

WIND CAPTORS AS POWER PLANT, TOBOGGAN TUBES AS ESCAPING FACILITIES AND INTELLIGENT TENSEGRITY FOR BUILDINGS IN FUTURISTIC MEGA CITIES

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ABSTRACT

Global Village is on its way close to materialization via cybernetics, robotics, internet communications. The fantastic transformed shapes of the world are among the astonishing configurations due to the new technologies already available like: bio, nanotechnologies and IT, applying G.P.S, G.I.S, and robotics for hard and tedious labors without waste, casualties and side effects but much more prompt and accurately executive. It is evident that, in this aim, efficiency measures and considerations of sustainable environment are prerequisites to globalization.

1. INTRODUCTION

The augmentative world population is increasing progressively, due to advancement of biological health sciences. At the same time, industries producing mass consumption goods, due in great part, to the Bessemer blast-furnace in the mid nineteen century, had brought relative welfare comfort to mankind on the Planet.

Therefore, as production of mass consumption increases materials, rivalries between producers augment to achieve better quantity and quality as fast as possible. As such, the interconnection between transactions requires simple and short links to accomplish tasks.

From the beginning, high-rise buildings were thought of as the most efficient way to better manage transactions since they contained all services and avoided scattered activities. Each tower resembled a city with more than one hundred thousand residents (New York: Manhattan) where, slowly but invincibly high-rise buildings grew up on the land like mushrooms, spontaneously but without a master-plan thought of convenience. It was rather as old primitive village inappropriately planned for today's public services, making much troubles carrying out functions.

The reception of these concepts in developing countries appears to be similar, with the belief that population density will lead to reductions in travel distances and to the efficient improvement in vehicle emissions,

public transport, waste disposal, healthcare and education, and will augment synergetic efficiency.

Accordingly, new-towns had better to be of high rised type with a convenient design of infrastructures in which all functions, as well as physical comfort is optimized accurately under a multi disciplinary process named: Economy Efficiency Effectiveness (3E).

2. TENDENCES FOR SYNERGIC CITIES

There is a long way to proceed, between “acceptability” and “exploitation” relative to “adaptability”. In that, when a rural comes into a town, he is affraid from the intensity of activities, rather prefering the happy and slow pace of life back in his village. But if he holds up and endures time-lag period, after submission of “acceptability”, he could never go back home, feeling his time is waste and trifling. That was the main reason for the huge rush of exodus after the industrialization era. Of course, a very slow rate of backward exodus from towns to rural also exists, but in this case all equipments of convenience are fully available. The resulting scattered infrastructures, resources and activities lead to waste of energies and spaces like in Anglo-Saxon new-town planning with high percentage of dispersing single dwellings. Beyond demagogies, it seems to be convenient for the economy of a country and more for the World-Trade challenge, to have less than five percent of its population active in industrialized agricultural regions, while generating higher efficiency and more products.

Therefore, if in the middle of 20th century, mankind did not accept this new life-style, living in a “megastructuristic” city, advocated by the Age of Masters of architecture, it may now be the “right time” for a challenge and for a giant mutation of “trend” in our new aspects of environment throughout the Planet.

As the notable architect Le Corbusier felt it at first, megastructures represent a convenient solution for comprehensive futuristic cities in which, mega cities are the symbols of compact, organic and integrated functions with all necessary equipments closely available and functioning. A self sufficient mega city, could be compared with an integrated electronic circuit “chip” in which, activities are executed as fast as in an up-dated comupter with a very high frequency capability. A mega city is not only a mass scale shelter form which includes a mega-form discrete, and rapidly-changing functional units, which fits within the larger framework, but a serviceable structure constructed of modular units, capable of great or even unlimited extension. The aforementioned framework is a megastrutural unit, into which smaller structural units (like rooms, houses or small buildings of other sorts), can be built or even plugged-in or still, clipped-on after having been prefabricated elsewhere as car fabrics. May be one day, the 22nd century man will assist to see a megastructure simply covering the entire surface of the Globe rather like Dinausors, leaping over the forests, hills, oceans or even old towns which, have still kept their attenuated economy efficiency, with much nostalgic, in contrast with mega cities aspects, as we enjoy today to visit as tourists, the old typical villages. Old villages could be used as refuges for retired people where they could enjoy themselves

practicing artistic, scientific or free activities far from daily urban engagements.

High-rise building concepts, could be bearing walls or structural columns mounted as integral dwelling units, just plugged-in or clipped-on, each one suspended on rails as multi Eiffel Tower elevators. This precaution allows the easy mobility for regular maintenance.

