

A Strategic Analysis of the Adaptive Reuse of Industrial Heritage Affection on Urban Infill Development Policies with an Approach to Social Sustainability (A Case Study: Shokoofeh Babol Vegetable Oil Company)

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ABSTRACT

As an approach to urban infill development, urban regeneration can lead to social sustainability by establishing a synergy between culture and economy using the potential and actual industrial heritage capacity as evidence of the cultural developments in the past and using creative industries in order to link individuals to a collective identity, to escape from urban poverty, and to encourage people toward participation and social dynamics. This study uses the strategic planning approach and the SWOT questionnaire to analyze the impact of recovering Shokoofeh Babol Vegetable Oil Company on urban infill development in the social sphere and then proposes strategies in relation to the situation. In this line, the strategy of “using urban infill development policies including urban restoration and regeneration to strengthen urban identity and emphasizing social interpretation and collective memory to strengthen social interaction” is considered as the most important strategy under study.

Key words : Industrial heritage, Infill development, Social sustainability, Adaptive reuse

INTRODUCTION

Since the industrial revolution, technology is constantly evolving with industrial practices. Technological innovation, advances in the automotive industry, reduction in transportation costs, and developments in the deindustrialization trend of the urban environment have led to the relocation of industrial centers from urban cores to marginal agricultural land (Stratton, 2000).

One of the outcomes of the relocation of industries is the broad expanse of land remaining from relocated industrial sites in urban cores which are characterized by rich green spaces, old buildings, and some elements relating to large factories and workshops (Snyder, 2005). The preservation of such

areas as a symbol of the history of modernism and the old industrial heritage in Iran under the name of industrial heritage links the contemporary era to the past and strengthens the spirit of place in this connection which is the result of responding to the public needs and maintaining close relationships in the neighborhood over time and can be considered as a space of collective experience and memory.

Industrial heritage, compared to other forms of recognized heritage, constitutes a relatively new field (Cho *et al.*, 2014). Heritage protection is an integral part of the development of urban culture. Adaptive reuse of heritage encourages new cultures and contributes to the achievement of the double goal of cultural innovation and economic development (Langston *et al.*, 2007). Economic development is the

most important dimension of physical development. One of the most important factors that affect physical development is the presence or absence of urban infrastructure which is the basis for urban infill development (Fakhr Ahmadi *et al.*, 2008).

In the area of social planning and design, cultural considerations emerge from discussing social sustainability and social capital. One neglected aspect in discussions on sustainability is the social and cultural potential of adaptive reuse that generously contributes to the protection of industrial heritage and ensures the cultural maintenance of the past, the present and the future (Roseland *et al.*, 2005). Modern adaptive reuse of industrial heritage sites that have lost their function contributes to the improvement of social sustainability and cultural potential and leads to social cohesion through respect for cultural capital as an important part of the social potential by maintaining a shared collective identity (Blockley *et al.*, 1999).

Opportunities for adaptive reuse of industrial heritage in urban cores support sustainability and smart development initiatives that focus on urban infill development and are an attempt to reduce urban sprawl (Hawkes, 2003). However, physical reuse and functional restructuring, adaptive reuse of industrial heritage based on the needs and requirements of the post-industrial society, and economic revitalization through injecting new types of land use for improving the share-profitability of industrial buildings are among issues that have been raised in relation to industrial heritage (Langston *et al.*, 2008).

Yiftachel and Hedgcock (1993) (Yiftachel *et al.*, 1993), Tweed and Sutherland (2007) (Tweed *et al.*, 2007), and Yung and Chan (2012) (Yung *et al.*, 2012) conducted extensive research on industrial heritage and methods of protecting it that leads to sustainability. The studies conducted by Tweed and Sutherland (2007) and Yung and Chan (2012) on the international level show how the concepts of sustainability and the conservation of industrial heritage can contribute to global sustainability. Tweed and Sutherland (2007) have a more comprehensive approach to industrial heritage and sustainability and consider them as symbols of social sustainability in their research. They underscored the link between

industrial heritage and enhanced quality of life and their role in defining location area identity. Yiftachel and Hedgcock (1993) in their study move beyond the studies by Tweed and Sutherland (2007) and Yung and Chan (2012) by focusing on one of the pillars of sustainability - sustainable urban communities.

