Dynamics of high rise buildings in Pakistan and its sustainable approach

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Abstract: **Buildings are the main destination for county's power supply and high rise building seems to be utmost achievement. On the contrast, the dynamics of high rise building in Pakistan in quite pessimistic. The exponential rate of increase in population, land unavailability, demands for high rise buildings. However, majority of development is restricted to low rise building, as a result, sufficient land that could be used for agriculture purpose, which is the main concern of Pakistan, is wasted. Hence the efforts for developing high rise buildings in Pakistan is largely on demand. This kind of problem need to be dynamically investigated. Therefore, analysist develop Causal loop diagrams to address the different correlated terms of the problem. This paper studies the need of high rise building in Pakistan and most importantly, reveals the different aspects behind insufficient high rise building in Pakistan. The dynamics of problem has been discussed through Causal loop diagrams. It is shown that, developing high rise buildings, ultimately ends at sustainable development.**

Keywords: **High rise Building, Sustainable approach, Causal loop Diagram.**

I. INTRODUCTION

Pakistan, a developing country Its main population lies at rural regions about 70% but due to increase in population at exponential growth, the infrastructure needs is increasing day by day. The land availability restricts them to small size infrastructure especially in urban area that ultimately increased the demand of high rise structures and for that high rise structures strong foundations is essential to be provided but in Pakistan the buildings are merely restricted to low rise and medium rise buildings. The land being used in such drastically manner that we could hardly presume it could fulfill the future generation needs. Cities are expanding, the land availability is decreasing. Moreover, the land is to be used for agriculture purposes and it seems that in near future it will become the critical issue. Furthermore, the Govt sectors and land planners they are either unaware or being involved in corruption and illegal allotment. There is no check and balance system for such kind of measures.

There are many reasons the contractors and builders are not considering high rise building trend one is related to foundations experts especially in KP province we are lacking of such experts who willingly agree to use any type of foundation. Due to this reason the need of strong, reliable and economical foundations is the urgency of today. The trend of providing pile, pile raft and compensated foundation in Pakistan is pessimistic. The reasons behind it using of conventional method, inexperience of Engr. And also the lack of knowledge regarding economical design of these kind of foundation in our country. It would be rather fruitful to design such foundation in economical concern and well design for the future crisis concern of Pakistan. To design such dynamic problem, stock flow and causal loop diagrams are used to elaborate. It shows the various concerning terms and points that directly or indirectly effect the problem. (CLD) is a qualitative method for visualizing how different variables in a system are interrelated and how they influence each other to create system dynamics. consists of a set of nodes that represent the variables in the system, and connecting lines that describe the relationships between the variables and direction of each relationship while stock and flow diagram is a technique that can provide a basis for simulating the behavior of the system over time.

II. METHODOLOGY

While making causal loop diagram for the presumed complex problem the following steps has been followed.

A. *Selection of theme.*

The theme is problem of lack of high rise buildings in Pakistan. It is my Final Year Project topic and willingly I decided to make the CLD for this problem.

B. *Selection of key variables*

Economy, Lack of experts, Heights restriction, Foundation Experts, ban by govt. Conservative approach, no innovation, team unity, political stability, peace, investment by foreign countries, managerial and design

1) *Primary Variable*

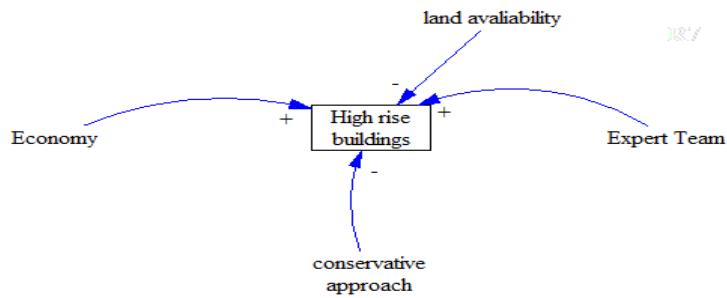Economy, Lack of experts, Conservative approach and land restriction are selected as primary variables

