A Study on Shushtar New Town by Employing “POE”
Causes of Complex Erosion & the Sustainability Factors in the “Sector Five”

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ABSTRACT
The Shushtar New Town Residential Complex (SNTRC) is one of the most well-known construction projects in the contemporary history of Iranian architecture designed by Kamaran Tabatabayie Diba in early 1970s. With the claim to mediate and compromise the conflicts of modern architectural requirements with the expectations of new born social comers, the plan was treated as a turning point in the design of personnel housing complex plans (PHCPs) for developing countries. However, this masterpiece has experienced serious erosion and changes since first phase operation of 1977 by its inhabitants and left today the Iranian vested interests facing with one challenging question: why should such a fascinating and relatively prominent build with its promising high sustainability was not able to maintain its integrity in facing with residents expectations and suddenly become a disaster and if this was the true, why a part known as “Sector Five”, has preserved its original configuration? The present research has tried to solve this dilemma using POE; a systematic method for post-operational evaluation of buildings. According to the finds it is positively possible to match safely the new architectural concepts with post-modern cultures during transitional from volatile culture of newcomers to more sustainable social classes. Also the research highlighted that SNTRC failure was due to overall ignorance of factors such as compatibility with the needs of residents and flexibility with necessary after-occupation changes including installation of new municipal utilities where instead sustainability of the “Sector Five” stemmed from proper design, and ownership of the residents.

Keyword
Shushtar New Town, Sustainability, Urban Sustainability, POE

INTRODUCTION
Nowadays, with the rapid population growth and migration flow from rural to urban areas, construction of PHCPs fulfilling the needs of all rankings & classes of society is more important than ever. This issue has intensified particularly in the modern days when majority of the architectural projects presented in Iran and most other developing countries suffer from a kind of structural intricacy, identity and social confusion. Therefore the great concern is that if modern architectural views and the “musts” of traditional cultures in transitional stage toward new society are not in balance with each obviously the ultimate installations will not fit to real conditions and will fail in lend itself to requirements of inhabitants. In this regard Iranian Ministry of Housing and Urban Development (IHUD) as the legal authority to approve PHCPs and sponsor of this project has decided to launch a multi-phases study program aimed to address most suitable and sustainable architectural design for a typical PHCP as raised by private sector of Iran’s industrial business and to fulfill the requirements of Iran vision 2025 roadmap which calls for provisions of workers’ city for all state-owned industries. In the preliminary phase of this study, historical review and assessment of previous efforts has been assigned by an agreement to Department of Architecture & Urbanism, Shahid Rajaee Teacher Training University (AURU). Focusing on tried cases with well established architectural bases, SNTRC came to the scene for AURU project leaders’ comments in order to see how the so-called social conflicts were considered and if it had been rectified and balanced in this workers’ city or again the story of India’s Fathipour Secret Museum was repeated. SNTRC is one of the most widely known architectural example implemented in the recent decades in Iran. It is a typical residential and urban complex satellite town to house technical, administrative and working staff of a sugarcane farming and processing company near Shushtar, a city in Khuzestan province and in south of
Iran, during famous 1970s petrodollars daring projects boom. The evolution of SNTRC was treated as an important pivot point in modern Iranian architectural era trying to sew modern views with traditional social cultures during transitional to more stable social classes for developing countries. The idea which was sketched and developed by Iranian architect Diba in 1970s claimed to be succeeded in finding the key answer about how to match and balance the different social classes living admires and expectations in a workers’ city. In the opinion of many experts and critics this complex was considered as a turning point in terms of identity, physical structure, and social stability back in its days and ultimately these impressions resulted in allocation of Aga Khan Award for Architecture (AKAA) in 1986. Unfortunately, except in one part known as “Sector Five”, the rest of SNTRC suffered serious erosion mostly by major changes made by residents in such a way that a root cause failure step felt to be necessary and vital in order to unravel the observed paradox before any attempt to copy the SNTRC principle design concepts as a satisfactory platform.

