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SMART INTEGRATED TOWNSHIP

Impact of Industrial revolution on Housing sector

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Abstract: There were series of industrialisation in the past centuries which led to new inventions in technology and manufacturing industry, construction and commuting facilities which lead the lives of people become easier. As it also lead to development and improvement of the housing typologies down the lane. This project involves the design of modern day housing community with all the improved technologies in a housing unit. A design which involves the community character, improved environmental quality with social connect. The project discusses about how a new age township can be foreseen with improved living conditions and smart integrated solutions. The connection between the public zone and private zone, to create a pedestrian friendly environment with a social connect. This is a 100 acre site with premium villas, row villas and apartment complex comprising of 1.5 BHK , 2.5BHK and 3BHK housing units. In this project, we will look forward to design a residential community in a 100 acre area experimenting with new concepts of smart designing strategies and automation concepts in order to create an interactive community.

Index Terms – industrialization, housing typologies, evolution, smart housing strategies, residential township.

I. INTRODUCTION

Industrialization has historically led to urbanization by creating economic growth and job opportunities that draw people to cities. Urbanization typically begins when a factory or multiple factories are established within a region, thus creating a high demand for a factory labour. Other businesses such as building manufacturers, retailers and service providers then follow the factories to meet the product demands of the workers. This creates even more jobs and demands for housing, thus establishing an urban area. In the modern era, manufacturing facilities like factories are often replaced by technology, industry, hubs. These technological hubs draw workers from other areas in the same way factories used to, contributing to urbanization. It is a process of change from an agrarian and handicraft economy to one dominated by industry and machine manufacturing. This process began in Britain in the 18th century and from there spread to other parts of the world. Building an inclusive, healthy, functional and productive cities is perhaps one of the greatest challenge facing humanity today, and there are no easy solutions. The key part of this challenge has to be focused on the urban areas and its public spaces. Public spaces such as parks, squares, plazas, green spaces and streets shows success in the level of quality and human interaction that takes place in it. In an urban setup, within a residential community, vehicles no longer rule the streets, the pedestrians are given more importance. Industrialization has historically led to urbanization by creating economic growth and job Opportunities that draw people to cities. The rate at which the cities are growing poses a pressure on architecture that is being produced. With most Indian cities aiming to get into the image of a globalized city, there is a need in creating more interactive spaces. The natural environment is put in a position to bear the consequences of the increase in urban population, which demands the need to create architecture in a healthier and responsible manner. At present scenario, the evolving urban population and work culture puts architects in a position to monitor the needs of an urban community. It is not possible to create a city with a healthy environment, socially and economically viable surroundings in a short span of time. Though it is possible to create residential communities in a small scale level with more interactive open spaces and healthier environment. The aim of this project design is to understand and explore the evolution of a residential community. With the impact of the industrial revolution from the mid-17th century until today on the housing sector, with the developing socio-economic scenario towards the future where internet of things is taking place to rule.

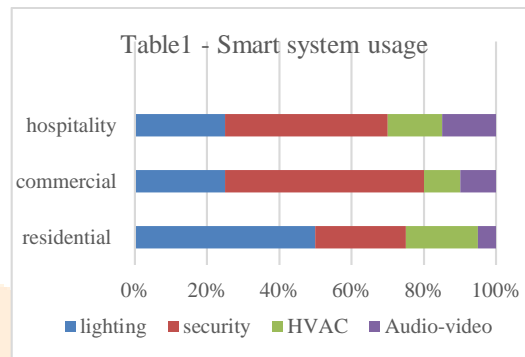
II. OBJECTIVES

The objectives of the project is to learn how the housing environment changes and the things it might adapt into getting into the evolution of housing today. The project aims to explore and understand the evolving housing trends in a modern day residential township. To learn about the various modern standards involved in a residential community in order to create a futuristic housing development. To understand the involvement of home automation systems in a residential unit and the difference that makes in a day to day life of people. This project main objective is to create a balance between the growing economy and natural environment which we ought not to forget in the process of evolution. This now leads to adapt the concepts of smart design strategies on community level to create and maintain an integrated community, which will also focus in creating a healthy environment for the

residents to be occupied. As for creating a healthy environment with all the luxuries might be a major point while designing a residential township.