3. CLIMATE AND WIND EFFECTS

Wind effects on mega cities are one of the growing problems on and around urban structures, due to high degree of exposure. At roof level, it is common for wind speed to be more than double that experienced at ground level. To create wind flow in a town and specially in a mega city, we have to ordain mass of buildings so that seasonal appropriated dominant winds, cross throughout them so as to augment speed on the top but avoid whirlwinds on the ground. Therefore, adjustable fins on the buildings and convenient airships in different parts of towns, could be studied and planned for through an intelligent and tactful strategy.

A further justification is the ecological one: designing for city climate results in reduction of overall energy consumption of the buildings through the use of passive devices as consumption water or FOGTEC reservoirs against fire or wind captor turbines as power generators installed on megastructures of city heights [Fig. 1]. Application of the said fins or airships when required during appropriate seasons, like a splendid frigate in stagnation over the city, rather moving with the wind, controls and directs the flow of air to revitalize the atmosphere and to create a real micro climate inside a city: sweeping pollutions and evaporating the humidity which in turn lowers the temperature and sometimes, can avoid atmospheric inversions. These measures lead to operational cost savings, which translate to minimize the use of energies, especially pollutant fossil fuel. Every kilowatthour of energy conserved in a building constitutes a reduction in negative environmental impacts on the biosphere arising from extraction, production, distribution and utilization of that Kwh unit of energy, hence contributing to a more sustainable development on the Planet.

Before starting to design cities and more, mega cities in a future near, which necessitates more efficiency controls, a multi disciplinary teamwork must be formed: technical, social, economical, legal criteria. Budgetary constraints, due to return on investments, are the most important factors to carry out well successful buildings, new towns and especially here, mega cities designs.

If today, Manhattan-District seems like a wonderful object as a postal-card, surely it could not respond to its updated functions, especially because it had not been planned at first for mega city, and it grew up spontaneously tower by tower, during past times. Some suggestions can be beneficial for Manhattan: several floor plans near to ground cutting low levels of the towers in different heights, can give services, separating different activities as motor traffics and tertiary sectors leaving all road spaces to the pedestrians.

4. URBAN FRAMEWORK

Megastructure allows spatial guided and computerized planning which means that better precautions are required to build mega cities from top-down or higher levels to lower levels, leaving the ground levels free, until fitting later more and necessary but adequate urban services, without usual disturbances. Calculations show that only 30 million square meters of land on the Planet are habitable. It is possible to densify habitation population up to 3.5 times that of the current situation through design and construction of urban spatial infrastructures. In other words, 35,000 people may be reintegrated in one square kilometer. Thus, world population, up to one thousand billion people, may comfortably be placed on the Planet.

4.1 Tensegrity and intelligent skeleton

Tensegrity is a self-stressed system in which only compression and tension member co-exist to form free-standing structures requiring minimum anchorage and weight, compared with conventional types of structures. Double layer tensegrity systems are relatively short, making the network quite rigid and compact. This new concept of tensegrity relies on using a suspension of discontinuous compression, which effectively acts as a stiffening system in continuous tension system practiced by Buckminster Fuller. Tensegrity is part of many natural processes and is present even in our own human body as noticed by Levin in his address to the North American Academy of Manipulative Medicine. The literature about tensegrity is numerous and new. But, what we can emphasize now, is that, intelligent muscles and ligaments throughout biological process including nanotechnologies and informatics (IT) can, in a near future, shape the bodies of buildings like human skeletons seconded by A.V.S (Active Variable Stiffness), and confine all buildings in a city, through a spatial cross-networked megastructure utilized [Fig.1]. Furthermore, such confinement actually performs as crossing toboggan tubes for escaping or even as oblique ways and elevators joining together tall buildings in different directions.

