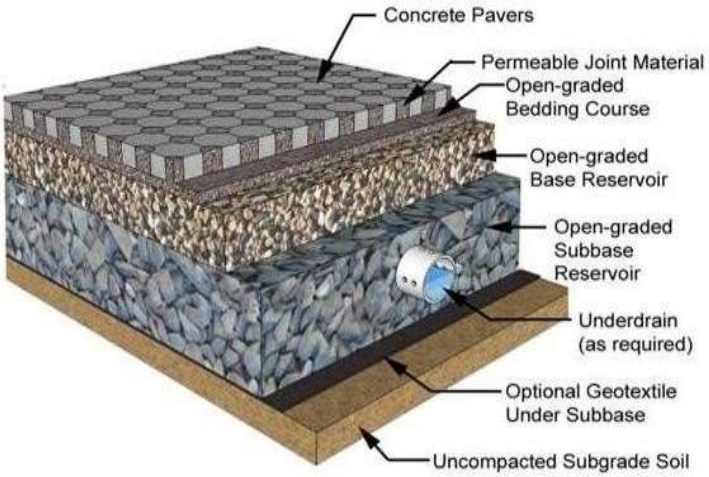


figure 64, floor pavement section

2. SERVICES

2.1 Water Supply

To supply water in the site, municipal water line is used as a main source and to avoid the discontinuity of supply of water, boring as the secondary source of water is used. The water obtained from boring is aerated and supplied to the underground water tank and then to the overhead water tank through pump. The overhead water tank will be used to distribute the water in all the building blocks. And a separate firefighting water tank is also provided which is attached to the underground water tank.

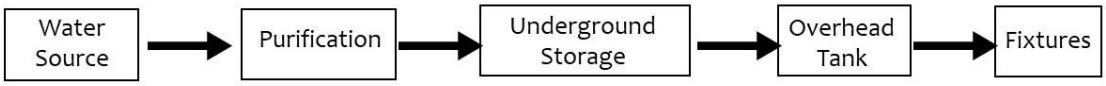


figure 65, Water supply

Calculation of water

DISCRIPTION	WATER REQUIRED
Basic requirement (assuming a medium demand of 4 liters per sq m of effective floor area for covered markets = floor area of 4506 sq m x 4	18024 liters
Cold storage requirement at 20 liters per ton = 105 tons x 20 liters per ton	2100 liters
Basic requirement	20124 liters
Add 50% Contingency	8670 liters
Estimated total water demand	28794 liters

Description	No. of people	Overhead lpd	Total	Remarks
Administration	40	45	1800	
Food court	40	50	2000	
Restaurant	125	45	5625	
Bank	15	45	675	
Quarters	20	45	900	
Market Demand			28794	
total			**39794 liters**	

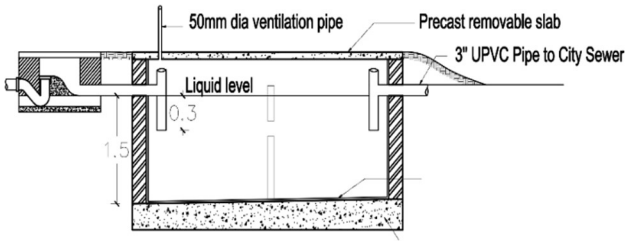
total water consumption per day = 39794 = 39 Cu.m approx.
Total Under water Tank size =117+50 = 167 cum.m (9x5.5mx3.5)
Size of water tank =39x3 = 117 cu.m
Firefighting Requirement (NBC) = 50 cu.m

2.2 Sewerage management

The site has access to the municipal drainage line, the soil water and wastewater will get collected at the septic tank and soak pit respectively and the overflow will have outlet to the municipal line.