Fig 1; Primary variables and its relation with the problem

1)   Secondary Variable

Heights restriction, Foundation Experts, ban by govt, no innovation, team unity, political stability, peace, investment by foreign countries, managerial and design are selected as secondary variables.
The further connections are explained as;
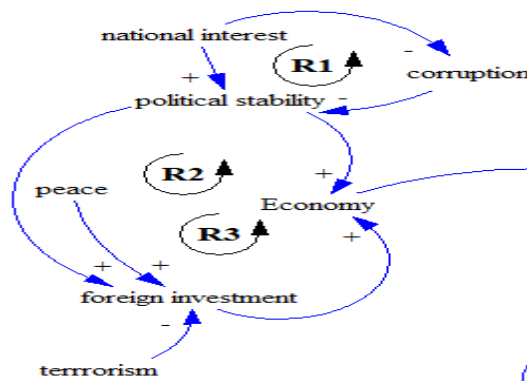 managerial and design, consisting of the following 4 risk events:

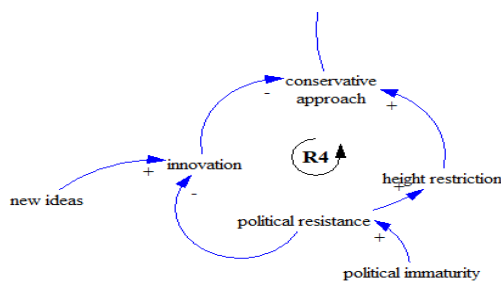Fig 2 Economy and its secondary variable

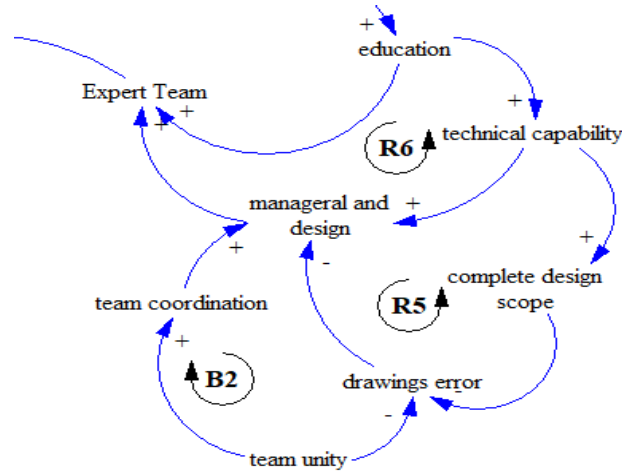Fig 3 Conservative approach and its secondary variable
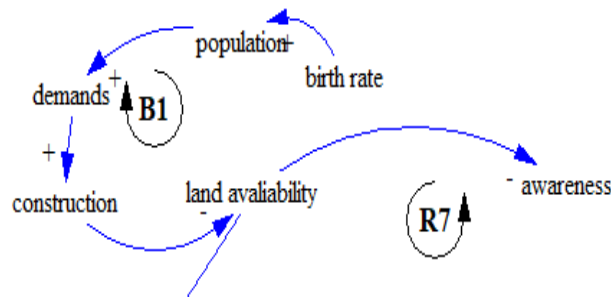
Fig 4 Experts and its secondary variable

Fig 5: Land Availability and its secondary variable

Intervention and information, consisting of the following risk events: client interference; change orders and information delays from designer.

C. Linking all the variables.

All variables whether primary or secondary they are linked by arrows and assigned their corresponding signs, either or negative.

D. Looping.

Through the signs and relationship of variables among each other. I loop them. Two types of loop are there one is the reinforcing loop and the other one is the balancing loop.in reinforcing loop the effect is accumulated while in balancing loop the overall effect is balanced. Here I have 7 reinforcing loop and two balancing loop.

III. FEEDBACK LOOP INVOLVING ACTUAL CONSTRAINTS TO HIGH RISE BUILDING IN PAKISTAN (FINISHED MODEL)

On the basis of following the mentioned methodology to make CLD the given CLD for the presumed problem has been established in VENSIM Software.
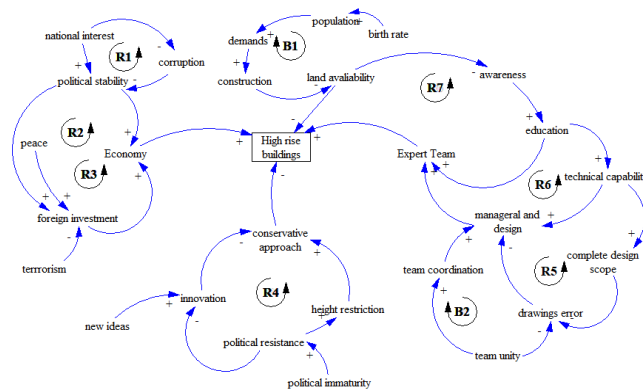
Fig 6: Overall Causal Loop Diagram

Figure shows feedback loops related to the actual condition of problem of high rise building in Pakistan. This figure shows seven reinforcing and two balancing feedback loop involving network
Variables.