In view of the foregoing discussion and by understanding that the recognition of the potentials and limitations of industrial sites can have a constructive influence on urban infill development policies in the social sphere, in this article we try to answer the following questions. What are the potentials and limitations of the reuse of Shokoofeh Babol Vegetable Oil Company? And, what are the possible strategies for the reuse of this factory that lead to the reinforcement and promotion of urban infill development policies in the social sphere of Babol city, Iran? In this study, we attempt to analyze the strengths, weaknesses, opportunities and threats from the view of experts in relation to the importance of industrial heritage and its role in sustainable urban and social development. Finally, with regard to these views, we provide strategies and solutions based on the SWOT model in order to take optimized and targeted advantage of the strengths and opportunities and eliminate the weaknesses and threats for the achievement of sustainable urban development through adaptive reuse of industrial heritage.

Case study

Shokoofeh Babol Vegetable Oil Company is located in an area of 22 thousand square meters in the third historic layer of the development of the city of Babol (1965). The building goes back to the second period of the Pahlavi dynasty in 1959 and was constructed and operated under the supervision of Russian engineers. The company is located in the neighborhood of Ahangar Kola and, for its expansiveness, is adjacent to a variety of land use including education (elementary school), higher education (University of Babol), cultural (Najarian library), religious (Ahangar Kola mosque), and administrative, medical, engineering and residential complexes. The designing principles of this complex are fully consistent with the principles of vernacular architecture and texture and its characteristics such as a special exterior brickwork and plasterwork

Table 1: Internal factor evaluation (IFE)

Row	Internal factors	Initial coefficient	Weighted mean	rank	Final coefficient
Strengths					
1	Vast structure of the site and its location in the urban fabric	80	0.090	3	0.270
2	Adjacency with residential, administrative, educational and commercial land use	81	0.091	3	0.273
3	Urban utility infrastructure such as water, electricity, gas and telecommunications	74	0.083	2.5	0.207
4	Access to public transportation and the city's main paths of connection	80	0.090	3	0.270
5	Physical compatibility of the factory's building with the surrounding fabric, neighborhood and region	75	0.084	2.5	0.210
6	Long-term presence in the urban landscape and the acquisition of an elemental or landmark status	85	0.096	4	0.384
7	The body of the industrial building as an economic and cultural capital in physical development	83	0.094	3.5	0.329
8	Existence of different types of vegetation as well as nature-oriented and pedestrian-oriented design	81	0.091	3	0.273
9	Observation of technological and structural evolution and the use of materials in the physical evolution of the building as evidence of the identification of social and cultural urban evolution	85	0.096	4	0.384
10	Existence of free or open plans and flexibility in design	76	0.086	3	0.258
11	Geographic features of cultural locations in the site such as a sense of history (the past) and progress (present and future)	88	0.099	4	0.396
Sum		888	1		3.254
Weaknesses					
1	Existence of old and dilapidated buildings on the edge of the site that creates an unsafe neighborhood	42	0.118	1	0.118
2	Lack of infrastructure to provide transportation and parking lots in Ahangar Kola neighborhood and narrow paths in distressed areas adjacent to the site	74	0.209	3	0.627
3	High maintenance and reconstruction costs for the buildings on the site because of being old and deserted for a long time	69	0.194	2	0.388
4	Environmental pollutants such as odor, continuous noise and explosions during factory operation, and financial and human costs to citizens (leading to a negative image or memory in the public mind)	70	0.197	2.5	0.492
5	Harsh and cold aesthetics, unadorned facades, and the volume and materiality of industrial buildings against the human scale	52	0.147	1.5	0.220
6	Existence of huge cultural and economic class differences among the residents	48	0.135	1	0.135
Sum		355	1		1.98

Table 2: External factor evaluation (EFE)

Row	Internal factors	Initial coefficient	Weighted mean	rank	Final coefficient
Opportunities					
1	Existence of Noshirvani Industrial University of Babol and the presence of students as a local institution for cultural and scientific innovation	73	0.084	2.5	0.210
2	Presence of different classes of people due to the mixing of land uses adjoining the site and opposition to social isolation	80	0.090	3	0.270
3	Efforts of authorities for the deindustrialization of urban corpora and the relocation of industrial activities to urban outskirts	81	0.090	3	0.270
4	Being located in the third historic layer of the development of the city of Babol (1965) strengthens the potential of the site as heritage and the application of urban regeneration strategies for the promotion of sustainable urban infill development	90	0.1	4	0.4
5	Changing needs of the post-industrial society and the need for changing the industrial land use and adaptive reuse of the existing framework to meet public needs	82	0.091	3	0.273
6	Babol's citizens' interest in and motivation for the establishment of local charitable and philanthropic communities and the lack of venues in the city for the performance of social activities	79	0.090	3	0.270
7	Holding art and movie festivals in the town (Babol is known as the city of movies) and the potential of using creative industries for urban regeneration of the criterion culture as a factor for encouraging urban infill development policies	83	0.094	3.5	0.329
8	Strengthening the urban tourism industry by reusing industrial buildings as industrial heritage and the convergence of the two axes of culture and economy in urban regeneration	88	0.098	4	0.392
9	Adjacency of Ahangar Kola mosque to the site, the use of religion as an element of social capital and the potential to develop social activities in rituals	76	0.081	2.5	0.202
10	The primary potential of industrial heritage for strengthening small businesses and recruiting local labor by creating inventive areas in the adaptive reuse of the site and the use of surplus properties, incomes, and taxes for funding neighborhood and urban public services in the city	88	0.098	4	0.392
11	Increase in residential density, the inclusion of areas adjacent to the site in the agenda of the fifth commission of the municipality of Babol, and low per capita cultural-social space in the area	74	0.084	3	0.252
Sum		894	1		3.26
Threats					
1	Low familiarity of authorities with the effects of protecting the country's industrial heritage on the social and cultural capital and the promotion of urban infill development policies such as urban restoration and regeneration of the criterion culture	82	0.218	2	0.436
2	Increase of social abnormalities compared with before with the presence of students and tourists in the area	81	0.215	2	0.430
3	Stress, tension and insecurity for residents due to the presence	73	0.194	1	0.194