Septic tank:

Quantity of wastewater = 75-80 % of water consumed (31835.2 liters/day)
detention period = 3days
toatal quantity of wastewater in 3 days = 95505.6 liters = 95.5 cu.m.
Volume of sludge = 125x0.03x3 = 11.25 = 37.75 (for 3 years)
Required Size of septic tank = 95.5+11.25 = 106.75 cu.m.
size of proposal septic tank is 8m x 4m x 3.5m



Soak pit:

Soil Infiltration(I)=60 l/hr/sq.m

Area=q/I = 326/60=130.73 sq.m

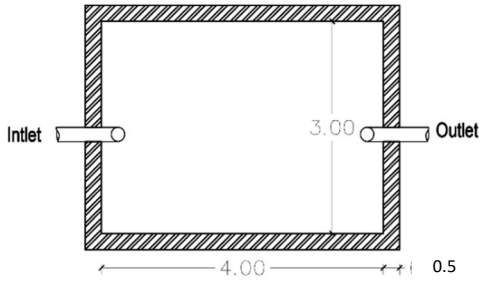
Now,

A=130.73 sq.m

Let,h=2.5m

Then,

d=15.64=16m



As 5m diameter is exceeded,the area has to be divided into 4 soak pits of diameter=16/4=4m and height =2.5m

3. Conclusions

Throughout this thesis report, we have delved into the architectural design considerations for Agro Market Hubs, recognizing their significance in revolutionizing the agricultural sector. The research conducted has examined various aspects of the Agro Market Hub architecture, including spatial planning, functional requirements, sustainability, and user experience. The findings underscore the critical role that architectural design plays in creating a conducive and efficient environment for Agro Market Hubs to thrive.

one of the key conclusions drawn from this research is that the architectural design of Agro Market Hubs should prioritize functionality and flexibility. By providing well-designed spaces that accommodate the diverse needs of farmers, traders, logistics providers, and other stakeholders, Agro Market Hubs can facilitate seamless operations and enhance productivity. The integration of modular and adaptable designs allows for future expansion, adjustments, and customization based on evolving market demands.

Furthermore, the study emphasizes the importance of sustainability in Agro Market Hub architecture. Incorporating environmentally friendly practices such as energy-efficient systems, renewable energy sources, water conservation measures, and green building materials can minimize the ecological footprint of these hubs. Additionally, the inclusion of green spaces, recreational areas, and amenities can enhance the overall well-being of users and promote a healthy working environment.

4. Recommendations

- **User-Centric Design:** Prioritize user needs and experiences in the architectural design process. Conduct thorough user research and engage stakeholders to understand their requirements, workflows, and preferences. This will help create user-friendly spaces that facilitate efficient operations and promote user satisfaction.
- **Spatial Planning:** Develop a well-organized spatial layout that allows for smooth movement and logical workflow within the Agro Market Hub. Ensure proper zoning of areas for activities such as trading, storage, processing, administration, and logistics. Incorporate clear signage, wayfinding systems, and intuitive circulation paths to guide users within the facility.
- **Infrastructure and Facilities:** Design infrastructure and facilities that align with the specific requirements of an Agro Market Hub. This includes provision for storage facilities with temperature and humidity control, processing units, quality control laboratories, cold storage, loading docks, and administrative spaces. Integrate appropriate technologies and equipment to support efficient operations.
- **Integration of Technology:** Embrace digitalization and integrate technology into the architectural design of Agro Market Hubs. Incorporate digital platforms, IoT (Internet of Things) devices, and data management systems to enable real-time monitoring, automation, and seamless connectivity among stakeholders. This will enhance operational efficiency, decision-making, and market linkages.
- **Sustainability and Resilience:** Integrate sustainable design principles and practices into the architecture of Agro Market Hubs. Incorporate energy-efficient systems, renewable energy sources, water conservation measures, and waste management systems. Implement strategies to mitigate climate risks and enhance the resilience of the facility against natural disasters.
- **Collaboration and Partnerships:** Foster collaboration between architects, urban planners, agricultural experts, and other relevant stakeholders to ensure a holistic and interdisciplinary approach to Agro Market Hub design. Collaborate with local communities, government agencies, and non-profit organizations to address social and economic considerations.