MATERIALS AND METHODS
Introduction to POE
As mentioned before this paper use POE methodology to assess SNTRC statue. The concept and definition of POE was first proposed by Wolfgang F. E. Preiser and colleagues in 1988. Later in 1999, they conducted several case studies which brought about it as a successful method to be employed by experts. In other words, POE is a process of evaluation and thorough investigation of buildings in a systematic manner long after they have been constructed. [1]

The process of POE consists of six consecutive evaluation stages and a final stage for presentation and implementation of the results. The procedure can be illustrated as follow (Fig. 1): the first stage is to define the sample case study, determine the strategy and objectives of the evaluation. The second stage is to review the objectives pursued by construction of the case study. The third is to identify the current issues using library and field research in order to find out the defects leading to frustration of the objectives. The fourth is to plan for fulfilling objectives with regard to the current issues. The fifth is to categorize and prioritize the solutions regarding the results obtained from the study as well as comments of the occupants. The sixth is to select and screen applicable options. And finally, the seventh stage is to give reports about the obtained results to relevant institutions so as to take proper measures and implement reforms. [2]

RESULTS AND DISSCUSSION
The outcomes of application of POE methodology for each stage can be presented as follow:
Stage 1: Determine POE strategy and objectives
The project under study in this research is SNRT apartment complex designed by the renowned contemporary architect Kamran Diba (Fig. 4). In the opinion of many experts, this complex was considered as a turning point in terms of identity, physical structure, and social stability back in its days. SNRT was also regarded as the most successful architectural sample of contemporary residential
complexes and it even culminated to the extent that honorably won Aga Khan Award in 1986. After the operation, however, the complex encountered a big challenge – fulfilling the needs of occupants coming from different segments of society – and rapidly went through erosion and left almost nothing of the original appearance of this valuable complex. The important fact never mentioned before is the incredible stability in a part of this complex currently well-known as the “SectorFive” which remained almost intact since its construction. The question popped up in the mind of every observer is “what reasons lay behind the stability of this part and erosion of the other parts?”. Therefore, an analytical study on this complex could both answer the above question and help figure out strengths and weaknesses of the design. In addition, the obtained results can be used to further boost the longevity of this complex and offer solutions in order to prevent such problems in the future designs, which ultimately would lead to responsive and sustainable structures better than ever.

Stage 2: Review related studies, framework, and objectives of the project
The initial design of SNRT began in 1977. The first phase of the project was completed with the capacity to accommodate 4000 people in 650 residential units (Fig. 2). The new town was constructed near the ancient city of Shushtar in Iran so as to accommodate 31 thousand residents in an area of 270 hectares (Fig. 3). The majority of the occupants were the workers of a large factory producing sugar and cane.[3]. In his speech about design process of the project, Kamran Diba stated: "We took responsibility of the design and construction of a new residential complex connected to the old city of Shushtar. The urban design of this complex was extremely affected by topography and features of the construction site. The new town has a unique approach to cultural values in the Iranian society as a sample of traditional continuity. The prominent characteristics of the new town originate from a totally intertwined texture, and represent a native-Islamic physical architecture which will play a significant role in promoting social interactions and public participation." [4]

Diba mentioned several objectives and ideas of the Shushtar project as below:
- Physical similarity and integration of activities in both the new and old towns
- Applying introspective urban design
- Separating the traffic network of vehicles from that of pedestrians
- Inspiration from local civil engineering
- Facilitating population shift from the old to the new town
- Preventing the new town from exclusiveness to a certain organization
- Designing playgrounds, gyms and parks separated from the traffic flowing in streets and alleys
- Designing public structures with compatible and ongoing rhythm
Creating solidarity among residents and building an integrated community by adding an adjacent construction project

- Flexibility in designing apartment buildings according to the needs of occupants
- Flexibility and resistance against long periods of time
- Providing an opportunity to create diversity and variety of activities
- Consistency and continuity

Stage 3: Identify the current issues and unaccomplished goals

After collecting the entire information available regarding SNRT, and conducting the field and library research, the current issues were reviewed based on the observations and studies done. The most striking damage seen in a glance was the erosion, i.e. outward and inward apparent change in most of the buildings. As the physical element of identity in the main part of the complex, public structures have been either completely ruined by the occupants or somehow changed in a few places, where there was huge contrast to rest of the complex. In his book *Contemporary Architecture*, Masoud Amirban pointed out that issue and declared: “This complex suffered some damage during Iran-Iraq war in 1980-88, worse than which were the native inhabitants who awfully modified the appearance of the town to their own personal tastes. With the recent erosion gripping SNRT, it seems that little will remain of the complex in the near future (Fig. 5&6).”[3]