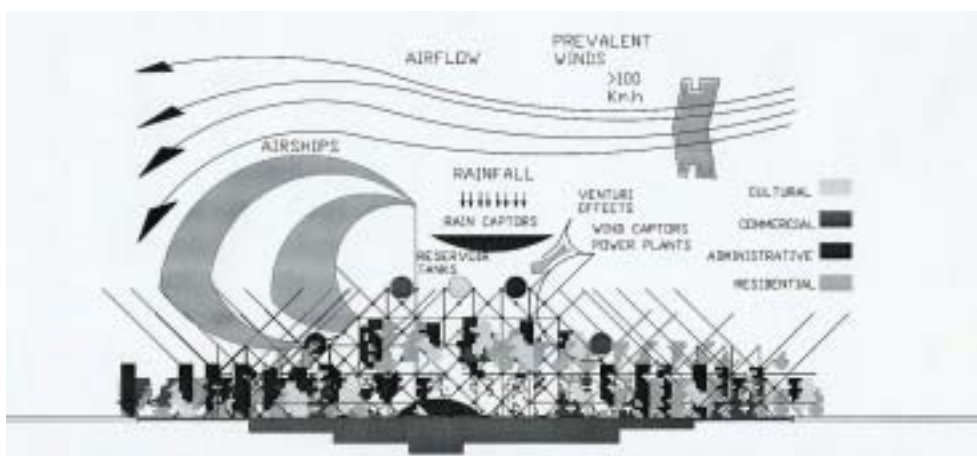


Figure 1: MEGA CITY (Rain and Wind Captors). Top-Down Solution

5. NEW TECHNOLOGIES IN BUILDING CONSTRUCTIONS

Nowadays, in the era of information technology and modern science, e.g. Nanotechnology, Biotechnology, Robotics, and automation based on cybernetics and GPS systems, construction industry is able to use these technologies in development. Construction projects such as massive dams, roads, tunnels and especially new industrial cities with emphasis on tall buildings must observe this subject. Definitely, it can be given credence that the erection of such magnificent constructions merits the 21st century of human nobility. This thought will lay the groundwork of a modern epoch that will advance the world with a wonderful transition in dimensions faster than what mechanical industries have put into operation during the last century.

Now we will have a quick look at some of these new technologies:

5.1 Nanotechnology (10^{-9})

Nanotechnology is a technique that in contrary to the past methods, instead of proceeding from whole to particle as extracting raw materials from mines which would result in the immense destruction of natural resources and threat to the environment, will proceed from particle to part (from Atom to Molecule) and from part to whole (from molecule to the substances) without any waste and pollution.

There are no casualties or loss in this production process. On the other hand, through this technology, new physical, chemical, and biological properties in proportion with the user's requirements can be invented. Thus it will provide the possibility to produce substances and materials at the best economical level, concerning volume, weight, thermal-acoustic, fire resistance etc... and reduce the weight of building and its foundation to the least possible extent.

In this small scale, it is possible in high voltage, by means of plasma, to decrease dimensions in such a way to produce Nanocarbon pipe system, quantum points, thin films, and structures based on artificial molecules of DNA and laser. The free convergence of solar energy is one of the most important means for solving the severe energy problems, particularly in construction industry. The role of solar energy would now be dominant when we remember that it is a good way to prevent development of hazardous pollutants e.g. CO₂ and CH₄, resulting a more useful way towards worldwide sustainable development. In this relation, utilization of Domotic Programs that can intelligently play a role in construction of expensive buildings is recommended.

On the other hand, Nanometric technology has some applications in structural engineering strength. In production of nanotubes, new composites and fibers weighing 1/6 of steel with a tensile strength of 100 times more than steels. Such nanometric products can be used in recycling of materials, based on self-developed, self-repairing computers. The recycled materials are liable to be traced by the bar codes (traceability) after they are once used, and they can go back to production and utilization process again. It is worth mentioning in production of very sensitive and small filters with dimensions finer than micro microbes, the nanotechnology can also be used. For

instance, to prevent dangerous diseases like Legionella Pneumophobia, which is very prevalent in tower blocks, this technology may be used.

5.2 Robotics

One of the modern technology development fields in construction industry is using Robotics. The large computer workshops named as ABCS (Automated Building Construction System) using automation labor robots bring about speed, accuracy and economical profits particularly in tall buildings. In this system, a skilled specialist builds up a tall building from base to top in a short time with the help of a remote control instrument and watching the operations through the screen.

In this method, different components of building such as foundations, pillars, walls, ceilings and other component parts like prefabricated kitchens, stairs, elevators, and bathrooms can be shortly installed. Further details of this kind of construction have appeared in many references and need not be mentioned in this discussion. As it can be seen, a lifting frame has surrounded the building and sets up the prefabricated parts in the prearranged places.

5.3 GPS System in security

Nowadays, the traditional methods of collecting, processing, saving, and displaying data are very costly and time consuming. This is why modern technologies should be used in mass production of buildings and cities. GPS system is considered as a basic solution for making a proper environment for management, programming, building localization, proper use of estates and data analysis. In this system after determining the position of the main points, the base of substructures (Landmark, Benchmark) the other points' coordinates can be precisely found and be applied in different procedures of building construction. Through these coordinates and according to a software program, the labor robots will enter the operation and will finish the building construction accurately, swiftly and without any casualties, and losses.

