young cities
Developing Urban Energy Efficiency
Tehrān-Karaj

07

Young Cities Research Paper Series, Volume 07

New Towns—Promises Towards Sustainable Urban Form

From "Shushtar-No" to "Shahre Javan Community"

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IV
The Shahre Javan Community— Background and Vision

This chapter focuses on the Shahre Javan Community Pilot Project: its layout, goals, and objectives. First, the background of the research project and its structure will be introduced. This will be followed by presenting the Shahre Javan Community Pilot Project and providing a thematic review of its vision as conceptualized by the design teams, encompassing the different aspects and dimensions. This review will provide a base for the later comparative studies.

1 Background

The Future Megacities Program is funded by the German Federal Ministry of Education and Research (BMBF). As a part of the "Framework Program—Research for Sustainability", it contributes to BMBF's "High-Tech Strategy for Climate Protection". The main goal of this research initiative is to create examples of best practice sustainable urban development.

In this respect, the project covers a wide thematic and geographic breadth, dealing with great urban agglomerations in China, Ethiopia, India, Iran, Morocco, Peru, South Africa, and Vietnam. The emphasis of all the research is "prevention and therapy" instead of just "diagnose", and is focused on specific energy-and climate-efficient structures in areas of housing and construction, nutrition and urban agriculture, public health and quality of life, urban planning and governance, direct energy supply and consumption, mobility and transport, water supply, waste treatment, and environmental management.

This research establishes close cooperation between the German and local partners and institutions, academic as well as administrative. It also includes political, economic, and societal stakeholders to make it more place-specific.

2 Young Cities Project

The "Young Cities: Urban Energy Efficiency. Developing Energy-Efficient Urban Fabric in the Tehran-Karaj Region" is one of the abovementioned research projects which aims to "develop methodologically sound solutions for implementing low carbon, climate change resilient housing within the specific climatic, environmental, cultural, and economic context of Iran" (Seelig, Ohlenburg and Pahl-Weber 2012a, p. 10). It intends to achieve substantial improvements in energy-efficiency by means of changing linear mass and energy flows towards an interlinked urban system of urban form, technical infrastructure and object planning, accompanied by assessment and management. Thus, the main goal is "developing methodological and applicable solutions for low carbon and resilient housing in the specific climatic, cultural and economic context of Iran" (Seelig, Wehage and Pahl-Weber 2011). Technische Universität Berlin is the main director of the project in cooperation with two other Berlin-based universities and a few other research or professional companies. The cooperative partner in Iran is the Building and Housing Research Center (BHRC), a research institute under the Ministry of Roads and Urbanism. It also includes The New Towns Development Corporation of Iran (NTDC), the Housing Investment Company (HIC) and some other academic and professional companies as well as NGOs.

The research is conducted by four teams which cover different scientific disciplines involved in the project, including Urban Development and Design, Urban Infrastructure Systems, Design, Structure and Engineering, and a supplementary Supporting Module which consists of four dimensions: Project Management, Environmental Assessment, Capacity Building, and Awareness Raising. Team 1 consists of five dimensions of Urban Planning and Design, Urban Design and Architecture, Landscape Planning, Transport and Mobility, and Climatology. Supported by the dimension Environmental Assessment, the team works on developing and applying energy efficient, climate responsive, and sustainable planning and management concepts which integrate urban design, architecture, transport, and landscape planning on a nearly 45 ha Shahre Javan Community Pilot Project area. Team 2 includes three dimensions of Energy Management, Water and Wastewater Management, and Integrated Urban Technologies, and focuses on testing and implementing integrated water and waste systems, as well as energy supply systems.

Team 3 consists of dimensions of Structural Design, Architecture and Engineering, and Building Services Engineering, designing objects and buildings while taking into account optimized structural design and efficient building technologies, materials, and installation systems as a part of the Shahre Javan Community Pilot Project.

Within and in the close vicinity of the Shahre Javan Community Pilot Project are some single pilot projects with different functions and

objectives. The first one is the new Quality Building, a five story apartment building which consumes 50 percent less energy than conventional Iranian apartment buildings and was completed in 2010. The New Generation Pilot Project Educational Building is located to the southeast in the opposite corner of the Shahre Javan Community area. Called the LIFEcenter, it is a center for Learning, Information, Forum and Exhibition, an educational building for vocational training to implement and train modern and sustainable building methods on site (Böhm and Mahrin 2011). The New Generation Office Building is another pilot project located in the south-western corner of the Shahre Javan Community area. The main objective of this building is to reduce energy consumption and improve internal thermal comfort by means of architectural design (Nasrollahi and Steffan 2011).

This project targets three scales: defining criteria for energy-efficiency in Hashtgerd New Town and other semi-arid regions at the neighborhood scale; developing and implementing adequate planning and design strategies in the form of a real-life planning project in Hashtgerd New Town and its subsequent evaluation; and finally elaborating manuals and guidelines for energy-efficient and resilient urban planning and design in Iran and the MENA-Region.

The employed methodology is a "research by design" approach; the planning and realization processes of the pilot projects are the main basis for scientific results.

3 The Shahre Javan Community: Objectives and Goals

To realize innovative ideas concerning a livable energy-efficient neighborhood, this project has selected a nearly 45 ha site as the main Pilot Project in which the entire area will be designed from urban infrastructure to housing scheme and public space. In other words, it is the site of realization of the particular measures and innovations developed by the research groups of the project. This site, marked by NTDC for this purpose, is located in the south of Hashtgerd New Town and is supposed to accommodate about 8,850 residents in 2000 housing units. Thus, "The area is developed in a trans-disciplinary manner tying together the Dimensions of urban planning, urban design, architecture, landscape planning, transportation planning and mobility management, urban climatology, water-, waste water- and energy management. Accompanying measures are con-

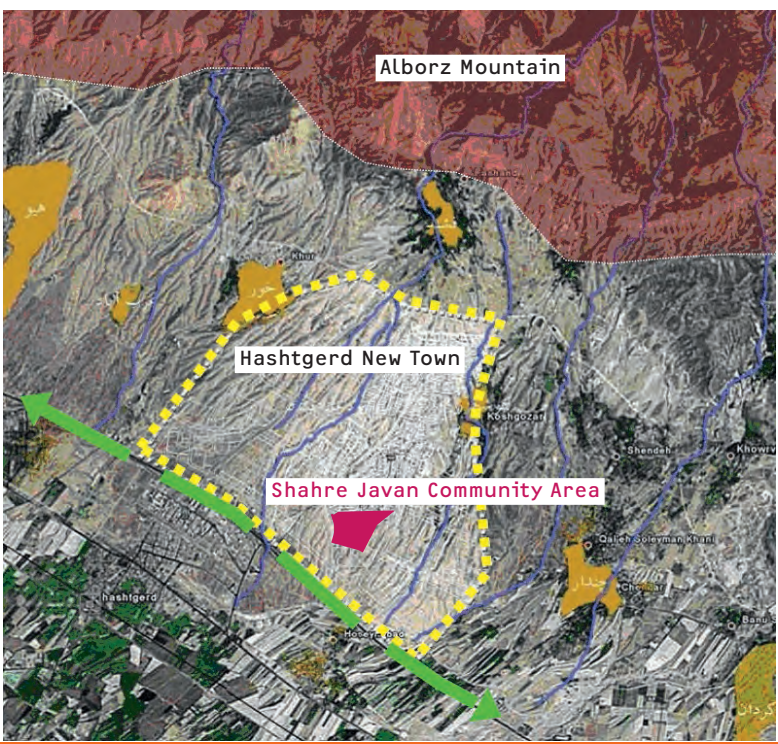

Fig. 56: The location of Shahre Javan Community Pilot Project in Hashtgerd New Town, Aerial view (Author, after Young Cities Project)

ducted through participation, capacity building, environmental assessment and accompanying monitoring" (Pahl-Weber, Seelig and Ohlenburg 2011, p. 60).

