Journal of Engineering Science and Technology
Vol. 15, No. 6 (2020) 3691 - 3708

THE EFFECT OF CITIE'S SHRINKAGE ON THEIR URBAN FABRIC: A CASE STUDY OF GARAGE AL AMANA DISTRICT IN BAGHDAD

M. H. AL-MUSAWI[1], W. SH. AL-HINKAWI[2,*]

[1]Faculty of Physical Planning, University of Kufa, Iraq
[2]Department of Architectural Engineering, University of Technology, Iraq
*Corresponding Author: 90039@uotechnology.edu.iq

Abstract

Cities, by nature, undergo several temporal and spatial transformations, reaching urban shrinkage. It starts with widespread, over-sprawl and an imbalanced urban and population growth to sprawl-shrinking, in which less activity is distributed over a larger area, resulting in negative spaces, higher vacancy rates, and increase of neglected and vacant structures or buildings, in addition to low cultural and commercial activities. This affects the quality of the fabric and causes the shrinkage of urban identity. This research attempts to study urban shrinkage locally through a selected urban fabric in one of the vital parts in Baghdad, which declined in most of its vital indicators due to urban shrinkage. The objective of the research is to extract the most important dimensions and indicators of its negative impact on the urban fabric, including the most important causes, patterns and appearances. This study found that the impact of urban shrinkage locally starts in the social dimension first, where affiliation and stability of the region decreases with increasing population migration, revealing the impact on the economic dimension, reducing investment, trade and employment opportunities in the fabric, thus affecting the urban dimension, all of which are evident in the declining fabric quality.

Keywords: Economic dimension, Quality of urban fabric, Social dimension, Urban shrinkage, Urban dimension.

1. Introduction

The concept of shrinkage has emerged in various aspects of life such as economics, sociology and geography; it has been the subject of many questions in urban studies, as urban shrinkage is linked to economic and social shrinkage. The physical symptoms of urban shrinkage are poor urban investment, imbalance in land-use, job loss, increasingly negative social feelings and poor fabric quality. With the absence of laws and legislation that limit the negative impact of this phenomenon, its impact is increasing in all economic, social and urban dimensions. Accordingly, the objective of this research is to identify the most important indicators of the shrinkage in the urban fabric. To achieve this, the following steps are considered:

- Defining Urban Shrinkage and its effects on the urban fabric by reviewing literatures that studied the subject, building a theoretical framework and deriving important vocabularies and their measurement methods.
- Applying the theoretical framework in a case study, analysing different conceptual aspects, using field surveys, a questionnaire, and presenting conclusions that reveal the definition of Urban Shrinkage and its effects on the urban fabric.

2. Urban Shrinkage in Cities

Shrinkage, for this research, is defined as "A practical or real retraction of a subject; a comprehensive impression that indicates the lack, decline, and lessening of something [1, 2].

The notion of Shrinking, within the urban context, is closely related to the concept of abandoned city. Oswalt defined Shrinking as a negative-connotation term, which at first indicates the lessening of a city's population and economic activity, involving various processes, reasons and effects not included in the definition. He also emphasized the growth within the process of shrinking, producing inessential spaces and buildings with obsolete characteristics, in spite of the lowering of the usage of those spaces. Shrinking cities keep expanding needlessly, which causes less activity allocated to more space [3].

The SCiRN network defined Shrinking Cities as high-density urban spaces with populations of no less than (10,000) that suffer from population decrease and economic changes largely for more than two years, which causes them to shrink economically, physically and demographically [4].

Pallagst [5] defined Urban Shrinking as a periodic process or a multi-dimensional phenomenon that includes cities, parts of cities, and urban spaces, with its cause going back to economic changes like industry decline, economic migration, changing settlement patterns and/or Urban sprawl. This effects suburban development, as the inner city goes through deterioration and decline, as population and economic progress decrease, and the city and its built infrastructure remain, with increasingly neglected buildings and vacancies in the urban fabric.

Shelq [6] defined the abandoned city as a city that has lost its crafts, commercial trades and productive centres, where poverty and unemployment are rampant among its communities. This city is also starting to be surrounded by slum that might even begin to penetrate into the centre. Slum areas and building deterioration

in the city centre cause the loss of the city's identity. This city does not have a low population, but has lost its spirit due to its elites abandoning it.

Ryan [7] identified different types of shrinkage in cities according to the reasons, viz, wide shrinkage (Extensive Shrinkage), interwoven growth and shrinkage. Interwoven growth and shrinkage are much more prevalent in cities. It has three elements, areas with extensive shrinkage, growth in isolation, and, growth in connection. According to Lynch, he described the interwoven growth and shrinkage in cities in an ideal urban example and named it "The Polycentric Net." As cities become a vital mix of different environments, while their parts experience shrinkage, other parts develop within this deranged urban fabric .

Reckien, and Fernandez [8] pointed to three different reasons for city shrinkage: functional shrinkage, caused by an absence of need, function migration, or technological developments; relationships between expansion, extension, and shrinkage; and, lastly, individual derivations (social patterns of behaviour).

Olsen distinguished the causes of shrinking as between European and American cities. In Europe, the reason goes back to social factors like lessening development, immigration, and fertility reduction, while in America; the reasons are economic, like depressions, unemployment, and job-loss [9].