In conclusion, the architectural design of Agro Market Hubs plays a pivotal role in creating functional, sustainable, and user-centric spaces that facilitate the efficient functioning of agricultural value chains. By incorporating the recommended strategies, Agro Market Hubs can become vibrant centers of economic activity, promoting agricultural growth, and benefiting farmers, traders, and rural communities.

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ANNEX 1
(Design standard)

Market Furniture:

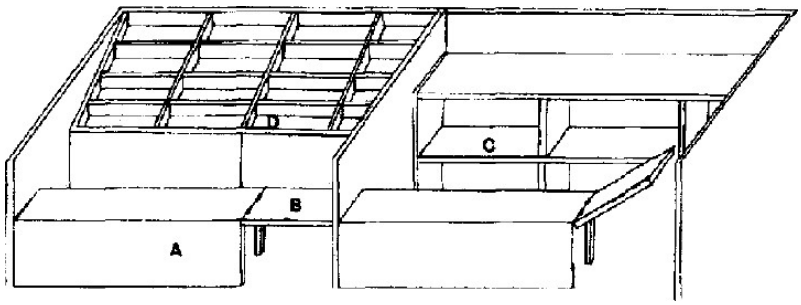


Figure 59: Typical fixed fruit and vegetable stall in a covered market

A. stall construction in blockwork, brickwork or timber (overall dimensions: frontage 1.5-1.8 meters; depth 1.5-2.5 meters).
B. counter flap to provide access to stall
C. shelves for display of vegetables
D. inclined display for fruits in crates

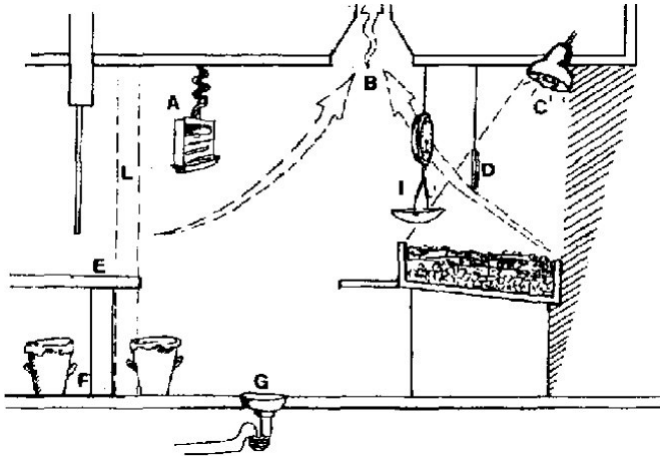


Figure 60: Cross-section through typical fish stall in a covered market.

A. insect trap
B. ventilation extract
C. display lighting, mounted sufficiently high to avoid produce damage
D. price board and promotion material
E. cutting table, possibly behind wall separating preparation and sales areas
G. drainage outlet in floor