Based on this approach, the Shahre Javan Community Pilot Project plays an essential role and has to cover a range of advantages, listed below (Ibid., p. 61):

- It serves as a tool to collect information, by efficiently clarifying the local conditions,
- As a pilot project it is a clearly defined task, with a fixed team and budget,
- It follows a "research by design" method, fostering constant feedback loops between design and scientific evaluation leading to applicable and concrete solutions,
- It raises awareness, given that the aims of the Pilot Project are adapted in the planning process (through feedback loops),
- It fosters communication within the Project since it is elaborated through a conversational process encouraging exchange between the partners,
- It is a model project and thus excluded from daily routine, allowing for innovative and new approaches,
- It is a laboratory to elaborate approaches for subsequent scaling-up of the solutions.

Fig. 57: The location of Shahre Javan Community Pilot Project in Hashtgerd New Town Comprehensive Plan (Author, after Peykadeh 2008)

The employed research methodology is combined, depending on the goal of every stage. It includes a literature review of existing knowledge as well as analytical reading of best practices. Any planning proposal is verified by model simulations using different software tools and programs such as Envi-met, VISUM, VISEVA+, ECOTECT, ENERGYPLUS and others.

4.1 Source of Architectural and Urban Inspiration

A close examination of the existing urban pattern in Hashtgerd New Town shows that the topographical situation is largely ignored; all the plots are arranged in a rectangular layout with a common width of 15 to 18 m. The positioning of building volume follows the conventional regulations of the urban planning system prescribed for all the cities. Thus, "The linear arrangement of the buildings makes for uniform linear open spaces oriented towards the public and private sides of the houses," as seen in figure 58 (Wehage and Pahl-Weber 2012, p. 39). An enclosed wall delineates the plot area, and cuts it from the outside. This project tries to go beyond this conventional urban layout and open new perspectives.

To achieve a place-specific approach to the urban design, the traditional Iranian-Islamic city was taken as the main source of inspiration, providing principles and ideas for designing an optimal urban form for this neighborhood. Based on a literature review, the main characteristics which deserve attention are: the access, composed of different sized pathways that create a clear spatial hierarchy between public and private spheres; the introverted courtyard house which combines privacy, social interaction and protection against climate, in addition to providing light for the interior; the compact, attached housing arrangement which minimizes the amount of exposed surfaces, reduces cooling and heating demand, and provides thermal comfort by creating external spaces that

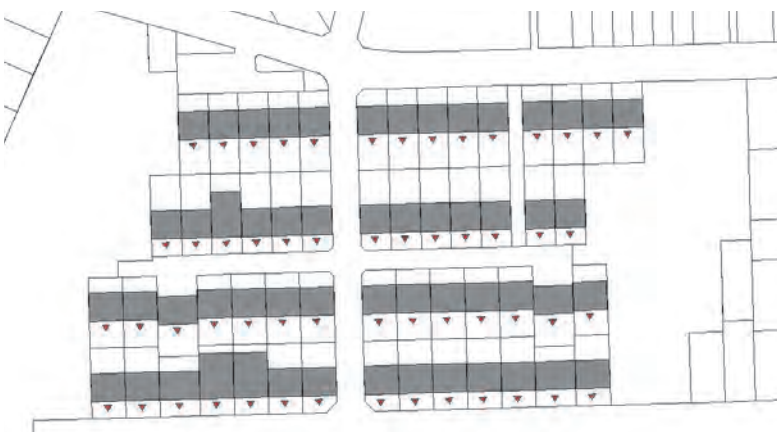

Fig. 58: Existing typical housing typology and urban pattern (Wehage and Pahl-Weber)

are sheltered from direct sunlight; narrow lanes bordered by high walls which create well-shaded spaces during hot summer afternoons and protect inhabitants from harmful winds; and finally, the proximity of different land uses, which are functionally separated by the access network, providing an appropriate amount of privacy while simultaneously providing easy access to services (Ibid.). As will be discussed later, different parts of the project, particularly the aspects of urban design and architec-

tural design, attempt to interpret these characteristics in a modern way at different scales, from quarter to neighborhood to single building, in order to bridge between modern and traditional modes of spatial configuration (Seelig, Wehage and Pahl-Weber 2011).

4.2 Urban Layout

The entire area consists of twenty-nine compact neighborhood clusters, organized in four rows, and located on the ridges of the site's hills stretching from north to south. Every cluster is an average of 100 m long and 60 m wide, accommodates 250–300 residents, and surrounds a central space (15 m by 30 m) around which four building groups are situated. This semi-public, semi-private space is the core of each residential cluster and provides the inhabitants with a common space to help foster the coherence of the neighborhoods (Seelig, Wehage and Pahl-Weber 2011). To access the clusters, one must walk through a narrow 6-meter wide street which connects the neighborhoods from north to south and east to west. Clusters are car-free zones, except for service and emergency purposes; parking is provided in underground parking lots below the neighborhood units.

Access to the area is by two main north-south roads, with a reduced road width of 13 m. Residential clusters are accessible by foot and bike through a six meter wide path from the access streets of the quarter. Cars are not welcome in the residential areas, except for service and emergency vehicles. Cultural and educational services including a mosque and elementary schools are located at the heart of the complex. The shopping center is located at the south-western border to serve on a regional scale.

Fig. 59: Site plan of the Shahre Javan Community Pilot Project (Wehage, Seelig, Pahl-Weber)

Fig. 60: Land use plan of the Shahre Javan Community Pilot Project (Seelig, Wehage, Pahl-Weber)

Urban layout gives priority to the existing local topography of the site, taking advantage of the natural landscape and vegetation. To avoid extra earth moving work, all the clusters are located on the ridges of the hills, with main accesses in the valleys. The green corridor on the eastern

edge of the area has been preserved. Moreover, housing height is limited to three stories to keep views to the surroundings open. All these measures attempt to adapt the urban layout to the existing conditions and to take benefit from natural forces.

4.3 Compact Urban Form

Compact urban form has been a main concept in developing the Shahre Javan Community area. The source of inspiration for the design team is the dense and compact urban form of the traditional Iranian city, which presents a clear hierarchy of public, semi-private, and private spaces and access systems (Wehage and Pahl-Weber 2012). Therefore, the proposed urban pattern is fairly dense, the average floor area ratio is 1.6, the equivalent of 228 persons per hectare. Perhaps counter-intuitively for its denseness, this pattern actually helps to preserve an appropriate level of privacy for the residents.

The compact urban form pattern can enhance resource efficiency; this model is suitable for the implementation of decentralized disposal systems, such as waste water treatment, as well as developing energy-efficient grid-bound supply systems. Simulation studies show that the em-

Fig. 61: Compact urban form in the traditional Iranian city, Isfahan

Fig. 62: compact urban form in the Shahre Javan Community Pilot Project (Wehage, Seelig, Timme, Pahl-Weber)

ployed pattern of compactness can remarkably reduce direct solar radiation and thermal loss, as well as the cooling demand by producing natural shade. However, despite claims about the contribution of high-density to a more sustainable urban life, a solely quantitative approach is not able to achieve this goal, “a more qualitative approach to urban growth” is urgently needed (Seelig and Pahl-Weber 2012, p. 35).