3. Urban Shrinkage in Iraqi Cities

Local researches look at Urban Shrinkage from the economic perspective and its effects on the architectural environment. The Iraqi economy is suffering from deflation, and there are indicators confirming the state of recession, including the apparent decline in the GDP growth rates and the high unemployment rates among young people, the existence of a state of inflation and deflation of prices (recessionary inflation), etc. [10]. The industrial sector witnessed the largest share of the downturn and economic stagnation after 2003, especially the factories of the public sector, with nearly 200 industrial establishments suffering neglect and deterioration and more than 60,000 private sector industrial projects disrupted and neglected due to the import policy, all of which had a negative impact on local products [11]. The perspectives of some of those economists regarding the economic shrinkage in Iraq are as follows:

Zeyney [12] stated that the Iraqi economy has had its golden age between 1920 and 1960, and after the regime change in 1979, the country began suffering from the weakening and shrinking of the economy, due to the wars it was involved in. Increasing government spending on the military led to a decrease in oil revenues and the accumulation of national debt. Additionally, both foreign and local investment dried up, the workforce was used up in war, and the country suffered many international sanctions and restrictions. These factors caused a great decline in domestic production. This economic situation is reflected in neglected and crumbling urban structures. Zeyney also stressed that the economic and financial shrinkage of the country is seen in the public infrastructure that is also neglected and breaking down. Additionally, the decline of the infrastructure strongly affects local industries negatively, which in turn further worsens the economy, causing a continuous cycle of economic decline and ruin.

Barihi [13] indicated that the country has suffered many difficulties due to the shocks and economic crises that it went through during the last few decades, which

witnessed faulty policies and bad management. Additionally, the most recent war of 2003 affected not only the economy and the infrastructure, but also social infrastructure, laws, regulations and government institutions. The economic struggles in Iraq stem from structural imbalances, as the country's sole dependence on revenues from the oil sector only, which made it more susceptible to shrinkage and changes .

The above researchers show that shrinkage in Iraq is a result of the economic shrinkage that the country is going through currently due to the several internal and external causes prevailing throughout the past years. These causes include wars, the resulting debt, financial sanctions, bad management, the sole reliance on oil revenues, the ruin of the agricultural sector, and the decline of the industrial sector. Economic shrinkage is further reflected in the neglect and abandonment of factories and infrastructure, which causes an increase in unemployment and a decrease in local production, as illustrated in Fig. 1.

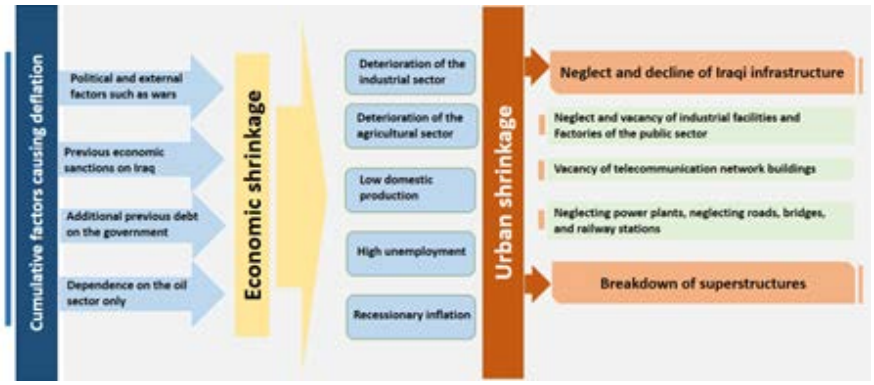


Fig. 1. Dimensions of Urban Shrinkage in Iraq. Source: The researchers.

The Procedural definition of urban shrinkage from the previous definitions is "A global or local phenomenon occurring in cities or parts of their fabric experiencing economic or social decline". Shrinkage occurs most often as a result of economic changes (post-industrial shifts / neglect of factories), or social changes (lack of population due to migration). The most important manifestations of urban shrinkage are the increase in the number of abandoned buildings that negatively affect the surrounding fabric, having economic, social and urban dimensions.

The research will adopt abandoned buildings as the most important aspects of urban shrinkage, in order to ascertain the most negative effects of these buildings in the urban fabric. To build the theoretical framework, a group of select studies that handled shrinkage comprehensively or partially are reviewed, to reveal all the significant levels and reasons of shrinkage, these studies will be reviewed in chronological order to clarify the modification of the concept.

4. Literature Review

Machado [14] stated that urban shrinkage – the phenomenon of abandoned buildings-works similar to a disease that causes an "Urban Infection." It starts in

one building and rapidly spreads to other buildings due to the rupture of the urban fabric, the loss of connectivity or continuity, which affects balanced ecological relationships within the fabric. Urban shrinkage also leads to the reduction of investment and land acquisition, which increases the difficulty of selling these properties, ruins the overall image of the area, and results in increased negative feelings towards the place and the loss of civic pride.

Rostami et al. [15] showed that, the most prevalent characteristic of a decayed urban fabric is the existence of abandoned buildings. The study points to the decayed fabric as one that is experiencing whole or partial decomposition and rupture, due to biologic ruin in terms of its both structures and vital elements, which reduce the quality of the fabric. The study presents the physical characteristics of decayed fabrics through the following:

- The form: The increase and spread of neglected buildings lead to the fabric morphological irregularity. The spread of buildings with small dimensions due to the recreation of residential and non-residential units.
- The coherence and strength of elements: The fabric cannot resist natural and coercive disasters; many of the buildings are old and of low durability; unsuitable materials like reused brick, stone, clay, and cement are widely used; and not less than 10 percent of the buildings are abandoned and unused.
- The value: The fabric loses its cultural, historical and social value.