H. weighing scales over display area

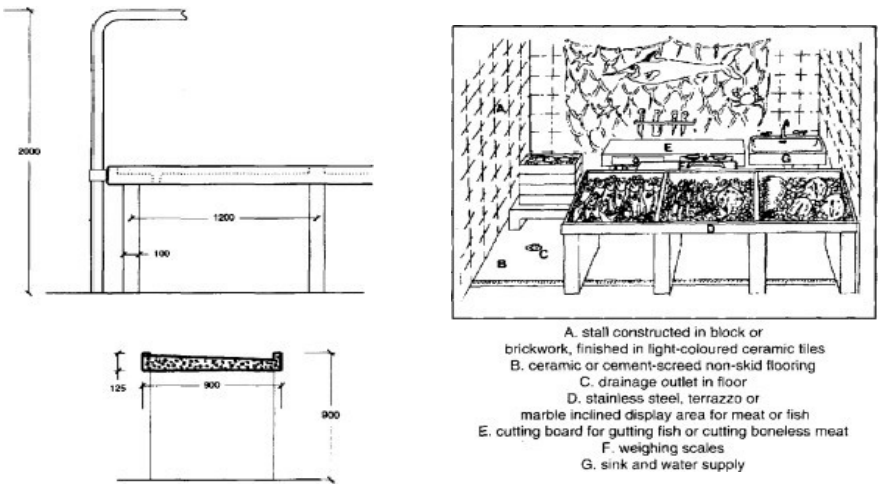


Figure 62: Typical fixed fishmonger's or butcher's stall

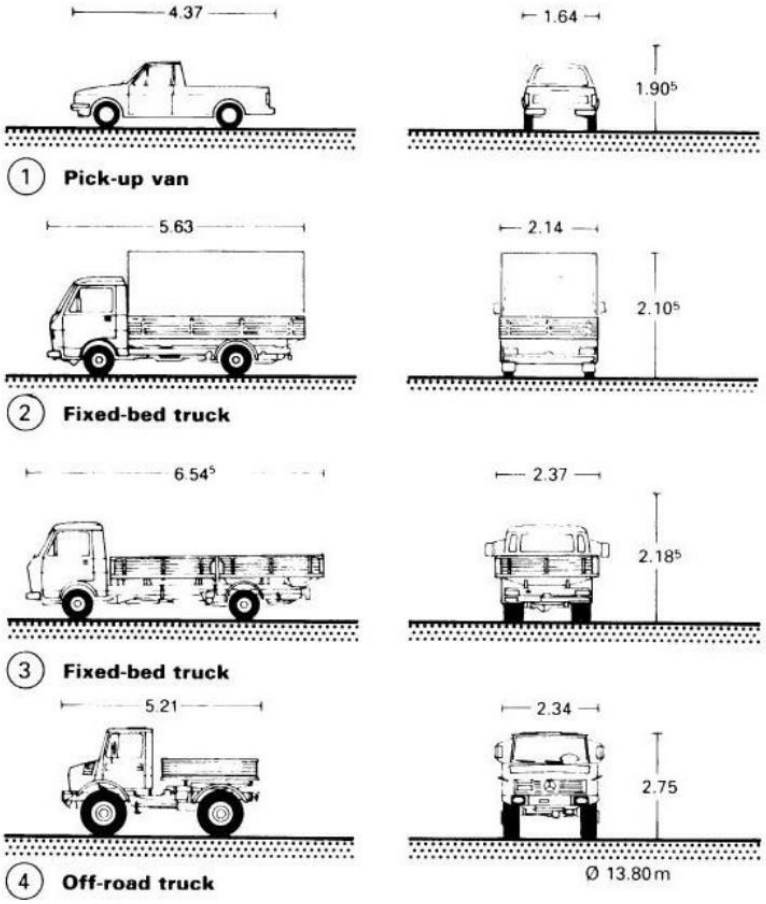


Figure 61: Farm vehicle standards

Restaurants and Food-courts

Rest and refreshment are requirement and necessity of people visiting community center. A good restaurant with adequate seating facility and good service attracts visitors. Surrounding of restaurant also plays important role in well-functioning of restaurant.

Design considerations for restaurant

- Exterior appearance should communicate clearly, with signs, lighting and menu
- displays.
- From outside, people should be able to view the interior seating, style and features.
- Variety of seating arrangement.
- Access for guest should not be confused with service entry.
- Minimum width of service aisle 0.9-1.35m.
- Cashier should be near to exit.
- Ambience can be created through decoration, lighting, creating smaller more
- intimate spaces, level differences, etc.
- Dining area per seat: 1.5-2.15m2.
- Kitchen area per seat: 0.4-0.6m2.
- Ratio of service area to total area: 1/4:1/2.
- Net kitchen area: 15-25%.
- Kitchen area is divided into dry and wash-up areas.
- Kitchen and wash-up are preferably at the same level as dining space.
- Good natural ventilation along with lighting of 215 lx (min.) in the kitchen.
- Other requirements include customer and staff toilets, office space, food storage
- including refrigerator and deep freeze, boiler room, etc.