A.   4 Model Feedback and loop story:

- R1 shows the variables national interest, political stability and corruption raging in country. Assurance of National interest by politicians increases the political stability and decrease the chances of corruption.
- R2 shows connected variables political stability, foreign investment and economy of country. Foreigner investor invest their money when observe the country political system status. Deciding on stability they invest in industry and improve country's economy.
- R3 shows the peace condition that ultimately effect investor attraction and then economy.
- R4 highlight of the most important variable that badly effect infrastructure condition in our country that is conservative approach having no innovation concept, lack of new ideas. It is because of mostly political immaturity, their ignorance and also the Engineers, contractors and consultant's conventional approach of using old methods and ideas. This kind of attitude discourage the construction of high rise building in Pakistan.
- R5 elaborate the technical capability of construction team in Pakistan whose ability and skills has a direct effect on the design and managerial activities during construction.
- R6 shows the role of institution in polishing of their Engineer skills and thought. It could reinforce the effectiveness of design and expertise if they are well trained and motivated.
- R7 shows the land availability and their impact on their inhabitants. Due to the exponential rate increase in population, land is becoming scarce for further construction. It alarms the people and aware them about the upcoming challenges that ultimately tilt them towards education how to cope with such kind of situation and education guide them towards the ways to manipulate and this finally will reinforce the idea of making high rise building in Pakistan.
- The balancing loop B1 partially give the idea about the interrelation of population and land restrictions. The more the birth rate the less will be the available land for construction purpose so controlling birth rate we could save our land for so many other progressive purposes.
- Balancing loop B2 impart the idea of team unity, coordination and thier derive result in form of mistakes in drawing and execution. The more the coordination the better would be the result and ultimately eradicate the chances of error.

Summarizing, all these loops shows the causes of problem and figure out how to deal with the problem of lack of high rise buildings in Pakistan. It gives a lot of options and approaches that if we could follow them in deep sense we would be able to cope with the current situation and finally we could easily manage the infrastructure, transportation, economic pressure even in a smart way.

B.   Model Boundary

As clear from the main heading the problem is discussed only for Pakistan and the issue been raised is all about its incapability of constructing high rise building in any province throughout the country.

C.   Choice of time

The selected problem has been discussed within the time horizon of the 21ˢᵗ century (1999-2019).

IV. RESULTS OF MODELING AND THINKING

The increase in population demands for better infrastructure but the land restriction, conventional approach and economic consideration restrict to achieve the desire. Therefore, through proper planning, well established political and educational system we could realize the need of high rise buildings in Pakistan for the coming generation and their prosperous life. High rise buildings not only save land but provide adequate support in urban infrastructure management and transport and agriculture facilities that intensively need the availability of land.

V. RECOMMENDING POLICY ADDRESSING THE PROBLEM OF HIGH RISE BUILDING IN PAKISTAN.

➢ In Pakistan the authorities do not take part with care and vigilance.

• Building system of Pakistan can be improved by making the authorities functional and responsible.

➢ In Pakistan no specific standards were followed which was dangerous for the society as well as the owner of the project.

• Pakistan now owns specific standards for construction in developed areas. Yet in underdeveloped areas these standards are to be implemented.

➢ In Pakistan there is less awareness in people regarding the construction and using conventional methods. They hire usually unprofessional person for the construction instead of the professional ones.

• Since Life is more important than Money. Hence, Awareness should be spread to avoid accidents in constructions.

• Safety First Rule should be adopted.

➢ In few of the areas of Pakistan old and abandoned techniques of constructions are still in used.

• Modern techniques are needed to be replaced by the old and abandoned techniques.

VI. KEY LEARNINGS FROM MODELLING THE PROBLEM

➢ Modelling a real life complex problem in loop diagram form make the problem much easier to understand and manipulate.

➢ Causal loop diagrams provide a language for articulating our understanding of the dynamic, interconnected nature of our world.

➢ We can think of them as sentences which are constructed by linking together key variables and indicating the causal relationships between them.

➢ By stringing together several loops, we can create a coherent story about a particular problem or issue

➢ Taking a complex, dynamic, and circular world and linearizing it into a set of snapshots may make things seem simpler.

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