The study also stated that among the most important signs of urban shrinkage are the fracturing, tearing and breaking of the urban fabric, the lack of infrastructure networks and public services, missing a road hierarchy, pedestrian sidewalks, other complementary elements, and a reduction of social activity. This causes a lessening of pedestrian activity, which in turn causes an increase in the need for vehicles, further enhancing energy usage and pollution. The environment hence becomes less sustainable and unhealthy, with the increase of environmental pollution.

Schnaitl [16] revealed the signs of urban shrinkage and building abandonment, as it affects the local and cultural identity. It also causes a loss of place attachment due to the reduction of cohesion and social ties, the loss of familiar places that are tied to the personal roots of community members.

Martinez et al. [17] explained the reasons of urban shrinkage in multiple contexts, and, analysed it as an outcome of globalisation. They point out the social and economic reasons that led to the migration, which in turn led to the abandonment of whole districts and neighbourhoods. The signs of urban shrinkage point to the shrinking of urban infrastructure and social services, a decline in business and cultural activity, a rise in abandoned buildings, a loss of parts of the urban fabric, and a decomposition of urban spaces.

Hollstein [18] found that vacant/abandoned buildings lead to urban decomposition, less cohesion, and a loss of its traditional paradigm, like styles and types that they were built on, affecting the definition of the public and private domains as two unique areas, making them less suitable for residents and visitors, affecting the edges and boundaries and decreasing interactive boundaries.

Wallace and Schalliol [19] showed that social disorder is the violation of the standards and rules that govern public places and behaviour, threatening public conduct and the characteristics of the environment. The disorder could be divided

into physical and social disorder. The physical disorder shows signs of vandalism and reflectance like vacant spaces, a reduction of open spaces, cracked sidewalks, abandoned and neglected houses, broken windows and garbage accumulation. Social disorder, on the other hand, depends on the behaviour of community members (Confrontations in public streets, loitering and other negative behaviours.) This reduces social interaction. It possibly also encourages violators to break the law and commit crimes. In addition to the aforementioned effects, it also speeds up the spiral of decay and increases the possibility of families with better economic standards leaving. This reduces the levels of wealth and resource access in such neighbourhoods.

Yin and Silverman [20] dealt with the most important economic components of abandoned buildings. They affirmed on the levels of investment and land acquisition, the level of investment affected mainly by the size and density of vacancy in the area. Abandoned buildings are seen as negative foci that reduce the chance that investors would invest in the neighbourhood. It is difficult to encourage people to continue building in such neighbourhoods. Abandoned buildings negatively affect houses, companies and retail businesses in the area; they reduce the rate of renewal as well, due to residents having less confidence in their neighbourhoods. The increase of vacancies also points to the ruin of the local housing market, as the reduction in housing prices is tied to shrinkage, in form of increase in the number of vacancies. In addition, the Structural-Spatial impact of shrinking buildings affects living conditions and among the most important spatial effects is the imbalance between offer and demand. Offers increase and demand decreases, which increases migration and abandonment.

Alias et al. [21] confirmed Urban Decay as the process that leads to the deterioration of the fabric's buildings and infrastructure, which hurts the welfare and safety of the community, decreasing the living condition of its residents. The most important economic effect of shrinkage is the reduction of investment from inside and from outside, due to the abandoned buildings that discourage retail, cultural, or residential investment.

Al-Hankawi and Mahmood [22] presented the most important effects of neglected buildings resulting from urban shrinkage, on the quality of the urban escape. The study showed that abandoned buildings are one of the most obvious physical characters of urban shrinkage, which affects the quality of the visual scene, the loss of visual cohesion and the creation of visual distortions. With the decline of maintenance and renovation, the abandoned buildings lose spatial or monument value, and are cut off from the urban fabric's visual scene.

Gearhart [23] pointed out that the financial disorder that results from abandoned buildings leads to a decline of neighbourhood attachment, satisfaction, trust between neighbours and their social relations, it also returns informal social control. The term “informal social control” is defined as society’s desire to achieve social norms and rules. The neglect of social norms indicates areas of higher levels of disruption. The study added that there are three levels of social control: private, parochial and public. At the private level, social control happens between friends, families, couples, etc. Parochial control, on the other hand, is made up of non-official social norms enforced by schools, churches, and community members in their interactions outside of their families. Public social control lies in the interaction between the community and foreign agencies.

5. Theoretical Framework

The studies also point to a number of primary and secondary themes and indicators regarding the economic, social and physical dimensions of urban shrinkage vis-a-vis the urban fabric. They are defined and summarized in Tables 1 to 3.

Table 1. Themes and indicators of the economic dimension (investment and landownership in the fabric). Source: The researchers.