III. DESCRIPTION

Home automation could have well been a part of science fiction many decades ago, but is a reality today. Home automation has its roots in smart home appliances which has over the years led to the development of integrated smart homes. Home automation today largely consists of four functional segments – Lighting, Security, Audio/Video and HVAC (Heating, Ventilating and Air Conditioning). Residential usage is the highest in the market and accounts for nearly 60% of the home automation industry. The design process explores in design concepts in modern day smart townships. Understanding the role of internet and modern day technologies in building a community will be a key role aspect. In order to understand the basic spatial provisions in a residential township, two case studies have been taken up; one international case study and one Indian case study: The Sustainable City, Dubai and Hiranandani parks, Oragadam, Chennai respectively.



The former case study on one hand helps in understanding the smart design strategies involved in a community level to create a well-organized and sustainable environment for the residents. The Master plan is developed to achieve socio-economic and environmental sustainability. This community uses solar energy as a major power generation source which almost covers 100% of the common area electricity supply. This renewable energy source helps to create a healthier and carbon free environment. The community has provided a car free residential zones to strengthen creating a carbon neutral environment. The residential communities are designed for pedestrian and kids friendly passages. Only electric vehicles are used within the residential zones. The operation and maintenance capital for the community and employees are raised from the rental income from the plaza which is constituted with various commercial outlets. There is a urban farming development within the community which runs the whole stretch of the site, which majorly supplies the essential vegetables and fruits for the residents. The urban farm and other common landscape areas uses the recycled grey water from the houses which strengthens the fact of sustainability even more with in the community.



Figure 1 -Master plan of the sustainable city, Dubai.

The latter case, Hiranandani parks, Oragadam, Chennai on the other hand helps in understanding the spatial analysis in residential township. The different spaces that are comprised in here are individual residential plots, residential high rise apartments and individual luxury villas. The high rise apartments constitutes of 2BHK, 2.5BHK and 3BHK that is ranging from an area of 1700 to 1900 square feet. The residential plotted developments range from area of 600 to 6000 square feet. The site plan constitutes of 70% of open spaces and 30% plot coverage. The project has a commercial and retail rental outlets of area ranging from 650 – 30,000 sq. ft.



Figure 2 -Master plan of Hiranandani parks, Oragadam, Chennai

The study on the master plan development with the case studies also include the study on the automation part in the community. The study on the networking systems, mesh networking systems and how it can be involved in a township plays a key role on the administration part of the community development in order to develop an integrated residential development. The residences are connected through networks and controller systems for monitoring and data collection process which in turn helps in creating a database. This also helps in giving immediate solutions on site level for futuristic records. The networking system also aids in providing SOS systems for the elderly residents in the community. The project that is to be designed has site chosen at the location Avadi along the Poonamallee – avadi high road. The site is 117 acre in area. The designed proposed is smart integrated township which will focus on the residential part of the township alone. With the development constituting of luxury residential villas, row villas and high rise apartment complexes. This residential development is all surrounded by series open green and socially viable neighborhood which is well connected with help of the smart automation and networking systems.