	of strangers and popular resistance to changes in the structure				
4	Lack of favorable economic efficiency of operations by the Municipality as a result of injecting socio-cultural land use to increase density and the injection of business land use	83	0.222	2	0.444
5	Lack of interest by the citizens in the complex due to the negative mental image of its operation in the past	57	0.151	1	0.151
Sum		376	1		1.655

have given it a dimension beyond its mere industrial appearance. This area is on the agenda of the fifth commission of the municipality of Babol.

METHODOLOGY

We used the SWOT model to design a strategic plan for this study. The following steps have been taken to implement this model in the study:

By conducting surveys on the internal and external environments of Shokoofeh Babol Vegetable Oil Company, we identified the strengths, weaknesses, opportunities and threats. In order to build an analytical model, we weighted the factors by expert evaluations. We asked more than 20 professionals with at least a master's degree in the fields of architecture, urban design, and maintenance and repair of historic buildings for their comments on the internal and external factors affecting urban infill development policies on a Likert scale with an

approach to social sustainability and considering the adaptive reuse of industrial heritage in this complex. The data extracted in the process related to internal factors (strengths and weaknesses) are presented in the table of internal factors evaluation referred to as IFE (Table 1) and the findings related to external factors (opportunities and threats) are presented in the table of external factors evaluation referred to as EFE (Table 2).

In the first column of both tables, we developed a list of internal and external factors. The second column presents the primary factor and the third column presents the weighted means for each of the factors listed in the tables such that the sum of the weights belonging to IFE and EFE becomes normal and equal to one in each table. The fourth column represents the rank and rating of each factor as follows: We rated each item from 5 (=very high) to 1 (=very low) based on the opinions of the respondents and ranked the factors from 1 (=low)



Fig. 1: Location of the site in the layers of urban development and its adjacencies