Themes	Indicators
A drop in investment levels	• External Investment (from outside the city) / (retail/cultural/educational) • internal investment (Landowners)/(residential)
An imbalance between offer and demand	• Difficulty in selling land • An increase in supply and a reduction in demand due to the reduction of the financial value of properties • A reduction in the price of buildings, land, and businesses in the fabric
A reduction of renewal within the fabric	• A decline in the process of rehabilitation and redevelopment of abandoned and neglected buildings • A decrease of social trust in the area • A reduction of financial access to renewal

Table 2. Themes and indicators of the social dimension (social disorder). Source: The researchers.

Themes	Indicators
A loss of place attachment (An individual's activity in society)	• Negative feelings towards the place/ absence of civic pride • Lose sense of the safety within the community due to the decrease in social activity. • Decline the quality of life among residents. • Regress of social and physical satisfaction. • The migration of the elites out of the city • Absence of social activity. Loss of open spaces. Regression in social services.
The weakness of unofficial social control	• A decrease in the likeliness of following social norms. • A loss in citizens' trust in one another. • Decline of social relationships. • The Levels of informal Social Control ▪ Private Level: Between Friends and Family. ▪ Semi-Public Level: Individuals and other outside their families ▪ Public Level: Between the

	community and foreign agents.
A violation of the norms that regulate public spaces and behaviour.	• Confrontations/ Individuals engaging in confrontations in public streets. • Loitering/ Individuals engaged in loitering in public streets • Evidence of negative behaviours foci of in the area.

Table 3. Themes and indicators of the physical dimensions (the quality of the urban fabric). Source: The researchers.

Themes	Indicators
Reduced pedestrian activity in the city	• Pedestrians being unsafe in the face of car traffic. • Reductions of complementary elements that help protect pedestrians. • A weakening of the definition of the edges and boundaries between the public and private domains.
Decomposition of the shape of the fabric	• The disorganization of the morphological shape. • Buildings lacking design and architectural norms. • A loss of sustainability and connectivity within the urban fabric. • An increase of buildings with small dimensions due to the recreation and redistributing of residential units.
A Reduction of the cohesion of the fabric and the strength of its elements	• The fabric losing its ability to face natural and coercive disasters. • The existence of low durability, old buildings. • The use of unsuitable building materials like fracture, stone, clay, and cement • An increase in abandoned buildings and structures within the fabric. • Missing a Hierarchy in the structure of the road.
Lessening in the fabric's value	• The fabric lacking cultural, historical or social value. • Losing the classical paradigm (the special styles and types that it was built on).
The lack of environmental security	• The decline and pollution of the environment/a decrease of the environmental standards and the opportunities for sustainability. • The absence of balanced ecological relationships within the fabric. • The accumulation of garbage and stray animals around abandoned buildings, emitting diseases and illnesses

6. Case Study

The research conducts a case study to examine the research hypothesis "urban shrinkage has many economic and social reasons. It causes building and facility neglect, which reflects in the urban fabric on both economic and social dimensions, through its themes and their indicators, its effect is later shown in the physical dimension", and to identify the indicators of its negative impact on the urban fabric locally according to the theoretical framework.

6.1. The study district

Iraqi cities have witnessed different types of shrinkage in many of their economic and social centres for a different reason, including shrinkage from interwoven growth. The interwoven growth could be noticed in the city of Baghdad when looking at its physical planning, as some areas of the city experienced growth and some experience depression in the same urban fabric. One could look at the "Rusafa" side and see that while many places have neglected buildings with receding functions, turning them into warehouses, in addition to a decrease of the scenic quality, with some areas experiencing growth and high levels of investment. [24]. Hence, the "Rusafa" side is a mix of healthy spaces that are interspersed with areas that are shrinking due to aging, migration and other economic reasons.

This research examined different areas of Baghdad/Rusafa that suffered from functional and economic shrinkage. The fabric of "Garage Al Amana" within "Al Wahda District', which includes "the military bread factory" and "general bus station for Mayoralty of Baghdad ", which lies within the urban fabric around the University of Technology. This site was chosen for case study for the following reasons:

i. Multi land use and the location nearby the University of Technology, which makes it easier for the researchers to conduct the fieldwork and the documentation.
ii. The chosen fabric shows the characteristics of urban shrinkage due to its neglected and abandoned buildings.

6.2. A description of the area

Garage Al Amana is one of the oldest districts in Baghdad, and was one of the most important business sectors, bounded in the north by the University of Technology, "Camp Sarah in the south the highway "Mohammed Al-Qasim" in the east and "The Sina'a St." in the west (see Fig. 2).

In spite of its small area, the inhabitants were a Christian majority (90-95%) during the seventies and eighties and during the nineties, with its original inhabitants starting to leave the country after 2003 [25].

6.3. Data Collection and measurement:

To prepare the measurement requirements, the researcher had divided the area into three parts (zone A, zone B, and zone C) according to the distance and number of neglected buildings in the zone, as shown in Fig. 3. Information, pictures, and maps of the study area were collected from the Mayoralty's departments.

Fig. 2. Land use for the study area [26].