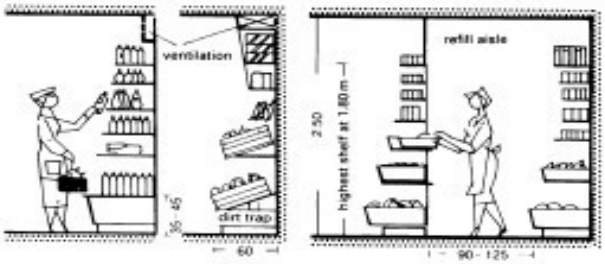
Design Considerations for food court

- Food-court consists of a seating area around which is grouped a number of kiosks
- selling different types of economical price foods.
- It must be in a prime location, fed off a main pedestrian flow with a positive, striking
- and identifying entrance.
- Location and kiosks size to be determined in relation to seating capacity.
- A reasonable number of kiosks is needed to provide adequate choice and variety,
- e.g., hot, cold, health related, ethnic, etc.
- A rough guide to areas may be to allow between 20-40m2 per kiosks and 1.2m2 per
- seat.
- Kiosks will be equipped by the management for the kiosk's operators, which
- include various catering equipment, including refrigerator, cooker, display
- counters, etc.
- Noisy or unsightly catering operations should be concealed from public view, but
- interesting activities should be visible and will promote sales.

Shelf units in shops → ① – ⑥ from which customers pick their own goods should be no higher than 1.8m and no lower than 0.3m above floor level.

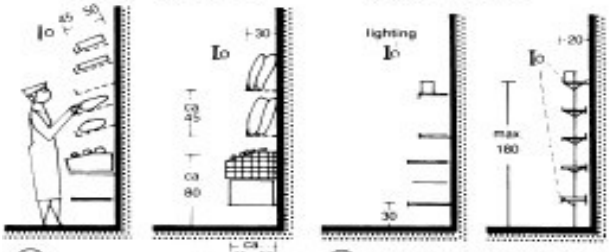
Attention must be paid to circulation routes in larger shops → ⑩ + ⑪. They should begin at the trolley/basket pick-up and end at the check-outs.

All shops require some provision for the handling of goods. These needs may vary from off-pavement deliveries for small units to the complex operations carried out by large retail businesses.



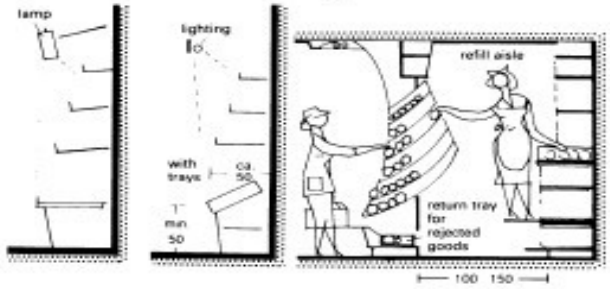
① Shelves for bottles — Shelves for fruit, vegetables and loose goods