Table 3: Synthesis of internal and external factors

Internal factors	Strengths	Weaknesses
	<p>S1 - Geographic features of cultural locations...</p> <p>S2 - Long-term presence in the urban landscape and the acquisition of an elemental or landmark status ...</p> <p>S3 - Observation of technological and structural evolution and the use of materials in the physical evolution of the building...</p> <p>S4 - The body of the industrial building as an economic and cultural capital...</p> <p>S5 - Adjacency with residential, administrative, educational and commercial land use...</p> <p>S6 - Existence of different types of vegetation...</p> <p>S7 - Vast structure of the site and its location in the urban fabric...</p> <p>S8 - Access to public transportation and the city's main paths of connection...</p> <p>S9 - Existence of free or open plans and flexibility in design...</p> <p>S10 - Physical compatibility of the factory's building with the surrounding fabric...</p> <p>S11 - Urban utility infrastructure...</p>	<p>W1 - Harsh and cold aesthetics and unadorned facades of industrial buildings...</p> <p>W2 - Environmental pollutants such as odor, continuous noise and explosions...</p> <p>W3 - Oldness of the buildings on the site and being deserted for a long time...</p> <p>W4 - Lack of infrastructure to provide transportation and parking lots in Ahangar Kola neighborhood...</p> <p>W5 - Existence of huge cultural and economic class differences among the residents...</p> <p>W6 - Existence of old and dilapidated buildings on the edge of the site that creates an unsafe neighborhood...</p>
External factors	Aggressive strategies (SO)	Conservative strategies (WO)
Opportunities		
O1 – Being located in the third historic layer of the development of the city of Babol (1965) strengthens the potential of the site as heritage...	SO1 - using urban infill development policies including urban restoration and regeneration to strengthen urban identity and emphasizing social interpretation and collective memory to strengthen social interaction	WO1 – Changes in the concept of aesthetics in the post-industrial era and attention to changes in taste and fashion in society after the advent of industrialization in Iran, the use of building originality to strengthen the sense of place and soften the harshness of industrial building, combinational architecture, the use of local materials, and consistency with the surrounding fabric
O2 – The primary potential of industrial heritage for strengthening small businesses...	SO2 – Holding a variety of artistic and socio-cultural events in the complex with the targeted synergy of site potentials and human capital	WO2- Determining the optimal potential of the site because of its expansiveness and providing infrastructure facilities for the welfare of local residents and visitors
O3 - Strengthening the urban tourism industry by reusing industrial buildings as industrial heritage...	SO3 - Emphasizing industrial tourism to strengthen social interaction and the convergence of the two axes of culture and economy in urban regeneration	WO3 - Encouraging local and small businesses by providing creative contexts such as promoting arts markets and the reuse of handicrafts
O4 - Holding art and movie festivals in the town and the potential of using creative industries...	SO4 - Accelerating and facilitating the understanding of cultural changes in the transition from tradition to modernity with increased social interaction between citizens and students as the most active stratum of civil society	WO4 - Reviewing and organizing the
O5 - Changing needs of the post-industrial society and the need for changing the industrial land use and adaptive reuse...	SO5 - Applying the technique of	
O6 - Efforts of authorities for the deindustrialization of urban corpora...		
O7 - Presence of different classes		

of people due to the mixing of land uses...

O8 - Babol's citizens' interest in and motivation for the establishment of local charitable and philanthropic communities ...

O9 - Existence of Noshirvani Industrial University of Babol...

O10 - Increase in residential density...

O11 - Adjacency of Ahangar Kola mosque to the site...

adaptive reuse in reusing the building for taking maximum advantage of the unique physical and architectural features of the design, as well as maintaining and strengthening sense of originality and place

SO6 - Using natural and climatic potentials for pedestrian-oriented designs to enhance social interaction
SO7- injection of modern uses to the body of the building to create a dynamic urban space and prepare the ground for the actualization of and cultural and social innovations for all classes and ages

SO8 - Establishing cultural, civic and art institutions, and encouraging people to participate in neighborhood and urban management

edges and boundaries of the site in relation to the city after reusing and injecting new land uses to the site, and integrating and linking it to the surrounding urban space

WO5 – Organizing the building and the site to provide optimal urban capitals, access to and enjoyment from equal urban facilities by all walks of life and providing social justice

Threats

T1 – Lack of favorable economic efficiency of operations by the Municipality as a result of injecting socio-cultural land use to increase density and the injection of business land use...

T2 - Low familiarity of authorities with the effects of protecting the country's industrial heritage...

T3 - Increase of social abnormalities compared with before with the presence of students and tourists in the area...

T4 - Stress, tension and insecurity for residents due to the presence of strangers and popular resistance to changes in the structure...

T5 - Lack of interest by the citizens in the complex due to the negative mental image of its operation in the past...

Competitive strategies (ST)

ST1 – Restoration, equipment, and maintenance operations on the complex by observing project management principles to save money, reduce the initial cost, and avoid reconstruction costs, as well as adaptive reuse of the building as an economic and cultural capital

ST2 - Training and informing citizens and residents, emphasizing the value of industrial heritage, creating culture through media and brochures

ST3 – Building commercial-cultural centers tailored to the fabric of the site to attract people, enhance social interaction, and encourage participation in order to fund the projects by the Municipality

ST4 - Utilizing the variety of land uses adjoining the site and the provision of urban spaces with multipurpose designs for employees, residents and students to spend their leisure time

Defensive strategies (WT)

WT1 - Holding seminars in relation to the adaptive reuse of industrial heritage and informing authorities of its positive impact on urban infill development and urban sustainability

WT2 - the use of religion as a social capital to encourage community participation and social control and to moderate social abnormalities

WT3 - Assignment of neighborhood security to the residents and citizens through civil rights trainings and mutual respect

to 4 (=high) proportional to their initial mean value. The fifth column presents the final coefficient of each factor which is calculated by multiplying the values of the third column by the values of the fourth column. Finally, we calculated the overall final coefficient of the complex under review.