The research adopted several methods for data collections and measurements, according to the specificity of the theoretical framework's indicators including:

i. The indicators of social dimension were measured through the questionnaire forms, a questionnaire was drafted with a group of questions directed to the residents of areas near the abandoned and neglected buildings in Zone A, and the residents of zones B and C which includes partially-abandoned buildings (*Appendix A*). The research depended (15%) of the total families in the three zones (720 families), 40 forms of each zone. Only 30 of them were usable due to some not being complete or not being subjective according to random samples selection that cover all the streets [27].

ii. The physical and economic dimension were measured according to the tables of the analysis lists (*Appendix B* and *Appendix C*) based on the field survey during multi visits from 18/5/2018 to 4/6/2018, and field interviews with the local investors. In addition to the analysis of plans and pictures, within the limits of the themes and indicators of the theoretical framework according to a descriptive analysis.

iii. For the validation of the questionnaire and the analysis lists, a one-way analysis (ANOVA) was used to measure the significance of three dimensions lists, the result were significant at $p< 0.05$ [28]. And for comparison between themes with different number of indicators, Eq. (1) was depended [29].

$$xi = \frac{xi}{\sum xi} * 100\% \, , \quad \frac{x^{i=Part}}{\sum_1^1 x^{i=Total}} \tag{1}$$

Fig. 3. Study area divided into three parts according to the distance from the neglected buildings [30].

7. Results and Discussion

Urban shrinkage leads to deterioration in the quality of urban life not because of the condition of abandoned buildings but because of neglect of the urban fabric and their surrounding property. The results indicate that greater size or density of vacancies exerts greater negative influence on the surrounding urban fabric in social, economic and physical terms.

Analysis and field interviews with local investors showed that the impact of the economic dimension is evident first in the decline of external investments in Zone (A) for retail, cultural and educational uses and in the decline of internal investment (by landowners and residents). In field interviews, local realtors pointed to an imbalance between supply and demand caused by difficulty selling properties, reduction in the price of buildings, land, and businesses in the fabric near abandoned buildings and the absence of commercial activity or social interaction. Additional factors that led to the decline in investment and ownership include weak competitiveness of the neighbourhood, decline in investment opportunities, loss of investor confidence, increase in differences and disparities at the local and regional levels, economic failure, and decreased opportunities for smart development. The decreased maintenance for private or public buildings played a prominent role in the decline of investment, in addition to a reduction in the financial ability to renew and loss of community confidence in the neighbourhood. Zone (B) followed Zone (A) in declining investment levels, and the least decline was in Zone (C), which included the lowest percentage of partially abandoned buildings (with only one). As shown in Fig. 4.

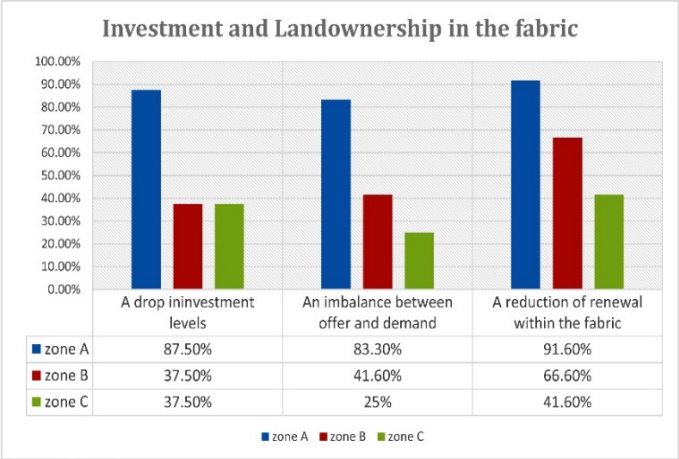


Fig. 4. The economic dimension of Urban shrinkage.

The results of the questionnaire showed that there is a social disorder in Zone (A), with the three main dimensional indicators declining: loss of place attachment, weakness of social control and violation of norms. Place attachment was measured by questions 1 through 11 concerning each respondent's social activities within the community, including indicators of negative feelings towards the place or declining sense of pride. Neglected buildings distort a community's feeling of pride.

Place attachment was also measured by the population's desire to take care of their front yards or maintain their homes, which are affected by economic contraction, on the one hand, and disinter action with place, on the other hand. Decreased place attachment was also measured through indicators of sense of security, lack of social activity, loss of a sense of housing satisfaction and desire of families to change their residence. The loss of social interaction due to the shrinkage of social services and the lack of open spaces (parks and recreational places), as well as other indicators of social interaction, such as visiting neighbours and friends during holidays and events, indicated loss of place attachment and confirms the indicators of theoretical framework.

The results of the questionnaire also indicated (questions 12 to 14) weak social control in zone (A), which showed low desire to implement social norms, loss of societal trust and decline in social relations and frequency of personal interaction outside the family. Finally, the results of the questionnaire showed an increase in negative behaviours focused in zone (A), with the second-largest increase in zone (B). In zone (C), the level of social disorder decreased due to increased social interaction resulting from a sense of security in the region and a feeling of housing satisfaction Fig. 5.