4.4 Mixed Land Use

The area's compact urban form has been combined with a mixed land use schema to achieve a more livable, vital, and flexible urban life for the inhabitants. The mixed use capacity of the area is realized in two dimensions, both horizontal and vertical. Horizontal mixed use means mixed horizontal distribution of different kinds of land uses over the entire area, including residential, commercial, educational, and cultural ones. Since larger land uses with regional capacity could intensify traffic, these structures, such as the shopping center, office buildings, and the secondary school, are located at the edge of the area. Social land uses are located in the center to make them accessible by walking, including the mosque, attached cultural functions, the kindergarten, and the primary school. At the neighborhood scale, commercial activities are mixed within residential units.

Finally, the idea of "vertical mixed use units" has been introduced on the sub-neighborhood scale around the courtyards of each sub-neighborhood to provide both commercial and social functions within the walking distance. These small commercial units can be used for "small scale commercial and social uses, such as convenience shops for the daily needs, service units for the supply of the neighborhood (crafts, restaurants, copy shop, barber) and small scale social amenities (e.g. neighborhood center)" (Seelig, Wehage and Pahl-Weber 2012a, p. 73). Thus, inhabitants walk through the residential quarter to experience and enjoy this pattern of mixed use, which simultaneously enhances their social contact.

Fig. 63: The pattern of vertical mixed land use (Seelig, Wehage, Pahl-Weber)

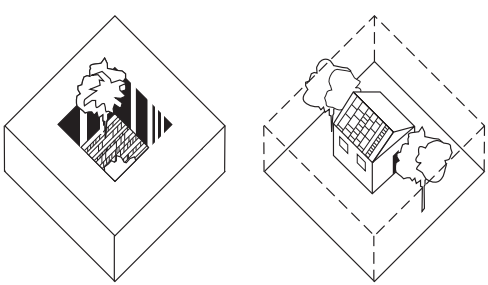

Fig. 64: Introverted courtyard typology versus extroverted typology (Wehage and Leubert, after Mansour)

4.5 Housing Typology

The traditional housing scheme based on introverted arrangements of space, was at one point transformed into an extroverted arrangement which threatens principles of privacy and intimacy, and this scheme has become the main urban pattern applied for the New Towns, among them Hashtgerd New Town. This project intends to go beyond this dominant pattern and introduce new housing typologies. Defining the housing ty-

pology, however, is not an isolated endeavor; it is fundamentally related to and influenced by the exterior and existing parameters of urban design, users, codes, energy-efficiency measures, sense of place, and vernacular architecture. For example, housing typology must be adapted to the already developed urban design pattern, as well as to a number of "hard facts" including "The system of access as part of the mobility system, the technical infrastructure, the plot orientation and the design-requirements to avoid earthquake hazards, form preconditions of the site" (Pahl-Weber et al. 2011). Moreover, some "soft facts," such as identity and flexibility, require a sensitive approach in the architecture. Thus, any housing typology has to meet diverse parameters and prerequisites.

In pursuit of the most climate-sensitive architectural typology, the courtyard prototype offers the best option by which "a more constant micro-climate" can be achieved. As a climatically appropriate form dominant in traditional Iranian cities, this prototype has been employed in the Shahre Javan Community area by introducing a contemporary interpretation of the courtyard house. This typology must be adaptable to different plot sizes, provide space for mixed uses activities, encompass a hierarchy of access, have the optimal climatic orientation, utilize regional technologies, and follow a "low rise-high density" pattern. Another important factor is the "demand for absolute privacy": the home is the final step through a hierarchical order to the private realm. Thus, the intro-

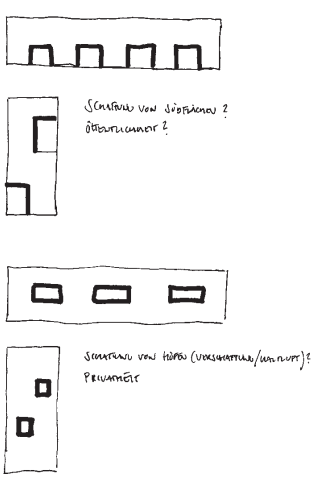

Fig. 65: The pattern of courtyard housing (Wehage, Wolpert, Pahl-Weber)

Fig. 66: Variety of alternatives for housing typology (Wehage, Pahl-Weber)

version of the traditional courtyard house "allows for a climate adapted dense urban configuration and for privacy as the main requirements of the socio-cultural context" (Wehage and Pahl-Weber 2012, p. 39). To achieve this, a hierarchical system has been developed in the interior layout of the traditional house, from public to private, reflected in the organization of interior areas dedicated to family life, guests, and strangers, around a central courtyard.

Based on this concept, two to three-story stacked courtyard houses, with an unusual depth of 20 to 35 meters, have been designed with a north-south orientation which maximizes energy potential and a vertical organization which provides sun for every residential unit. Moreover, the buildings have terraces and niches in the upper floors to increase solar radiation for energy production. Thus, "The flexible organization of floors around the courtyard allows for zoning of the living rooms depending on privacy and climate" (Wehage and Pahl-Weber 2012, p. 41).

Different types have been defined according to the plot areas foreseen in the urban design scheme. In general four types have been identified, with 6, 7.5, 9, and 15 m width, providing different unit areas from 60 to 180 m². In each typology, interior courtyards ensure privacy and offer livable micro-climatic conditions. These typologies, however, have to be re-formulated into various morphological alternatives to fit the characteristics of a given plot. Figure 66 shows some possible morphological alternatives.

In general, access to the houses is either through an entrance on street level or by an additional entrance from the parking garage in the basement. A hallway functions as a mediatory space to the central stairway which connects the upper and lower levels and may be used as a vertical interchange element. To prevent the privacy of the residential units through a hierarchy of spaces, and to enhance mixed use pattern on the

Fig. 67: Perspective to the sub-neighborhood (Wehage, Pahl-Weber)

Fig. 68: Ground level of the sub-neighborhood (Wehage, Wolpert, Pahl-Weber Pahl-Weber)

ground floor, the area facing the street is considered as a potential commercial unit for providing services at the neighborhood scale. The issue of privacy is also ensured by a vertical organization of space, such that the apartments located around a central courtyard enjoy a variety of private areas inside, and to the extent that areas for guests, services zones (like kitchen, baths, inner stairway etc.) and private family life can be individually organized due to the flexibility of the structure.

As can be seen in Fig. 68, every sub-neighborhood has its unique size and dimension, resulting in different types and consequently different plans and spatial configurations. In this sub-neighborhood, the northern blocks have two ground-level apartments, each occupying both the first and second levels, while in all, except for two, the southern side has been dedicated to local commercial space. In the southern blocks, each housing-row has two two-story (duplex) apartments with separated courtyards.

4.6 Climate Sensitivity

This project is environmentally sensitive in a variety of aspects, to derive benefit from the natural potentialities of the location. By employing a compact urban pattern, direct solar radiation is reduced and thermal loss is decreased, since minimizing the exposed building surfaces by minimizing the surface-area-to-volume (SA:V) ratio affects the thermal loss of the building.

All the buildings of the area have been oriented towards the south to reduce cooling demand (by 23 percent) and heating demand (up to 16 percent). Moreover, the compact urban pattern produces enough shade to

Fig. 69: View to public space at the sub-neighborhood (Wehage, Wolpert, Pahl-Weber)

Fig. 70: View to the courtyard of a residential unit (Wehage, Wolpert, Pahl-Weber)

also contribute towards reduced cooling demand. The advantage of this pattern is not limited to the indoor space; outdoor thermal comfort is also considerably improved.

In terms of the wind, prevailing north-western and western, as well as hot and dusty winds from the southeast in summer, are blocked by the particular arrangement of the buildings, at the same time that the northern cool winds are channelled through the site and passed through the

urban texture. Open green spaces will cool down the air and increase humidity through evaporation. The mixed use scheme contributes to environmental preservation by means of reducing travel demand for everyday needs and encouraging walking and cycling, thereby reducing CO_2 emissions.