The physical erosion in the complex buildings caused by occupants

Field research and interview with the occupants indicated the changes mentioned earlier were mostly the consequence of inconsistency between needs of the occupants and the architectural design in this complex. As it can be seen in the photos taken, most of the erosion and changes were due to lack of a space designed for car park, inappropriate infrastructure for municipal utilities, unsuitable interior...
design of the apartments for allowing enough skylight, lack of detailed maps for heating and cooling installations and spatial dimensions (Fig. 7,8,9,10). It should be noted, however, the idea of restricting cars from entering the buildings was quite favorable to the designer and the traditional Iranian society including Shushtar people back in 1970. Within a few decades, cars became a new essential member of every family, gradually challenging that architectural idea, so that residents started to remove the yard wall for the cars to be easily parked inside houses. Such failure of design in predicting future needs extended to heating and cooling installations as well as municipal utilities including gas and water piping and sewerage. For instance in 1970s, most of the Iranian cities did not benefit from direct gas piping and instead families had to use gas cylinders. Later by expanding the gas piping system to cities and suburban areas, such utilities were inevitably installed on outer surface of the walls and left most of the buildings with a disgusting appearance. Being no exception, SNRT suffered a lot of physical damage due to improper and irrational installations. However, one fact cannot be overlooked; flexibility and stability of this complex against long periods of time was the ideal objective of the whole structure designed by Diba, whose plan barely turned out to be correct and caused several unpredicted problems facing the complex.

Another reason of the erosion is that most of the residents are low-income families who pay cheap rents and does not own their apartments, which consequently diminishes the sense of belonging in the occupants of this complex and might even lead to criminal acts. Statistics provided by the police force in Shushtar show the most crime-prone area is SNRT, issues of which may remind one of 1960s Pruitt–Igoe housing project with 2740 residential units in St. Louis, Missouri (Fig 11). The housing project mentioned above had been designed by one of the most famous architects in those days. It was regarded as the symbol of modernism and was constructed according to the planning principles of Le Corbusier and the International Congresses of Modern Architects. This apartment complex accommodated poor low-income families. Since the entire land in this complex was separate
from the units and shared for public use, the true occupants of the buildings could not be distinguished from strangers, which created a dangerous environment and widespread criminal acts to the extent that mothers had to take their children to school in groups for more safety. In fact, that was how the largest housing project, pioneer of the modern architecture, turned into a center for criminal acts in St. Louis. Eventually for copying with the insecurity crisis, the municipal authorities decided to destroy the greatest symbol of modernism with a 3-billion-dollar loss in 1972 (Fig 12). [5]

Introduction to the “Sector Five” of Shushtar New Town and its sustainability factors
A part of the complex currently well known as the “Sector Five” is located in the west wing of SNRT (Fig. 13). Unlike other parts of the town that have gone through a kind of physical erosion, the “SectorFive” has survived and remained almost intact. In terms of design, most of the reasons associated with erosion of this complex are not visible in this part, which directly refer to the different design style applied to the “SectorFive” (Fig. 14). In comparison to other apartment complexes in SNRT, the “SectorFive” has larger and more dynamic space in terms of spatial dimensions and according to needs of different segments of society. The apartment buildings in the “SectorFive” were originally designed each with a front yard. The major factor contributing to erosion of this complex was identified to be the lack of open-wide yards for parking cars which is not seen at all in the “SectorFive”. Such key factor has played an important role in saving this part of the town from erosion. On top of that, more flexible interior design, larger front doors, assigning certain places for heating and cooling installations, and compatibility to installation of municipal utilities, have altogether played an important role in curtailing the erosion in the “SectorFive” and boosting the sense of place in its occupants. Another factor worth mentioning is that most of the occupants in this part of SNRT own their apartments, which creates in the occupants a sense of responsibility and commitment toward their living environment so as to protect it.