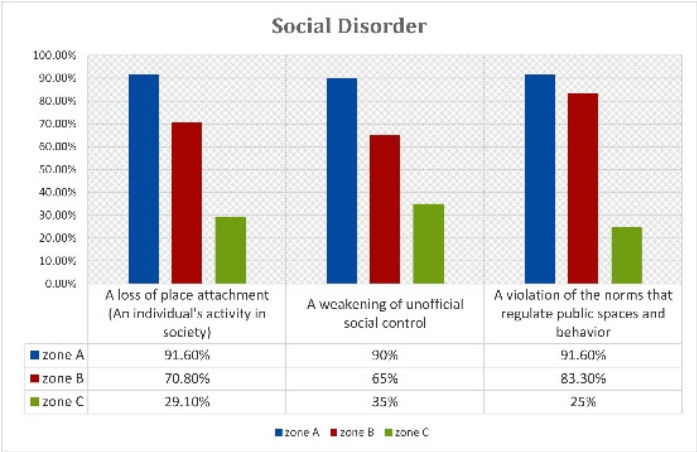
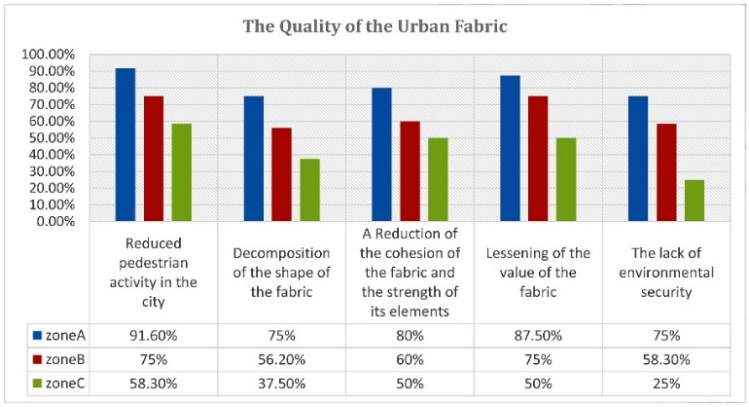


Fig. 5. The social dimension of urban shrinkage.

The physical dimensions of urban shrinkage are embodied in the quality of the urban fabric. The site survey revealed reduced pedestrian activity resulting from weakened definition of edges and boundaries between public and private spaces and a reduction of complementary elements that can help protect pedestrians. The fabric in Zone (A) was decomposing because buildings lacked architectural and design norms and small buildings appeared that caused gaps in the fabric. The reduced cohesion and reduced strength of the fabric's elements also directly led to a decrease in its quality, most of all in zone (A) because many buildings there lacked durability and used inappropriate materials such as brick remnants and iron sheets. The absence of a street hierarchy and structure and direct axes to the highway further contributed to a decrease in quality. The fabric's value in zone (A) also dropped as a result of the loss of the distinctive architectural style on which the fabric was first built, a consequence of continuous transformation and the decline of buildings that represent

the culture of the local community. Zones (B), and (C) followed zone (A) in these respects. The indicator "lack of environmental safety" was most prominent in zone (A) because of decreased environmental standards, fewer opportunities for sustainable development and the change of the environmental footprint in terms of the accumulation of garbage and debris around abandoned buildings. Zones B and C also followed zone A in this parameter, as shown in Fig. 6.



	Reduced pedestrian activity in the city	Decomposition of the shape of the fabric	A Reduction of the cohesion of the fabric and the strength of its elements	Lessening of the value of the fabric	The lack of environmental security
zoneA	91.60%	75%	80%	87.50%	75%
zoneB	75%	56.20%	60%	75%	58.30%
zoneC	58.30%	37.50%	50%	50%	25%

Fig. 6. The physical dimension of Urban shrinkage.

All three dimensions are close in terms of the impact of the shrinkage: 91.0% social, 87.5% economic and 80.8% physical, highlighting that the period of the effect was long enough to closely affect all three dimensions. The shrinkage also starts to affect the fabric's social dimension, decreasing belonging and security in the area and leading to out-migration that in turn leads to economic decline. Economic decline then leads to architectural decline, which is clearly seen in the quality of the urban fabric. (See Fig. 7.).

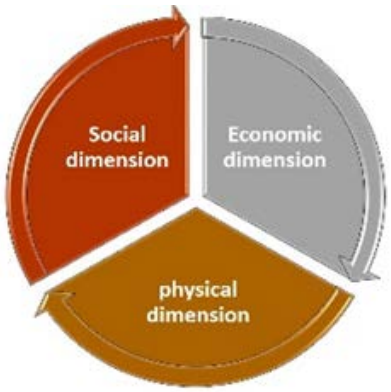


Fig. 7. The correlation between economic, social and physical dimensions.

8. Conclusions

The presented theoretical review offers an extensive study of the most important propositions and literature concerning urban shrinkage in cities. As it turns out, the

most common type of spillage shrinkage is consistent with the model of shrinkage in Iraqi cities.

This study arrived at a theoretical framework of three dimensions of the impact of urban shrinkage and abandoned buildings in their urban fabric: economic, social and physical. Indicators of these dimensions were applied in a selected urban area that had been severely affected by urban shrinkage. The practical study showed the impact of the economic and social dimensions on the physical dimension through reduced fabric quality due to urban decay, increased vacancy rates and neglected buildings, loss altogether of parts of the urban fabric and broken cohesion in terms of the delineation of borders. These interruptions present obstacles to the vitality of pedestrians in the fabric. The research found that the overall impact on value of the social, economic and urban dimensions converge over time. This highlights an urgent need for government and local authorities to adopt a multi-dimensional investment policy to revive the economic indicators demonstrated by the research.

To conclude, there is a notable difference between the economic impact that led to the urban shrinkage and the effect on the economic dimension that occurs in the urban fabric due to the influence of neglected buildings.