On the scale of single buildings, the courtyard prototype supports ventilation, allows natural cooling, and reduces direct exposure to the sun. North-south orientation and the unusual depth, 20 to 35 meters, of the buildings both help to maximize energy potential. Direct sunlight is made available to each of the units via the vertical scheme of the buildings.

The housing alternatives southern façade is the main source of benefit from solar energy and optimal sunlight. The design is of a flexible façade which regulates light and sun.

4.7 Appropriated Technology

The compact urban form of the Shahre Javan Community area allows for efficient energy supply with the employment of a grid-bound supply system. This translates into an energy concept based on heating through co-generation of heat and power from natural gas and distribution via district heating networks, while cooling takes place through solar cooling in decentral absorption chillers powered by thermal power and district heating.

Fig. 71: Energy concept for the Shahre Javan Community area (Nytsch-Geusen, Huber)

For water and waste management, a decentralized treatment system with middle-technology has been developed “in order to provide a reliably working system” appropriate for the Iranian context. This method keeps about 70 percent of water in the local cycle. Gray water from

bath tubes, showers, sinks and washing machines will be collected separately and treated in decentralised, vertical flow, constructed wetlands. Constructed wetlands (CW) are based on a robust and well developed low-tech solution and have low maintenance demand. To reduce piping, CWs will be located close to the houses. The particular topography of the site enables natural gravity transport of gray water. The treated gray water has a very high quality and can be reused for non-in-house purposes, such as irrigation of green spaces and service water (Nuñez von Voigt and Vocks 2012). Black water is not treated due to the complex, high-tech system needed. The rain water will be collected in a separate sewer system and reused for the artificial water body. Accordingly, approximately 50 percent of water will be recycled locally (Seelig 2011)

Within the housing typologies, a middle-technology option has been developed to enhance optimal use of natural sunlight. The non-load-bearing part of the outer façade has sun shutters, the regulation of which changes the energy-impact throughout the day and the seasons, as well as offering graduated control over the privacy of the inner living spaces. In this regard, two measures have been considered to maximize natural light and minimize summer heat. In front of all openings is a flexi-

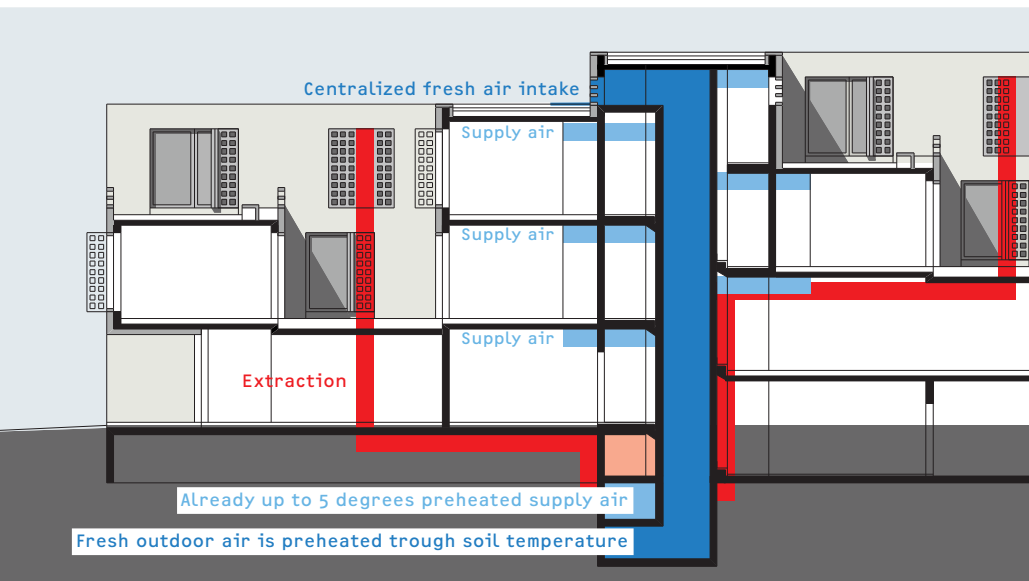

Fig. 72: Sub-soil energy use as example for energy saving heating technologies (Wolpert, Wehage, Pahl-Weber)

ble shutter which can be opened in winter to capture as much daylight as possible and maximize the solar preheating of rooms. This shutter can be closed in summer time to avoid overheating. Moreover, some large rotatable light shelves are in service to control the atmosphere of the courtyard: with a depth of 60 and located a distance of 120 cm apart, they can provide shade and moderate the temperature of the courtyard in summer time. Alternatively, a sun screen made of photovoltaic fabric can cover the

courtyard in summer time to prevent overheating and produce energy. In the evening this energy can be used for lighting. In the winter, the fabric could be rolled back up to allow more sunlight inside.

A central air supply and intake system will be developed at a sub-neighborhood scale to use subsoil energy to provide heat exchange for warming as well as cooling purposes. In this scheme, possible construction methods are all simple and regionally available: pre-fabricated in-situ construction methods, or a combination of semi-precast-elements.

4.8 Mobility

The main principle of the traffic strategy is to reduce traffic and increase mobility within the quarter by means of provoking a shift of mobility routines by supporting ecologically friendly means of transport and providing modern, efficient public transport network. This traffic scheme, moreover, aims at increasing accessibility, traffic safety, flexibility, and energy efficiency on the one hand, while reducing CO_2 and noise emissions on the other. In this regard, the concept combines "push" and "pull" strategies, using hard and soft policies placing motorized traffic as secondary in importance. The objective of soft policy is to provide the in-

Fig. 73: Traffic concept of the Shahre Javan Community area (Döge, Arndt)

habitants with information, i.e. mobility information packages, which encourages them to shift towards eco-friendly traffic behavior. Hard policy, on the other hand, addresses physical aspects of public transport, footpath, and bicycle systems. In this regard, a hierarchically structured public transport system has been developed, consisting of LightRail/Bus Rapid Transit (capacity: 2,000–30,000 Passengers/h, Catchment area: < 300 m), Citybus (capacity: 1,000–4,000 Passengers/h, Catchment area:

250 m–300 m), and local-neighborhood bus (Minibus, Catchment area: < 250 m) (Döge and Arndt 2012).

This scheme is supported by the dense mixed land use urban pattern of the quarter, since in this pattern local services are available within walking distance. Traffic simulations with VISUM prove that the employed land use concept for the 35ha area, when compared to functionally separated land use concepts, can reduce individual car trips by 3 percent, as well as reducing public transportation trips by 7 percent. In this quarter, central location of the social amenities provides easy, by-foot accessibility for most of the inhabitants in a catchment area of 300m. Other local services, such as the shopping center and secondary school, are located at the quarter's border. "This keeps motorized traffic out of the quarter, [and] ensures efficient access with public transport" (Ibid., p. 87). In overview, the area is surrounded by a high capacity transportation system of citybus and Bus Rapid Transit, before developing a Light Rail Transit which will be connected to the Hashtgerd-Karaj-Tehran Metro line. The residential clusters and neighborhoods will be served by a minibus line with stops a maximum of 250 m from any residential unit. Street parking is forbidden, except on the surrounding roads. Taxi stops are also avail-

Main Road [RASt 2006: p. 60]
- v_{max} = 50 km/h
- two lanes
- conceptual requirements: public transport (BRT/LRT), 1,600–2,600 car/h
- border space equipped with additional green or parking places

(according cross section 11.13 RASt 06)

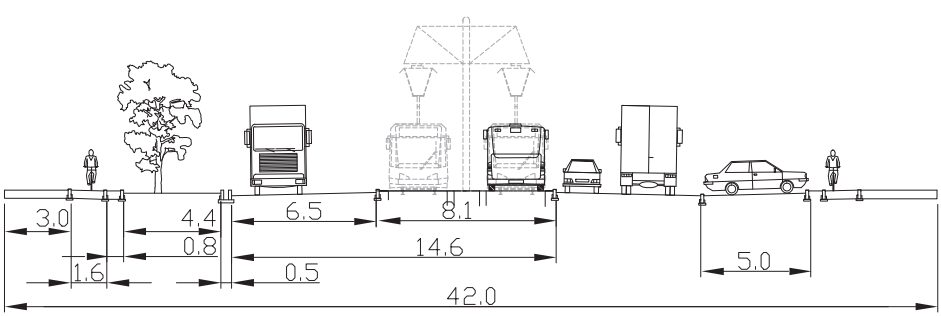

Fig. 74: Cross section of the main road (Döge, Arndt)

able, combined with car sharing stations. Pedestrian and bicycle paths are provided in separate lanes.