After completing the tables of internal factor evaluation (IFE) and external factor evaluation (EFE) known as data entry, the IFE and EFE tables needed to be integrated with each other (Table 3). This stage was carried out to explain the strategies based on internal factors (strengths and weaknesses) and external factors (opportunities and threats). Upon completion of this stage and after the review and synthesis of SWOT parameters, we achieved four conceivable strategies, including: Aggressive strategies (SO), Competitive strategies (ST), Defensive strategies (WT) and Conservative strategies (WO). By defining a strategic factor evaluation matrix, it was found that the results need to be analyzed in the environment of aggressive strategies (Figure 2). In order to develop effective strategies in an aggressive environment, we tried to think of operational strategies in the synthetic phase using EFE and IFE listed in the tables. Accordingly, we devised eight aggressive strategies, four

competitive strategies, five conservative strategies, and three defensive strategies (Table 3).

RESULTS AND DISCUSSIONS

Based on the theoretical sources of the research and the field studies that have been conducted to provide strategies and solutions for adaptive reuse of industrial heritage to encourage urban infill development policies with an approach to social sustainability, we determined urban and architectural capacities and constraints of Shokoofeh Babol Vegetable Oil Company by the SWOT model and propose practical solutions and strategies. Analysis of the findings in relation to strengths, weaknesses, opportunities and threats (according to Table 3, the prioritization and ranking of internal and external factors from the view of respondents) shows that:

- A: From among the strengths of the case under study, the variable of “geographic features of cultural locations in the site such as a sense of history (the past) and progress (present and future)” has been determined as the most important factor. In order to optimize the use of this factor, we emphasize urban

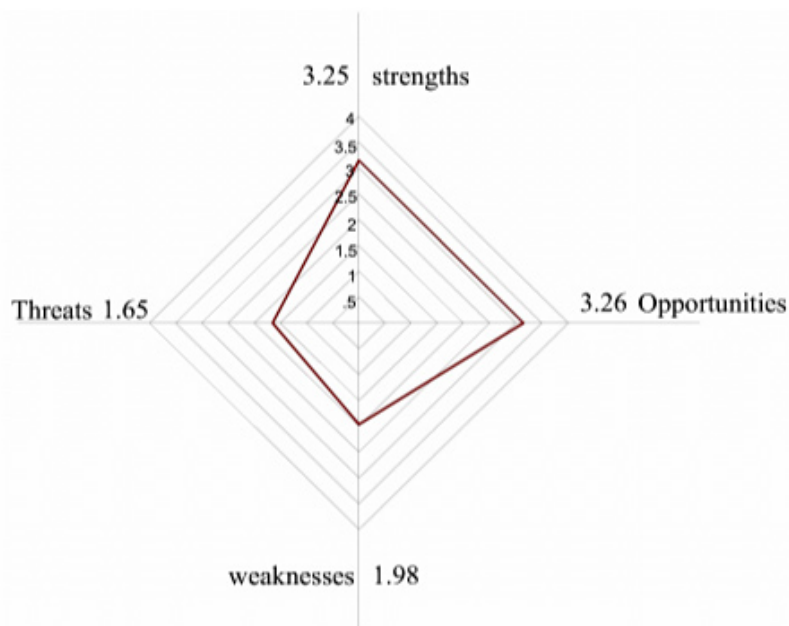


Fig. 2: Strategic factor evaluation matrix

- regeneration of the criterion culture.
- B: From among the weaknesses of the case under study, the variable of “lack of infrastructure to provide transportation and parking lots in Ahangar Kola neighborhood and narrow paths in distressed areas adjacent to the site” has been determined as the most important factor. In order to eliminate this weakness, we can utilize the expansiveness of the site in designing appropriate edges in relation to the urban fabric.
- C: From among the external opportunities in the case under study, the variable of “Babol city’s location in the third historic layer of development (1965), the potential of the site as heritage and the application of urban regeneration strategies for the promotion of sustainable urban infill development” is prior to the other variables. In this context, we can optimize the use of this factor by considering the aggressive strategies presented in Table 3.
- D: From among the external threats in the case under study, the variable of “lack of favorable

economic efficiency of operations by the Municipality as a result of injecting socio-cultural land use to increase density and the injection of business land use” is prior to the other variables. To eliminate this threat, we can refer to the competitive strategies presented in Table 3.

Having said this all, we can conclude that the regeneration of the criterion culture as an approach to urban infill development – with such basic concepts as the use of innovative economic areas and the so-called creative industries – can prepare the ground for a content and function whereby the superstructure is constituted by cultural and social currents and the base is constituted by economical and efficient mechanisms. This can be achieved through respect for the old spaces and the creation of proportionate new spaces in the internal fabrics and cores of urban areas. Such a perspective will lead to a form of synergy in objectives and constitutes a means for urban regeneration (Lotfi, 2011).

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