Abbreviations

SCiRN	Shrinking Cities International Research Network

References

1. Baalbaki, D.R. (1995). *Al-Mawred. Dar Al-Elm for millions*, (7th edition.). Beirut, Lebanon.
2. Hornby, A.S.; Cowie, AP.; and Gimson, A.C. (1978). *Oxford advanced learner's dictionary of current English*, (3th edition.). Oxford University Press.
3. Oswalt, P. (2006). Shrinking cities, *International Research*, Ostfildern-Ruit, Germany: Hatje Cantz Verlag. 1, 4-729.
4. Wiechman, T. (2007). *The future of shrinking cities: Problems, patterns, and strategies of urban transformation in a global context*. Berkeley, CA. USA.
5. Pallagst, K. (2008). Shrinking cities: Planning challenges from an international perspective. *Cities Growing Smaller*. Kent State University, 10, 5-16.
6. Shelq, A. (2014). *In the Blow of the revolution 2* .Dar Al-Farabi for publication, Beirut, Lebanon, (Arabic Edition).
7. Ryan,B.D. (2012). Rightsizing shrinking cities: The urban design dimension (1st edition.). *Journal City after Abandonment*, 268-288.
8. Reckien, D.; and Fernandez, C.M. (2011). Why do cities shrink? *European Planning Studies*, 19(8), 1375-1397.
9. Olsen, A.K. (2013). Shrinking cities: Fuzzy concept or useful framework? *Berkeley Planning Journal*, 26(1), 107-132.
10. Saleh, M.M. (2015). The economic recession in Iraq: a diagnostic vision. *Iraqi Journal for Economic Sciences.* 13(47), 1-9.
11. Haddad, H.O. (2012). The economic challenges for Iraq after the American withdrawal. *Journal of International Studies*, 52, 51-81.

12. Zeyney, M.A. (2006). *Iraqi economy*: *Current reality and future challenges, Emirates lecture series* (*103*). Emirates Center for Strategic Studies and Research, Abu Dhabi, United Arab Emirates.
13. Barihi, F.C. (2011). Iraqi Economy: Opportunities and challenges or an analytic study of economic and human development indicators. *Journal of Baghdad College of Economic Sciences University*, 27, 21-56.
14. Machado, S.L. (2010). *Urban Development and Urban Reuse: The Case of Valongo.* Master Thesis. Faculty of Arts, University of Porto, Porto.
15. Rostami, K.S.; Malaz, J.; and Bidram R. (2012). Drawing up and examine some indicators to recognizing blighted fabrics. *Research Journal of Environmental and Earth Sciences*, 4(10), 900-906.
16. Schnaitl, C. (2012). *Public vacancy in structurally weak communities - what to do?*. M.Sc. Thesis. Department of Space, Landscape and Infrastructure, University of Natural Resources and Life Sciences, Vienna.
17. Fernandez C.M.; Audirac, I.; Fol, S.; and Sabot, E.C. (2012). Shrinking cities: Urban challenges of globalization. *International Journal of Urban and Regional Research*, 36(2), 213-225.
18. Hollstein, L.M. (2014). *Planning decision for vacant lots in the context of shrinking cities: A survey and comparison of practices in the United States.* Ph.D. Thesis. Faculty of the Graduate School, University of Texas at Austin, Texas, US.
19. Wallace, D.; and Schalliol, D. (2015). Testing the temporal nature of social disorder through abandoned buildings and interstitial spaces. *Social Science Research*, 54, 177-194.
20. Yin, L.; and Silverman, R. (2015). Housing abandonment and demolition: Exploring the use of micro-level and multi-year models, *ISPRS International Journal of Geo-Information*, 4(3), 1184-1200.
21. Alias, A.; Zyed, Z.; and Chai, W.W. (2016). Revitalising critical components of urban decay features. *Journal of Building Performance*, 7(1), 125-132.
22. Al-Hankawi, W.S.; and Mohammed, A.M.H. (2018). The impact of abandoned buildings on the quality of urban-scape. *Muthanna Journal of Engineering and Technology (MJET)*, 6(2), 222-236.
23. Gearhart, M.C. (2017). *Preventing neighborhood disorder: The role of mutual efficacy in collective efficacy theory*. Ph.D. Thesis. Case Western Reserve University, USA.
24. Al-Hinkawi, W.S.; Mohammed, A.M.H.; and Deye, M. (2018). The Spatial fitness for functional requirements: Rusafa Center _ case study. *Proceedings of The National Conference 3: Towards a national strategy for urban sustainable development,* 253-222.
25. Yusef, F.K. (2006). Baghdad Christian neighbourhoods or Al Amana Garage. Retrieved July 22, 2019, from http://www.ankawa.com/forum/index.php?topic=61161.0.
26. Mayoralty of Baghdad, Designs Office, The library archive, (2018).
27. Mohammad, A.M. (2007). *Statistical analysis of the data*, Center for Graduate Development and Research in Engineering Sciences, Faculty of Engineering, Cairo University, Cairo.

28. One-Way ANOVA Calculator. (2020). Analysis of variance, Tukey HSD test, Static Kingdom. Retrieved March 7, 2020, from http://www.statskingdom.com/180Anova1way.html.
29. Bin Duaima, L. (2017). Research community and sample selection methods. *Proceedings of Scientific Research Methodology In Social Sciences*. Hussein Ras Al Jabal. Algeria, 264-277.
30. Google Earth. (2018).