Sub-neighborhoods are closed to cars, except in emergency cases. Parking spaces for the residents have been provided in underground parking lots.

4.9 Landscape Planning and Environmental Assessment

Landscape Planning and Environmental Assessment consider different environmental factors and ecosystem functions, supporting environmental protection and enhancement, as well as human recreation. As mentioned, the urban gross density is equivalent to 228 persons per hectare, which is achievable with a more compact urban form and reduced built-up areas. In general, 56 percent of the area is built-up area, compared to 72 percent of the Comprehensive Plan proposed by NTDC (Seelig, Wehage and Pahl-Weber 2012a, p. 74). This implies availability of more un-built space potential for improving the microclimate through a reduction of the heat island effect and thermal stress.

Based on an Environmental Assessment of the draft land use concept, the urban land use has been modified to preserve valuable biotope structures (eastern valley). Several changes are proposed: the relocation of a planned street, as well as environmental enhancement measures and compensation sites proposed to compensate for the impacts caused by the planned construction work (Ohlenburg et al. 2012). A further proposal is a 7 m² per capita green space (access radius 500 m), based on Iranian and German planning standards. This means a demand of about 56,000 m² of

Fig. 75: Distribution of greenery in Shahre Javan Community area (Ohlenburg, Nagel, Demuth, Garske)

green and open space for 8,000 inhabitants. To meet this demand, in addition to the central park, the east adjacent green space structures had to be partially included in the green space calculation (Demuth et al. 2012, p. 81). As for landscaping, native or adaptive trees and shrubs with minimal water consumption are the best option due to the scarcity of water resources. In this regard, treated gray water from the decentralized constructed wetlands will serve for irrigation purposes, the rest of which will

be allowed to seep to enrich the groundwater. The plan also includes installation of water saving irrigation systems (Ibid.).

According to a landscape design study (Fenk and Strein 2012), landscaping of this area is a combination of three greenery concepts of Central Park, Green Connection, and Big Scale Greenery, all linked to the human-made cultural landscape. The Central Park is the major pedestrian avenue linked to a set of (semi-)private and public spaces with unique views to the surroundings. The northern part of the park works as the gate or the main public entrance on the pedestrian level to the Shahre Javan Community area with "an iconic staircase flanked with constructed orchards". A Green Connection including tree clusters and lush green spaces connects the Central Park to the Big Scale Greenery in the east. The main public space of the complex is right in the middle of the Central Park, accessed by a large rainwater basin which works as an open plaza flanked by staircases and ramp-systems. As the cultural heart of the complex, it interweaves the public strip with spaces for religious purposes, schoolyards, school gardens, and constructed wetlands on different levels into one entity. In the southern part of the Central Park there exists a patchwork of landscape architecture elements of tree clusters, construct-

Fig. 76: Distribution of greenery in Shahre Javan Community area (Ohlenburg, Nagel, Demuth, Garske)

ed wetlands, sport- and playgrounds and a rainwater recharge tank embedded in dry landscape fields.

The Big Scale Greenery in the eastern part of the site is a large multi-functional landscape divided in three parts of High Park, Upper Park, and Lower Park. The High Park aims at providing an urban agriculture space, mainly for private gardening based on natural resources and decentralized irrigation systems. In the Upper Park there is an observa-

tion deck and a variety of recreational and sport facilities. The Lower Park includes a valley characterized by the water course edged by riparian vegetation and orchard trees. Here there is a pedestrian area, bicycle lanes on the western side, and a link to the commercial zone. Thus, the Big Scale Greenery provides a symbiosis of socio-cultural, ecological, and economical infrastructure within a local aesthetic entity.

On the neighborhood scale, the greenery at the center of each neighborhood provides a gathering place for social interaction and activity, strengthened by the mixed use pattern scheme. In some cases private gardens have also been designed in front of the apartments, intended to be planted and maintained by the owners of the apartment units.

Fig. 77: Landscaping in sub-neighbourhood level (Wehage, Seelig, Timme, Pahl-Weber)

V
Comparative Analysis

This chapter provides a comparative analysis between Shushtar-No and Shahre Javan Community Pilot Project in order to discover similarities in concepts and objectives. In chapters II and IV a short but articulated thematic introduction to both projects was provided. Putting these thematic studies together, it becomes evident that both projects, despite essential differences in terms of the context, approach, and goals, have some commonalities in regard to the over-arching concept, as well as in architectural and urban initiatives, which deserve consideration. In this chapter, after some introductory remarks which address the different contexts and goals of the projects, a parallel comparative analysis will be presented in which every thematic subject is studied in both cases.

These two projects reflect two different conditions, which define their departure point, planning strategy, and goals. In other words, their planning and design agendas have been influenced by different contexts and have different responses to their individual economic, politic, and environmental pre-conditions. In general, while Shuhstar-No aimed at designing a community which opposes dominant modern principles and, in contrast, attempts to showcase the achievements of a traditional urban texture, Shahre Javan Community takes the current unsustainable condition of Iranian cities, their problems in the fields of energy-consumption and energy-efficient housing, as the main point of departure.

Shushtar-No has to be understood in a context where large investments in the housing sector accelerated the dominant trend towards modernized construction approaches which neglected socio-cultural values of Iranian community and culminated in an "identity crisis" (Diba 2002). To resist this overwhelming trend of "housing development" Diba proposes a "community development" to address traditional Iranian life-style and habitation.

The Shahre Javan Community, on the other hand, was created in the context of the massive population growth of Iranian cities in the last 30 years, the resulting critical social, ecological, and economic challenges, the growing demand for housing, and the increasing energy consumption. Various facts and data support the argument that a move towards energy-efficient housing systems is urgent and necessary, including the increasing energy consumption rate of 7 percent per annum in Iran, and the building sector's high share of energy consumption accounting for about 40 percent of national consumption, such that "The rising energy demand and the impact of the built environment on Green House Gas (GHG) emission make the built environment a crucial factor of mitigating Iranian climate change impacts" (Seelig, Ohlenburg, Pahl-Weber 2012a, p.10). Moreover, the worldwide phenomenon of climate change will transform Iran's climate and development context, such as higher and dryer temperatures, less precipitation, longer periods of cooling demand, and the danger of sea level rise - all of which will be even more critical in large urban agglomerations like Tehran-Karaj. As expressed by the design team, "These challenges define the context and impetus for the Young Cities project. Considering predicted climate change impacts, the huge mitigation potential and a rising political awareness of energy efficiency, the 'Young Cities' project aims to develop methodologically sound solutions for implementing low carbon, climate change resilient housing within the specific climatic, environmental, cultural, and economic context of Iran" (Ibid.).