② Partition allowing replacement of containers from refilling aisle



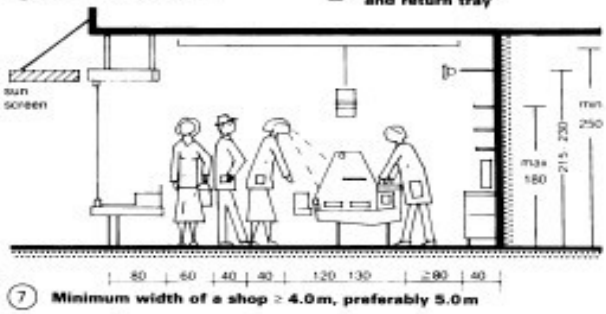
③ Bread display

④ Shelf display unit

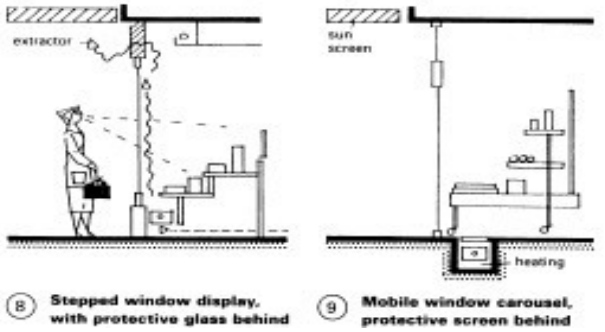


⑤ Self-service shelves

⑥ Shelf unit with refill aisle and return tray

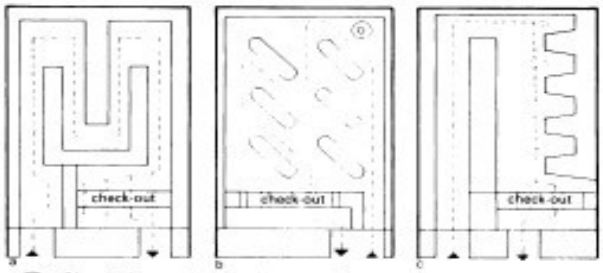


⑦ Minimum width of a shop ≥ 4.0m, preferably 5.0m

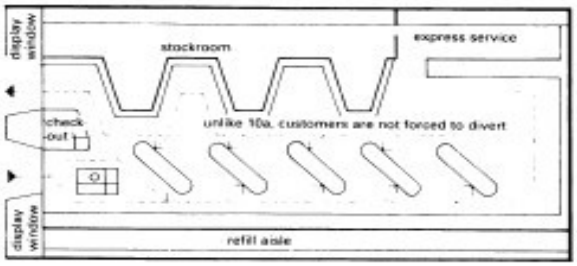


⑧ Stepped window display, with protective glass behind

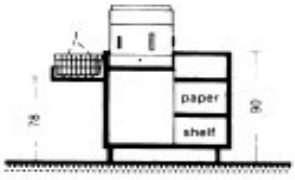
⑨ Mobile window carousel, protective screen behind



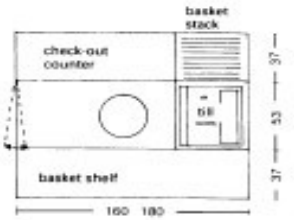
⑩ Circulation routes must account for corners (a and c, entrance and exit separate; b, together)



⑪ Good view of the whole shop from check-outs is essential for customer convenience and security



⑫ Section through small check-out position



⑬ Plan of a check-out position giving minimum dimensions

⑭ Section through counter in a self-service shop

SHOPS

The walls, floors, counter tops and work surfaces in fishmongers, game and poultry shops and butchers must be washable. Suitable materials therefore include marble, ceramic tiles, glass and plastics.

Fish perishes quickly and so must be kept chilled. It also smells strongly so fishmongers' shops should be surrounded by air-locks or air-curtains. Note that smoked fish, unlike fresh fish, must be stored in dry conditions and provision must be made for this. The possibility of large bulk deliveries should be taken into consideration. There may also be a need for an aquarium to attract the eye. → ① + ②

Game and poultry shops are sometimes part of fish shops and often stock only one day's supply of goods. They require a separate work room with facilities for plucking and scraping. As poultry absorbs smells, it must be stored separately both in the cold room and shop. Large refrigerated compartments and display cases are needed. → ③ + ④

Butchers' shops → ⑩ + ⑪ should preferably be on one level and have trucks on rails or castors to allow carcasses (which can weigh up to 200 kg) to be moved easily. Work rooms and cold rooms should be one and a half to two times the size of the shop.

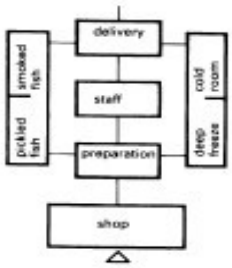
All fittings in cold stores must be adequately protected against corrosion, due to the high humidity level in these spaces.

The conflict in fishmongers' and butchers' shops between balancing the requirements of temperature for staff comfort (around 16°C) and the display of provisions (−2°C to 0°C), can be dealt with by using directional fan heaters, which blow warm air towards staff and away from food, radiant heaters placed high on the walls or under-floor heating.

In addition, adequate ventilation is required for the removal of smells.