We should believe that construction of tall buildings and tower blocks, is one of the unique particularities of the 21st century, making a suitable building for the new era, where the world will go forward much faster than the industrial revolution since 18th century. In the new era, urbanization and planning are growing along with the development of tall buildings, resulting nearly in the Global Village. Therefore, it is the governor's responsibility to minimize the undesirable conditions of the 20th century by proper planning. It is worth mentioning that no more than 10 countries follow an appropriate and systematic planning to be standardized, and reminding that the environment is at the risk of destruction and devastation. At the threshold of fast industrialization of many countries, we remind here that more than 200 countries are involved in this Standardization Process, which may lead to more devastation of the environment in a way that living in many parts of the world would become impossible, the fact that the Kyoto Protocol is a witness towards it.

5.3.1 Execution & construction process

It is very important to have a tool to be able to control data and statistics relating to physical progress of projects. By using geographic information system (G.I.S) within the execution process, it is possible to prepare tables, plans, and statistical charts and provide comprehensive reports by which to control experts and project managers. In controlling development, particularly urban development operations such as road and bridge construction, excavation of tunnels with much accuracy, agricultural operations to identify appropriate soil and other executive operations for performing the related plan, it is possible to use computer for macro financial saving in economic productivity of the society.

5.3.2 Operation & maintenance

All affairs relating to municipalities and registration departments in connection with limitation and division of lands, land use variations, separation and issuing housing density license in different regions of a city, are controlled on the basis of this system.

A major part of activities of a city municipality is concerned with maintenance of urban installations such as repair or replace of water and natural gas pipes, electrical cables, excavation in different regions, integration of underground installations, establishment of important urban services centers, urban traffic, garbage disposal stations, and some other affairs are considered as urban activities.

Quantity of materials for execution, establishment, reconstruction, repair and renovation of different parts of a city during operation should also be estimated with regard to growth of urban population.

Furthermore, by using G.P.S. system, it is possible to improve current activities of a city, for example in commercial activities, providing necessary security by tracing the shipments with the Intelligent Vehicle Highway System (IVHS).

Control of robots in ports for leading the goods to warehouses (Rotterdam Port in Holland).

Decrease of urban traffic and environment pollution and saving fuel consumption by presenting the best ways to drivers.

Rendering appropriate services to disabled, to blinds or those suffering from respiratory problems or to other residents who need such information.

6. CONCLUSION

Conventional technologies with tedious human labor and its worldwide pollution and environmental destruction, should be banned or at least prohibited. Global Village is already en route towards cybernetics, applying new available technologies like: bio or nano-technology or, generally, Information Technology such as G.P.S, G.I.S and robotics without any waste, casualties and side effects, but much more prompt and accurately capable to carry out specific tasks for sustainable development.

Man knew iron since several thousand years ago, but only in nineteenth century, Bessemer with his blast-furnace, produced these metals

in mass quantity. It was a Top to Bottom process or from Total to Parts with tremendous loss of materials of mines and ravages that count for today's many environmental problems. Nowadays, it is possible to produce materials using methods never applied before. Instead of proceeding from Total to Parts or from whole to particle as extracting raw materials from mines, leading to immense destruction of natural resources and threat to the environment, it proceeds from Particle to Part with a trend of Virtual to Reality, at the level of atoms and molecules, in which case casting is completed by computerized software and can also construct and repair itself.

Therefore, in order to modify the present conditions, necessary measures should be taken to avoid in the near future, an indubitable Apocalypse in our misused Land.

Nowadays, in the era of information technology and modern industrial and scientific innovations, it is quite possible to fulfill the great ideas of the 21st century man thrilled to live and work in a peaceful environment. It is possible to proceed towards new scientific and cultural developments, while trying to protect the global environment and meet the targets of sustainable development.

Special care must be taken on a free, spontaneous, flexible and organic development of volumetric urban spaces as residential, tertial, commercial and cultural functions. A calculated megastructure and computerized proper urban infrastructures might be better, to fallow a top to the ground plan to better control future under construction area of a mega city in term of expansion. Avoiding later an unsafe situation due to lack of self-sufficiency of safe drinking water or adequate sanitation and sustainable environment, are the most important topic cases to observe. The synergy of a village, city or mega city is progressively higher as the interconnections increase and are computerized so that the total effects of combined actions, as of certain drugs, is greater than the sum of their individual effects. If a compact city as mega city is well designed and optimized in all processes referred to in this debate, one may realize the "total synergy" between inhabitants and their output for the "near future" on the Planet. Furthermore, in a similar prospect to discovery of the American Continent, which led to expansion of Planet Earth dimensions and to growth of human activities, it is hoped that numerous other planets, greater than the American Continent, are discovered in the next few decades and are made available for the human use.

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