To meet the abovementioned challenges and questions, Young Cities Project has developed a multidimensional and multidisciplinary research and design team to cover all the fields and areas in question, establishing different Dimensions (see chapter IV) to carefully address diverse aspects

of the problem. Taking benefit from the progressive international literature and practical examples on the one hand, while trying to adapt these findings to the specific context of Iran by means of introducing innovative solutions and approaches proved by different tools such as simulation on the other, the Young Cities Project, and Shahre Javan Community Pilot Project as the site of manifestation, has introduced a leading concept which should be recognized and evaluated worldwide, particularly in the Middle East and North African regions which suffer from similar problems.

However, putting this project in the context of Iran with its unique socio-cultural, political, and administrative characteristics may lead us to be cautious about the future of the work. Some previous examples such as the case of Shushtar-No provides a good, reliable basis to revisit this critical issue. As explained in chapter II, despite progressive ideas employed in this complex, the current situation is unacceptable and even tragic. The question is, how should we evaluate the unfortunate and unpredicted failure of this project? We discussed that a range of problems have influenced the life of this complex, not just the under-estimates or probable mistakes in design and planning, but also the later managerial and administrative decisions of the policy makers, and their inattention to the initial concepts and ideals. Now the question is how to ensure that the same thing will not happen for the Shahre Javan Community after its realization, and how to learn from similar cases. Here, the necessity of a comparative investigation between these two projects becomes clear, to show what has happened to similar initiatives and concepts within the Shushtar-No experience, and, thus, what could be a challenge for the Shahre Javan Community in the future. The main argument, as supported by the case of Shuhstar-No, is that what jeopardizes the future of the Shahre Javan Community is not the conceptual basis, but the treatment and decisions of policymakers, city administrators, and urban management during or after project realization. In other words, while it is the task of the designers to account for probable future challenges of the project – and, as will be explained in this chapter, a set of regulations and suggestions have been carefully proposed in the form of a Detailed Plan to avoid these future challenges and guarantee a secure implementation – it is also the duty of the policy makers to be sensitive about the careful realization of the projects on the one hand, and to plan for effective control, monitoring, and maintenance of the complex on the other. This comparative investigation will provide a basis on which the proposals of the last chapter will be grounded.

It is worth mentioning that this chapter only concentrates on the commonalities; obviously differences in goals, approaches, and employed innovations are considerable, and the Shahre Javan Community Pilot Project represents a more diverse and multidimensional approach due to the complexity of the project's context on the one hand, and its multifaceted goals and objectives on the other.

Environmental adaptation is a key issue for both projects and special approaches and methods have been employed to achieve this goal. Despite differences in the climatic condition of the two—Shushtar-No is located in an arid area with hot summers and mild winters, while Hashtgerd in a semi-arid area with cold winters and warm summers—similar urban patterns have been taken as the inspiration source for the most effective environmental adaptation, namely, the "closed texture" (Diba 1986) of the traditional Iranian city and the "dense and clearly readable urban pattern" (Pahl-Weber, Seelig and Ohlenburg 2011, p. 60) of the traditional Islamic city. Although the suitability of this particular form for both climates requires scientific investigation, both projects strove to benefit from the typical vernacular urban pattern. This common concern has been incorporated in similar physical considerations, such as creating compact texture with narrow streets to produce sufficient shade and breeze, minimize exposed building surfaces to reduce thermal loss, optimize orientation of the buildings to enjoy natural breeze and ventilation, and benefit natural ventilation, cooling, and sunlight advantages of the courtyard typology. Some differences, of course, are observable, mostly derived from the availability of different construction technologies: while Shushtar-No employs more traditional methods, such as construct-

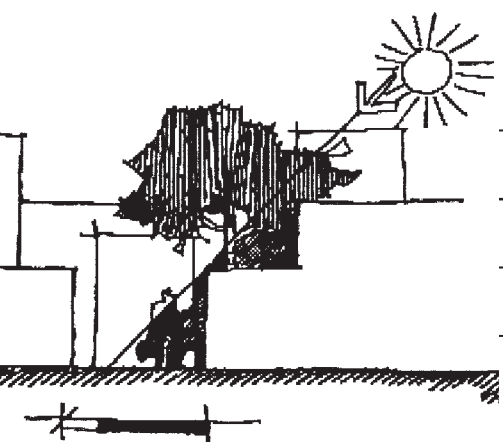

Fig. 78: Narrow streets in Shushtar-No (Diba 1986)

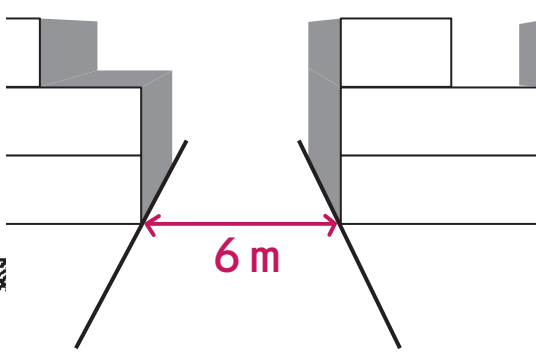

Fig. 79: Narrow streets in Shahre Javan Community Pilot Project, schematic design (Seelig, Wehage, Leubert, Pahl-Weber)

ing thick load-bearing walls, Shahre Javan Community Pilot Project uses more advanced technologies such as photovoltaic sun screens to optimize on environmental conditions.

Both projects have taken the traditional urban pattern of typical Iranian cities as the source of inspiration for planning and designing urban layout; while Shushtar-No refers to the neighboring traditional city of Shushtar as a reference, the Shahre Javan Community Pilot Project refers to the "typical" or "general" image of a traditional city and intends to re-interpret its urban configuration in a new way- using the compact urban texture of the city of Kerman as a reference image . Whatever the inspiration sources are, both cases propose a compact urban form with a low-rise, high-density approach, but using different formal interpretations.

A close observation of the urban pattern designs (Fig. 80) shows that, urban configuration of Shushtar-No is more regular than the Shahre Javan Community Pilot Project, maybe due to the undulating topography of the latter case. Further, street geometry in the former case is strictly regular and thus far from the organic street pattern of the traditional city, while in the latter case, street pattern follows an irregular, somewhat organic order more similar to the organic street patterns of the traditional city. This is easily perceivable by comparing figure-ground maps of both projects. Finally, Shushtar-No generally appears more compact than the Shahre Javan Community in terms of built-up areas; urban blocks are densely linked and interwoven.

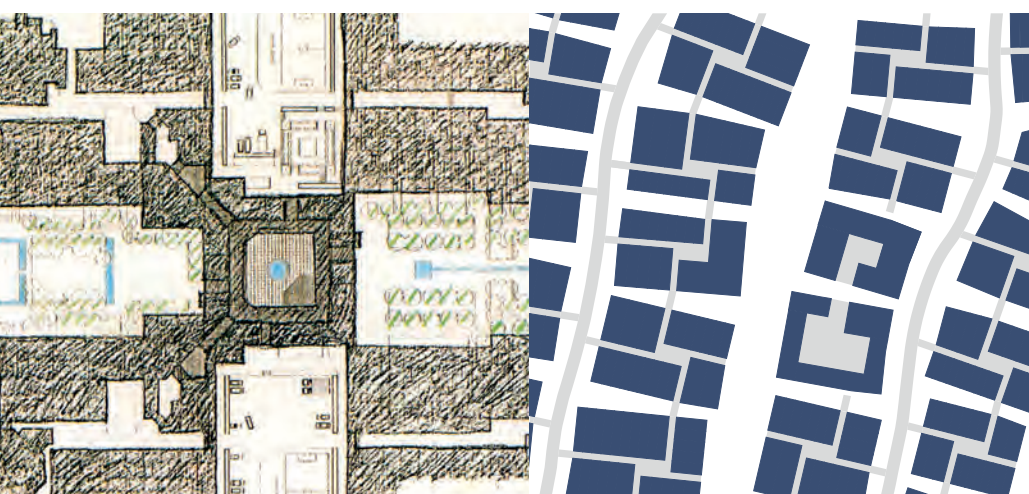

Fig. 80: Figure-Ground scheme of the projects (left: Diba 1981; right: Wehage, Seelig, Pahl-Weber)

The low-rise, high-density approach has been manifested differently in these projects. In Shushtar-No the majority of the buildings are non-apartments (90 percent), while in Shahre Javan Community Pilot Project the general residential pattern is composed of apartments. However, since in the latter case the highest building typology is not more than four stories, both of the projects could be categorized as low-rise, high-density complexes.