Fruit and vegetables need to be kept cool but not refrigerated. Potatoes should be kept in dark rooms. Sales are mostly from delivery containers (baskets, crates, boxes etc.) and dirt traps and refuse collectors should provided below storage racks. → ⑦ + ⑧

In general, the planning and design of greengrocers' shops should consider the requirements for delivery and unpacking of goods, washing, preparing, weighing, wrapping, waste collection and disposal. Flower shops can be combined with fruit and vegetable shops.

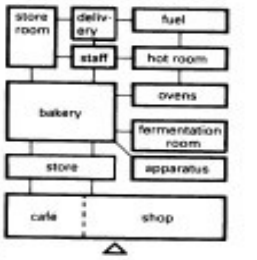


① Functional diagram for fishmonger's

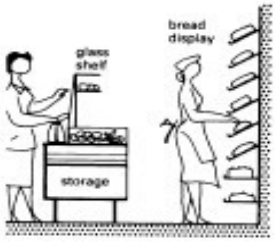
② Fish counter with cooling compartment and drain

③ Functional diagram for poultry and game shop

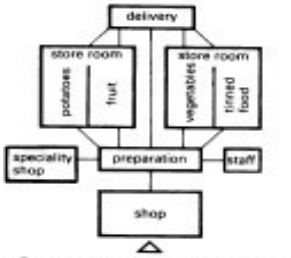
④ Solid counter with marble or tile facing



⑤ Functional diagram for a bakery: good ventilation needed, possibly dehumidify



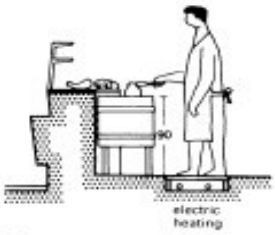
⑥ Sales counter with screen



⑦ Functional diagram for fruit and vegetable shop: little storage provision as most goods delivered daily

⑧ Counter with stands for boxes and baskets, drip pan and dirt trap

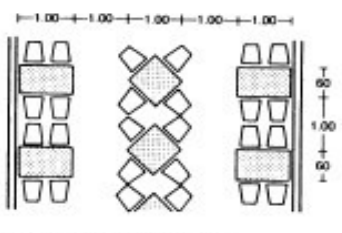
⑨ Pavement sales from trolleys or shop-front displays



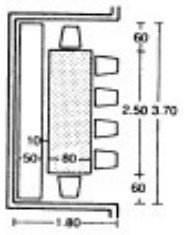
⑩ Butcher's counter with chopping block

⑪ Normal butcher's counter (also for fishmonger's → ②)