Fig.11 Pruitt–Igoe , 1960 Reference: Newman, 2008
Fig.12 Historical photo from demolition of Pruitt–Igoe Reference: Newman, 2008

Fig.13 Shushtar New Town – Phase one – Sector Five Reference: Authors
Fig.14 One of Sector Five apartments Photographed by Authors - 2012
Stage 4: Planning for improvement, solving problems, accomplishing unfinished goals, and sustainability of the complex

Having investigated the sustainability factors of “SectorFive” in SNTRC and collected the factors contributing to erosion for categorization into a table, members of the research team began to suggest solutions concerning the accomplishment of the unfinished goals and the observed issues such as erosion in this valuable complex. After reviewing previous studies and receiving feedback from several university professors specializing in architecture, civil engineering and environmental psychology, they came up with the following initial solutions:

1. Prohibition of ruining walls and building any type of front door without obtaining a permit from the municipal department for more protection and prevention from erosion of the complex.
2. Prohibition of building a yard in apartment buildings so as to prevent physical discrepancy in the construction site.
3. Adopting a governmental budget for renovation and repair of the worn or damaged parts.
4. Reconsideration in design of the house yards and assigning a car park in each unit.
5. Reconsideration in design of the access points for allowing cars to enter the building.
6. Redesigning public parking lots so as to encourage people to keep their cars outside the building.
7. Running other phases of the project that have been halted.
8. Reconsideration about where to install municipal utilities so as to curb further damage to appearance of the complex.
9. Modifying the openings so as to admit and increase more daylight intake.
10. Designing certain places for unexpected installations, so that the complex would become compatible with changes over time.
11. Prohibition of renting or selling the units in order to create a sense of commitment in the original occupants.
12. Designing a system for heating and cooling installations in each unit, so as to prevent damage to structure of the buildings.
13. Dividing public places into semi-public and semi-private in order to provide more security.

Stage 5&6: Selecting applicable options and prioritizing solutions

Having suggested all the possible solutions, the research group began to select applicable options at the next stage. Most of the suggested solutions might require certain background or facilities that are difficult to supply. Therefore, the most applicable solutions were selected and prioritized after weighting up all the available options. The prioritization was based on a strategy calling for “immediate action taken for prevention from further erosion of the complex and rescue the buildings from further deterioration.” Assigned next in priorities was “realization of the unaccomplished goals”. Having been reviewed and screened, eight options were finally chosen and then prioritized as below:

1. Prohibition of both removing the walls and building any type of front door without obtaining a permit from the municipal department for more protection and prevention from erosion of the complex.
2. Prohibition of building a yard in apartment buildings so as to prevent physical discrepancy in the construction site.
3. Prohibition of renting or selling the units in order to create a sense of commitment in the original occupants.
4. Reconsideration about where to install municipal utilities so as to curb further damage to appearance of the complex.
5. Designing a system for heating and cooling installations in each unit, so as to prevent damage to structure of the buildings.
6. Redesigning public parking lots so as to encourage people to keep their cars outside the building.
7. Designing certain places for unexpected installations, so that the complex would become compatible with changes over time.
8. Adopting a governmental budget for renovation and repair of the worn or damaged parts.

CONCLUSION

The final stage of POE methodology or conclusion is summarized as below:

a) The results obtained from the study on SNTRC indicate that in general a number of preplanned objectives in this Iranian paramount architectural design failed mostly due to the followings which ultimately speed up the observed erosion and degrade the design value:

1) Inconsistency of the SNTRC’s design with the needs and expectations of disparate people with various social class base normally found in any worker’s cities.
2) Incompatibility and lack of required flexibility of the SNTRC to cope with events and changes occurs or raised since installation such as new born municipal utilities.

3) The fact that most of the occupants are not the owner of their apartment and are impartial to imposed external destructive decision/actions.

4) Made physical changes to indoor and outdoor appearances by residents and unskilled/incompetence authorities.

b) To support the drawn conclusion absence of above outlooks, deficiencies, and damage mechanisms caused the buildings of “Sector Five” to be nearly preserved in sound condition with no appreciable erosion and changes observed in the remaining parts of SNTRC.

c) As the result of this preliminary phase, the AURU announced the possibility of combining traditional culture rules into modern architectural thoughts and brought forward 8 offers to IHUD (see again stage 5) for amending scope of work of their future workers’ cities.

d) Along with these activities, AURU independent of this project frame work, with thought of preserving this valuable complex from further erosion and also liability to keep the designer primary goals, plans to set out cooperative phased out projects with Shushter city authorities to share more details for required modifications.

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