Another difference is the pattern of “street” or “passageway” in both projects. In Shushtar-No there is a clear continuous hierarchy typical of traditional cities, from the central public space up to the culs-de-sac. This character grants the complex a particular ambiance (Stimmung), such that a short walk through the streets is reminiscent of a traditional city. In the Shahre Javan Community Pilot Project a sense of spatial hierarchy is also observable, where the streets are arranged by the dominant dispersed hierarchy which starts from a public space and ends in a semi public space (in sub-neighborhood blocks).

In both projects, the courtyard prototype is understood as the optimal model upon which the basic configuration of entire complexes and residential units are organized, it is a prototype which addresses both the physical and socio-cultural prerequisites of dwelling in Iran. There are three distinguishable levels of implementation for this prototype: urban, community, and unit. As illustrated in chapter II 2.5, Shushtar-No shows a clear hierarchy of courtyard implementation from urban to individual unit level: the spinal open space stretching through the complex works as an urban courtyard, central open space is the community courtyard, and each residential unit enjoys its individual interior courtyard. The urban courtyard in the Shahre Javan Community Pilot Project is fragmented due to the urban layout, it is comprised of several landscaping areas incorporated in the Central Park and Green Connection. Community courtyards are more effective in this project, since every residential cluster has been organized around a central open space. Urban blocks of the residential neighbourhoods are divided into residential units designed around a central individual courtyard.

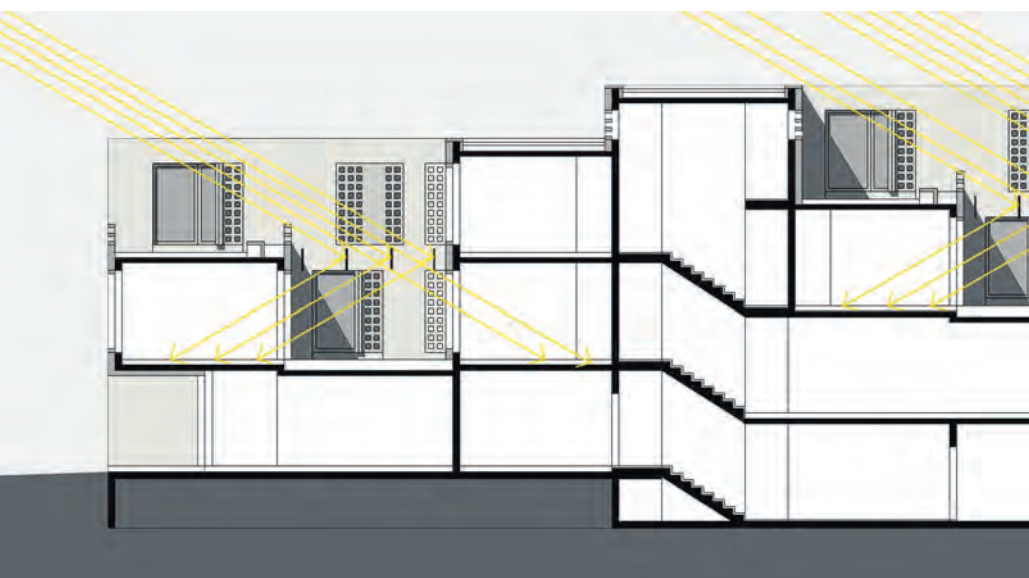

Fig. 81: Architectural measures to protect privacy and to use the sunlight (Wolpert, Wehage, Pahl-Weber)

Thus, the courtyard prototype has been employed as the central concept for the housing layout in both projects: in the case of Shushtar-No, with direct reference to the traditional housing typology in the old Shushtar (Fig. 17); in the Shahre Javan Community Pilot Project the courtyard as an optimal prototype has prioritized its unique capacities and potentialities. In Shushtar-No, single residential units employ a formal interpretation direct from the traditional courtyard scheme, where the courtyard

defines the central space around which all the living rooms are gathered. This courtyard contains typical elements such as a pool and greenery (Fig. 18). In the apartment buildings, this courtyard is transformed into a joint open space at the center to provide light for the interior.

In Shahre Javan Community Pilot Project the courtyard prototype has been interpreted differently. In this case, the "interior courtyard" plays the key role such that all the units have access to an interior courtyard. This courtyard, in addition to its climatic advantages, must help meet the demand for privacy (Wehage and Pahl-Weber 2012). Here, some architectural measures have been considered to prevent possible visibility and protect privacy, such as making the exterior edge of the courtyard inaccessible by means of putting a greenery box and thus hindering direct view, or covering the windows with grilles, and allocating interior courtyards to one single two-story apartment in which visibility of the lower level is not in question.

This issue is of high importance when one considers the later interventions by the inhabitants of the Shushtar-No complex to guarantee their privacy and security. As explained in detail in chapter II 2, residents of Shushtar-No have walled the exterior windows and in some cases balconies to protect privacy and enhance security. This example shows that if the desire for privacy and security, as a fundamental factor for the residents, could not be met in a building, then the inhabitants would solve this problem using any immediately available measures or interventions, drastically changing the urban scape for the worse.

5 Mixed land use

The concept of mixed use is realized in Shushtar-No as a separation between dwelling and work, typical in traditional Iranian cities where there is a clear division between dwelling-place and working place: local services for the neighborhood (mahalla) purposes are collected at the neighborhood center, separate from the residential areas. Thus, in Shushtar-No, local needs and services on the neighborhood scale have been provided in central, mixed use areas.

In the case of Hashtgerd, the concept of "mixed use" has been interpreted differently and is manifested in two patterns: "vertical mixed use" and "horizontal mixed use," where the local services are more fundamentally linked to the residential units, with a close connection between dwelling and work. This connectivity is more observable in the residential units located around the central public space in the blocks where the ground floor has been dedicated to commercial activities in the hope of enhancing social livability at the neighborhood scale. To compare, in Shushtar-No a concentrated mixed use is observable, whereas in the Shahre Javan Community, commercial units are more deconcentrated (see Fig. 69).

Theoretically this concept is a progressive idea whose advantages are extensively acknowledged by scholars. However, both approaches (employed in Shushtar-No and the Shahre Javan Community Area) may have some crucial challenges in the absence of systematic neighborhood control and management. A main challenge is the misuse of commercial spaces, in the sense that the owners might (for more profit) dedicate these spaces to functions which may be disturbing to neighborhoods and their socio-cultural sensitivity. Originally visualized as a place for light shopping purposes, supplying the everyday needs of inhabitants, there is the potential for them to be transformed into noisy workshops or other disruptive pursuits. Moreover, regular customer traffic could jeopardize neighborhood security and privacy, leading to resident dissatisfaction. Additionally, the façade of the commercial units may be changed or re-organized in an inappropriate way, consequently disturbing the aesthetics of the complex – unless unambiguous regulations and strict control are taken into consideration for the entire Shahre Javan Community area. To avoid these inconveniences, clear-cut regulations have been proposed at the urban planning and urban design level, including defining allowable non-disturbing uses for the commercial spaces of the sub-neighborhoods, and providing separate entrances for them (see Seelig, Wehage and Pahl-Weber 2012b, pp. 97–98). A careful implementation and observation of these regulations may prevent the abovementioned challenges.