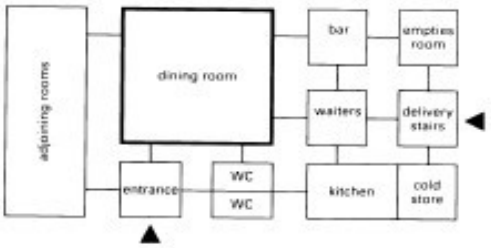
RESTAURANTS: ARRANGEMENTS



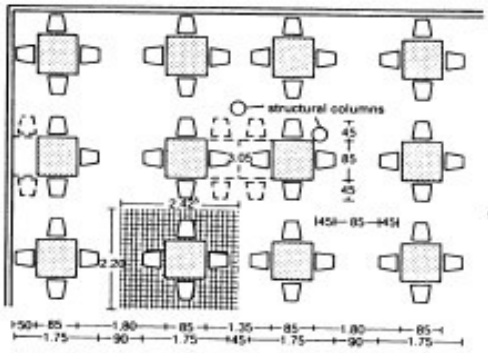
① Minimal seating layout



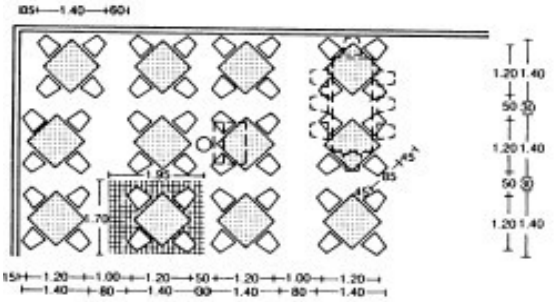
② Alcoves arrangement



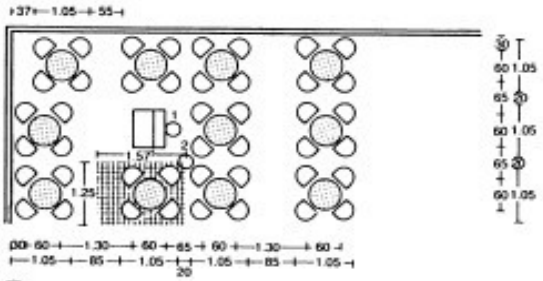
⑦ Functional layout for a small restaurant



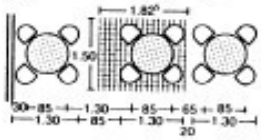
③ Parallel table arrangement



④ Diagonal table arrangement



⑤ Minimal table spacing



⑥ Café table arrangement

Before any restaurant or inn is built, the organisational sequence should be carefully planned. It is essential to establish what meals will be offered, and at what quality and quantity. It is necessary to decide whether it will be à-la-carte with fixed or changing daily menus, plate or table service, self-service or a mixed system. Before deciding on the layout, it is important to know the anticipated numbers and type of clientele and the customer mix. Bring in planning specialists in kitchen and cold store design, as well as in electrical, heating and ventilation systems and washing/toilet facilities.

The position of the site will suggest what type of inn or restaurant is likely to be suitable.

The main room of a restaurant is the customers' dining room, and the facilities should correspond with the type of operation. A number of additional tables and chairs should be available for flexible table groupings. If appropriate, provide special tables for regular customers.

Any function or conference rooms should have movable furniture to allow flexibility of use. A food bar may be installed for customers who are in a hurry. Large dining rooms can be divided into zones. The kitchen, storerooms, delivery points, toilets and other service areas should be grouped around the dining room, although toilets can be on another floor → ⑦.

Structural columns in a dining room are best in the middle of a group of tables or at the corner of a table → ③. The ceiling height of a dining room should relate to the floor area: ≤50 m², 2.50 m; >50 m², 2.75 m; >100 m², ≥3.00 m; above or below galleries, ≥2.50 m.

Guidelines for toilet requirements in inns or restaurants are shown in → ⑨.

dining floor area	walkway width
up to 100 m²	≥ 1.10 m
up to 250 m²	≥ 1.30 m
up to 500 m²	≥ 1.65 m
up to 1000 m²	≥ 1.80 m
over 1000 m²	≥ 2.10 m

⑧ Walkway widths

customer places	toilets men	toilets women	urinal bowls	urinals (m)
50	1	1	2	2
50–200	2	2	3	3
200–400	3	4	6	4
400	– determine in individual case –			

⑨ Toilet facilities

The minimum width of escape routes is 1.0 m per 150 people. General walkways should be at least 1.10 m → ⑧, with clearance heights ≥2.10 m. The window area should be ≥ 1/10 of the room area of the restaurant.

type	chair occupancy per meal	kitchen area required (m²/cover)	dining area required (m²/seat)
exclusive restaurant	1	0.7	1.8–2.0
restaurant with high seat turnover	2–3	0.5–0.6	1.4–1.6
normal restaurant	1.5	0.4–0.5	1.6–1.8
inn/ guesthouse	1	0.3–0.4	1.6–1.8
approx. 80% supplement is added for storage rooms, personnel rooms etc. cover = seat × no. of seat changeovers			

⑩ Floor area requirements

tables	seats	water service (m²/seat)	self-service (m²/seat)
square	4	1.25	1.25
rectangular	4	1.10	1.20
rectangular	6	1.05	1.10
rectangular	8	1.05	1.05

⑪ Total space requirements for dining rooms: 1.4–1.6 m²/place

main aisles	min 2.00 m wide
intermediate aisles	min 0.90 m wide
side aisles	min 1.20 m wide

⑫ Aisle widths

ANNEX 2

(Drawings)