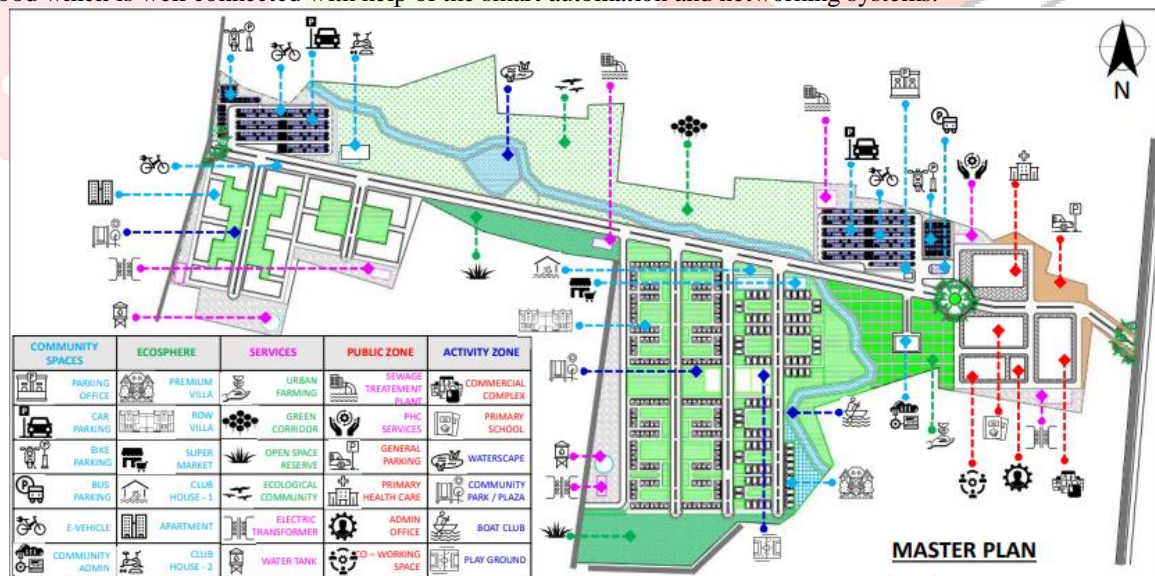


Figure 3 - Master Plan of the Smart integrated township, Avadi.

The entire site will be accessible by smart bikes and electric vehicles where the parking for conventional vehicle is placed separately away from the residential zones. This caters in maintaining a carbon neutral environment within the residential zones for cleaner air quality and healthier environment. The introduction of urban forest will help in maintaining the micro climatic conditions of the site. The urban organic farming caters to the essential fruits and vegetables for the residents in the community. Naturally present is stream of water canal running through the site contour which added on to development of a communal activities and socially viable township.

Table 2-Area classification

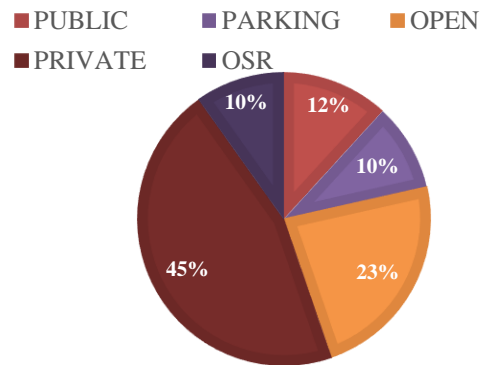
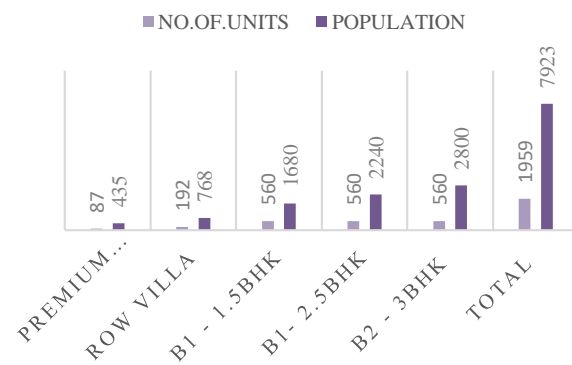
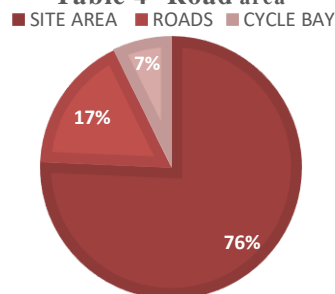


Table 3 -Population



The above charts show the area classification and the other shows the number of residential units with the anticipated population that the township going to cater to. The township has hierarchical road system with a main axial road of 20m width, sub arterial roads of 12m width with cycle passage on both sides added to it which connects to the residential zones, which has a road width of 7.5m. Every residential zone has a private green open space with community parks and kids play area.