In Shushtar-No, greenery was limited to economize and simplify its maintenance; an architectural decision borne of the architect's awareness of the generally low maintenance quality common in Iranian public spaces. This fact is observable in the complex's existing situation where the limited central greenery has been left unattended and thus in disrepair (see chapter II 2). To find an intermediate solution and raise residents' awareness and concern about the importance of greenery, some semi-public, semi-private garden spaces have been designed in front of the apartments for which the residents were to be responsible. However, these pieces of landscaping are now either walled-in and added to the property, or left out and neglected.

In the Shahre Javan Community Pilot Project, maintenance of the main greenery spaces, "Central Park", "Green Connection", and "Big Scale Greenery"—taking their complete implementation for granted—will be a critical issue. Key questions include: who will pay for realization, and who will cover the costs of and be responsible for maintenance (the municipality or the community itself). But this is not the only challenge. The importance of the proposed greenery for the community has been well studied and elaborated by the research and planning team, and progressive but place-specific measures have been developed to minimize the costs of the maintenance, in what promises a pragmatic prototype for similar cases (see Ohlenburg et al. 2012, pp. 101–104; Fenk and Strein 2012, pp. 105–106). However, initiatives have to be planned, mainly by the local administra-

Fig. 82: Semi-public greenery in front of the residential units (Wehage, Seelig, Timme, Pahl-Weber)

tion, to secure full implementation, since a partial realization will not meet the needs (or reach the potential) of the landscaping. On the other hand, some private gardens have been designed in housing areas, which, like Shushtar-No, are supposed to be planted and maintained by the residents. What is needed in this case is a clarification of ownership, maintenance costs, and managerial support to provide a secure base for such a vision and prevent a fate similar to that of Shushtar-No's landscaping.

Providing a car-free built environment and encouraging residents to park their private vehicles out of the residential quarters was a progressive concept for Shushtar-No, especially since, in the 1970s, private cars were not affordable and therefore less usual, particularly in a complex where the majority of inhabitants belonged to the labor class. The architect's principle intention was likely inspired by that time's critique on the overwhelming technology rather than environmental concerns, and was aimed at creating walkable spaces, making the residential quarters more livable, and enhancing social contact. On the other hand, the car-free quarters of the Shahre Javan Community Pilot Project came more from an environmental point of view, as a tool to decrease CO_2 emissions and energy consumption at the neighborhood level; a very effective and common concept in the current literature on sustainable development. In other words, cars were for Shushtar-No an enemy of social life, while for the Shahre Javan Community they were an enemy of the environment and a source of pollution.

In Shushtar-No cars were supposed to be parked and left in designated parking lots outside the residential quarters, access to the residential units was by foot. In the Shahre Javan Community, the initial idea was to follow a similar approach, this was later changed and rightly so given the probable unwillingness of the inhabitants. The only justification was the current, excessive car-dependency of Iranians, which makes any radical change of behavior almost impossible. Moreover, the existing poor public transportation encourages people to orient their life towards private cars. In the final concept, parking spaces were provided within the residential quarters in underground parking lots designed with direct access to the residential units.

The way this kind of parking scheme has been treated in Shushtar-No is very indicative. Residents don't care about using public parking lots, they drive their cars into the residential quarters, and either park them in front of the houses or in the garages they've built out of their courtyards. This is not feasible in the Shahre Javan Community, as the spatial configuration of the neighborhoods does not allow it. In general it can be argued that, although a completely car free neighborhood may have more environmental and social advantages for, and be more socially acceptable to, the inhabitants, provided that they are adequately informed, this mediatory approach—providing parking space for all the residential units—appears to be both more acceptable and more feasible. This approach, simultaneously meets the inhabitants' concern for a private car, while helping them to re-consider their car use patterns. This is the concept behind "soft policy", the aim of which is to provide inhabitants with information which encourages them to shift towards environmentally-friendly traffic behavior.

However, when accounting for the current traffic problems in Iranian cities, it could be argued that the planned general traffic package, the "hard policy", which considers a range of aspects from footpath and bicycle to Light-Rail and BRT, may fail to be realized in the near future. As a result of a systematic analysis of the existing conditions and the given comprehensive plan (see Döge and Arndt 2012), the proposed scheme combines all possible modes to achieve an efficient transportation system. However, the reality, which is out of the hand of the planners, shows a different story. For instance, the BRT system has been recently integrated into the transportation network of major cities like Tehran, and the Metro line of Tehran is supposed to be connected to Hashtgerd New Town in 2013, after several retardations. Even if realized in 2013, extending the metro line into the city is unfeasible, as long as the current problem with absorbing new inhabitants remains unsolved, and the population growth does not remarkably increase. Nonetheless, the proposed traffic package introduces a progressive and pragmatic framework which can be used and adapted for other similar cases.

In both projects, the employed construction technology is neither primitive nor advanced (high-tech), but a middle-level technology based on what is available. However, this approach is more recognizable in the case of the Shahre Javan Community, since a range of technical issues have been identified to meet the goals of the project regarding energy-efficiency and environmental adaptability. In Shushtar-No the materials and construction methods were locally available, while the employed labor were mainly native people. In the case of the Shahre Javan Community Pilot Project, the employed technology is not limited to building construction, but extends to the mechanical facilities at the building and community scale, such as the decentralized water and waste treatment system. Considering issues of "availability" and "locality" within the scale of region, many techniques and materials are locally available, excepting just a few. During actual construction and realization, local contractors and labor have priority, while simple materials are supplied from neighboring factories, supporting the new town's economy from the beginning.

9 Target Group and Actual User

Shushtar-No was originally designed for the employees of the Karoun Agro-industrial Company; there was a somewhat clear idea of the users, their social status, the number of inhabitants, etc. This has enabled the design group to plan for this complex in detail. However, as was explained in II.2, due to the political conditions after the Islamic Revolution and the Iran-Iraq war, this initial intention was neglected and the residential structure of the complex was drastically changed. Most of the current, observable problems with Shushtar-No are rooted in this radical change; the unexpected residents are very diverse and generally form lower social classes than was originally planned for.

In the case of the Shahre Javan Community, there was no clear picture of the probable users, their social class, or their background. This ambiguity was chiefly due to the ambiguous and changing character of Iranian New Towns, as well as the difference between the predicted structure and the reality, what made any precise prediction by the Hashtgerd NTDC impossible. This uncertainty in regard to the target group is critical, since it makes achieving a clear understanding about the wishes, behavior, and expectations of the probable users impossible. For instance, innovative initiatives would be more welcome if the area is inhabited and managed by a homogeneous, culturally and socially educated people, rather than by diverse, heterogeneous families. Moreover, any collective activity for more efficient community management would work better in a more homogeneous community.

It may be argued that, given the existing demographic pattern of Hashtgerd New Town, users would likely be similar in income and socio-cultural status, namely people from middle class with moderate income. In fact, it seems that, in the near future, this town will not be attractive enough for high-educated or high-income families, and no considerable change is expected. Policy makers and local administrators must take careful measures to avoid occupation of the complex under unexpected conditions and by unsolicited groups, and so to avoid the types of challenges experienced by Shushtar-No.

Universitätsverlag der TU Berlin
ISSN 2193-6099 (Print)
ISSN 2193-6102 (Online)
ISBN 978-3-7983-2512-8 (Print)
ISBN 978-3-7983-2513-5 (Online)

Road, Housing & Urban Development Research Center
ISBN 978-600-5392-63-0