Appendix A

Questionnaire

University Of Technology, Iraq	**Resident Questionnaire regarding the social dimension of Urban shrinking**	**Questionnaire No.:**		
Department of Architectural Engineering		**Block No.:**		
Please Answer The Following Questions:				
The Loss of Place-Attachment		**Yes (2)**	**Kindly (1)**	**No (0)**
1	Do you work in the same area where you live?			
2	Have you rehabilitees you house (Maintain or paint) or taken care of your front yard?			
3	Do you feel pride by living in this area?			
The Feeling of Satisfaction in the Neighbourhood (Socially and physically)				
4	Do you feel safe in this neighbourhood?			
5	Do your children play in the neighbourhood's streets and/or park?			
6	Are you satisfied and comfortable with living here?			
7	Do you want to move from this neighbourhood?			
Social Interaction				
8	Do you have social relations with your neighbours?			
9	Do you visit your neighbours during holidays?			
10	Are there spaces for residents to meet their neighbours and other residents?			
11	Are there enough social infrastructures for residents?			
Individual Behaviour in Public Places				
12	Have you seen individuals engaging in confrontations in the area (near abandoned buildings)			
13	Have you seen individuals engaged in loitering in the area (near abandoned buildings)			
14	Have you seen individuals try to break windows and doors of abandoned buildings and their surroundings?			
Informal Social Control				
15	Do you think that individuals in the area want to enforce social norms?			
16	Have you seen children draw or write on the walls of buildings in the area?			
17	After-school, do children hang around and fight in the streets of the area?			

Appendix B

List of researcher analysis of the economic dimension / investment and acquisition in the fabric

Note: The weight assigned to the impact of each variable in the analysis lists is as follows: 1=weak impact, 2=medium impact, 3=good impact, 4=strong impact).				
Note: The statistical equation to standardize the values of indicators (Percentage relative frequency)				
$xi = \frac{xi}{\sum xi} * 100\%$		$\frac{x^{i=Part}}{\sum_1^1 x^{i=Total}}$		
Primary themes: Investment and Landownership in the fabric				
Secondary themes	**indicators**	**Fabric parts**		
		A	**B**	**C**
A drop in investment levels	External Investment (from outside the city) / (retail/cultural/educational)	4	2	1
	internal investment (Landowners)/(residential)	3	1	2
Secondary singular effect value (2* 4 =8)		7	3	3
		87.5%	37.5 %	37.5 %
An imbalance between offer and demand	Difficulty in selling land	4	2	1
	an increase in supply and a reduction in demand due to the reduction of the financial value of properties	3	1	1
	a reduction in the price of buildings, land, and businesses in the fabric	3	2	1
Secondary singular effect value (3* 4=12)		10	5	3
		83.3%	41.6 %	25%
A reduction of renewal within the fabric	A decline in the process of rehabilitation and redevelopment of abandoned and neglected buildings	4	3	2
	A decrease of social trust in the area	4	3	1
	A reduction of financial access to renewal	3	2	2
Secondary singular effect value (3* 4=12)		11	8	5
		91.6%	66.6 %	41.6 %

Appendix C

List of researcher analysis of the physical dimension / The Quality of the Urban Fabric

Primary theme : The Quality of the Urban Fabric				
Secondary themes	**Impact**	**Fabric parts**		
		A	**B**	**C**
Reduced pedestrian activity in the city	Pedestrians being unsafe in the face of car traffic	3	3	2
	A reduction of complementary elements that help protect pedestrians	4	3	3

	A weakening of the definition of the edges and boundaries between the public and private domains	4	3	2
Secondary singular effect value (3* 4=12)		11	9	7
		91.6 %	75 %	58.3 %
Decomposition of the shape of the fabric	The disorganization of the morphological shape	2	2	1
	Buildings lacking design and architectural norms	4	3	2
	A loss of sustainability and connectivity within the urban fabric	3	2	1
	An increase of buildings with small dimensions due to the recreation and redistributing of residential units	3	2	2
Secondary singular effect value (4* 4=16)		12	9	6
		75%	56.2 %	37.5 %
A Reduction of the cohesion of the fabric and the strength of its elements	The fabric losing its ability to face natural and coercive disasters	4	3	3
	The existence of low durability, old buildings	4	3	3
	The use of unsuitable building materials like Fracture, stone, clay, and cement	3	2	2
	An increase of abandoned buildings and structures within the fabric	3	2	1
	missing a Hierarchy in the structure of the road	2	2	1
Secondary singular effect value (5* 4=20)		16	12	10
		80%	60%	50%
Lessening of the value of the fabric	The fabric lacking cultural, historical or social value	3	3	2
	losing the classical paradigm (the special styles and types that it was built on)	4	3	2
Secondary singular effect value (2* 4=8)		7	6	4
		87.5 %	75%	50%
The lack of environmental security	The decline and pollution of the environment/a decrease of the environmental standards and the opportunities for sustainability	3	3	1
	The absence of balanced ecological relationships within the fabric	**3**	**2**	**1**
	The accumulation of garbage and stray animals around abandoned buildings, emitting diseases and illnesses	**3**	**2**	**1**
Secondary singular effect value (3* 4=12)		**9**	**7**	**3**
		75 %	**58.3 %**	**25 %**