Table 4 -Road area



GREEN AREA

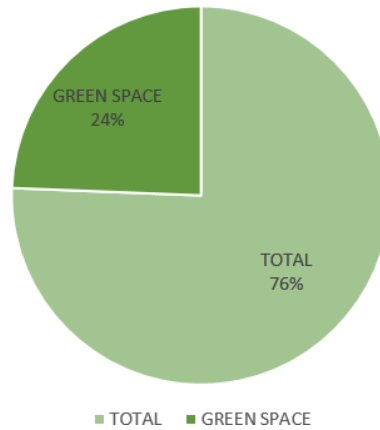
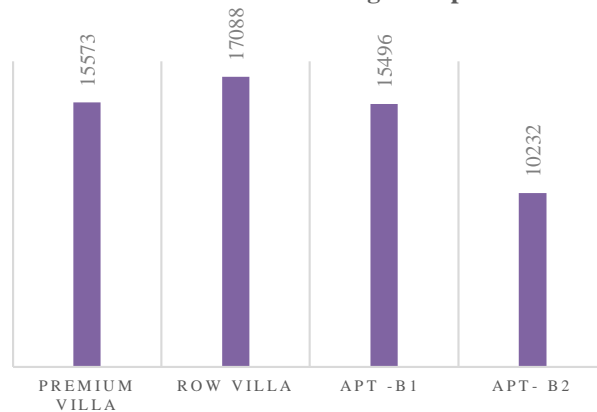


Table 4 -Housing footprint area



The above chart shows the housing footprint area within the residential township. Every residential zones comprises of green spaces in order to maintain relation between the open and built environment. On the sustainability part, the entire communities grey water is recycled within the site and used for landscapes also for the urban farming and urban forest. Every house has solar PV system for energy generation, where 80% of the electricity needed is produced within the site and used for common area purposes. The conventional car parking is also covered by solar PV panels in order to cater to the common electricity need of the site. The solid waste is managed within the site, wherein the grey water produced goes in irrigation of landscapes and the solid waste generated is used as manure for the urban forest. The runoff water that happens to drain in the water canal that runs through the site as of the topography of the site supports to it. As for the smart systems, every house is integrated with home automation system which is integrated with the community as well. The smart systems integrated helps in monitoring the electrical appliances of the house and their energy consumption. This plays major role in maintaining the energy efficiency of the housing unit.

IV. CONCLUSION

The project focuses on the major outcomes that the current industrial revolution is influencing on the housing sector, with the housing evolution that has happened in the series of revolution that has happened along the past years. Now that the internet of things is making major move into the housing communities in terms of automation systems and smart technologies, the human kind and the artificial intelligence comes hand in hand which develops a well-integrated and smart environment for the people to inhabit. This major outcome of this era leads in a making a community smarter, where the focus also need to be dealt on the environmental part, to majorly create a smart and sustainable environment. This will in turn create a balance between the growing world with new technologies and our native green environment that must be preserved for the future to come. The smart solutions that has been incorporated helps in monitoring, administering, creating database and finding solutions as a futuristic approach. It plays a major role in energy management and data management, for making work to be well documented without any human intervention. The project concludes that future of township will be with the smart solutions with well-connected spatial planning and strategical sustainable approach in order to create an integrated community. Also focus on the environmental aspects of giving more greener, cleaner and carbon neutral healthier environment will play a key role in development of residential zones. With the increase in major industries and technologies, creating micro climatic conditions within our select communities will be another major outcome of this era in housing development.

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