

The Riyadh Urban Growth Boundary: An Analysis of the Factors Affecting its Efficiency on Restraining Sprawl

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ABSTRACT

Recently, research on sprawl was increasing due to its impacts on the economy, society, and environment. Several studies have focused on the application of containment strategies to curb urban sprawl. Urban growth boundaries (UGBs) were among the containment policies adopted to tackle the issue of sprawling cities. This paper set out to undertake an analysis of the factors influencing the performance of the UGB of Riyadh City. A qualitative data analysis using NVivo12 software was adopted. To collect the required data of UGB, semi-structured interviews were conducted with nine experts involved in urban management, Riyadh city development, and other planning agencies. If the application of UGB policy in the western countries has managed to restrain more or less city sprawl, its replication to the case of Riyadh seems to have had some adverse impacts. That is, instead of controlling urban sprawl, it has stimulated it. The reasons may lie in the deficiency of monitoring and evaluation of urban studies, free provision of infrastructure, and lack of coordination between different city planning agencies. Understanding the factors affecting the UGB efficiency will assist policymakers and urban planners in reducing the spread of scattered and leapfrog residential development, lowering the cost of service supply and promoting infill development.

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1. Introduction

During the past thirty years or so, growth management strategies have come to the forefront of the urban planning agenda to respond to inefficient land-use practices and to curb the sprawl of cities. The literature is abundant on the policy measures to halt the scattering urban development in western countries. However, little studies have been undertaken on sprawl containment policies in Middle East cities. The growth management strategies adopted

were mainly compact city strategies, decentralized concentration strategies, and rural and open space preservation strategies. The policy measures adopted range from restrictive measures like urban growth boundaries, green belts, car park restrictions, and development fees to densification measures such as making denser cities more attractive, revitalization policies and the provision of public transport. Different zoning techniques such as maximum/minimum densities and mixed-uses, etc. were often used to implement such policies (Miceli & Sirmans, 2007; Heim,

2001; Pendall & Puentes, 2008; Zhang, 2011; Horn, 2014). Urban growth boundary (UGB) has been used as a measure to curtail the negative consequences of sprawl. It consists of delineating a boundary beyond which urban development would not be allowed. It designates the line between urban and rural areas and hence, the use of different land-use policies and regulations to direct urban development within the UGB to control the scale, time sequence, and shape of the urban area (Calthorpe & Fulton, 2001; Pendall et al., 2002). Its implementation, however, has been subject to a heated political debate in countries where it is implemented, and at times, it has even been legally challenged and sporadically amended (Loughman, Mourning, & Toros, 2011).

City planning authorities have widely used UGBs as a growth-management measure to control future urban planning development (Han et al., 2009; Ball et al., 2014; Wang et al., 2014; Hall, 2014; Yue et al., 2016; Mubarak, 2004; Rudolf, 2017; Millward, 2006; Cho, 2005). It has been argued to be an effective way to curb urban sprawl and tackle similar problems (Alshuwaikhat & Adenle, 2016; Sullivan, 2015; Strauss & Neamtu, 2006; Al-Hathloul, 2017).

The state of Oregon in the US has always been an outstanding example of successfully using UGBs to control urban growth. In their article, Nechyba & Walsh (2004) claimed that urban growth boundaries have so far become a popular strategy to limit sprawl. They argued that UGBs could be an effective instrument to control the expansion of urban areas. In their study on urban growth boundary and sprawl in Xinyi District in Taipei, Taiwan, Lai & Wang (2019) reached similar conclusions as they could not find enough

evidence to suggest that urban sprawl took place outside the UGB there.

However, when assessing the impact of such boundary on urban growth in Knox County, Tennessee, Cho et al. (2007) got to a different conclusion in which the UGB employed in 2001 failed to curtail urban sprawl in the region. Similarly, in recent research Ladraa & Saleh (2018) found significant discrepancies between what was actually built and what was intended to be built according to planners' projections. They concluded that the UGB strategy was unable to reach the set up goals due to the absence of a planning evaluation process. Likewise, in investigating the effectiveness of UGB in Hangzhou, China, Li (2014) concluded a deficient performance of the UGB compared to what had been planned. This was due to the defective planning techniques used in formulating the UGB, he argued. This has led Kim (2019) to conclude that while UGBs are capable of controlling the scattered and leapfrogging expansions as well as encouraging compact and contiguous development, the strategy does not always function as planned or guarantee the desired results.

1.1 Urban Growth Management and Sprawl in Riyadh

Riyadh, the capital city of Saudi Arabia, is located in the middle of the kingdom (see fig 1). It is considered one of the fastest-growing cities in the world. Within the span of half a century, Riyadh has increased from a small old town surrounded by walls to a modern city, more than a hundred times larger with an area of 2435 square kilometers (Alqahtany, 2014).

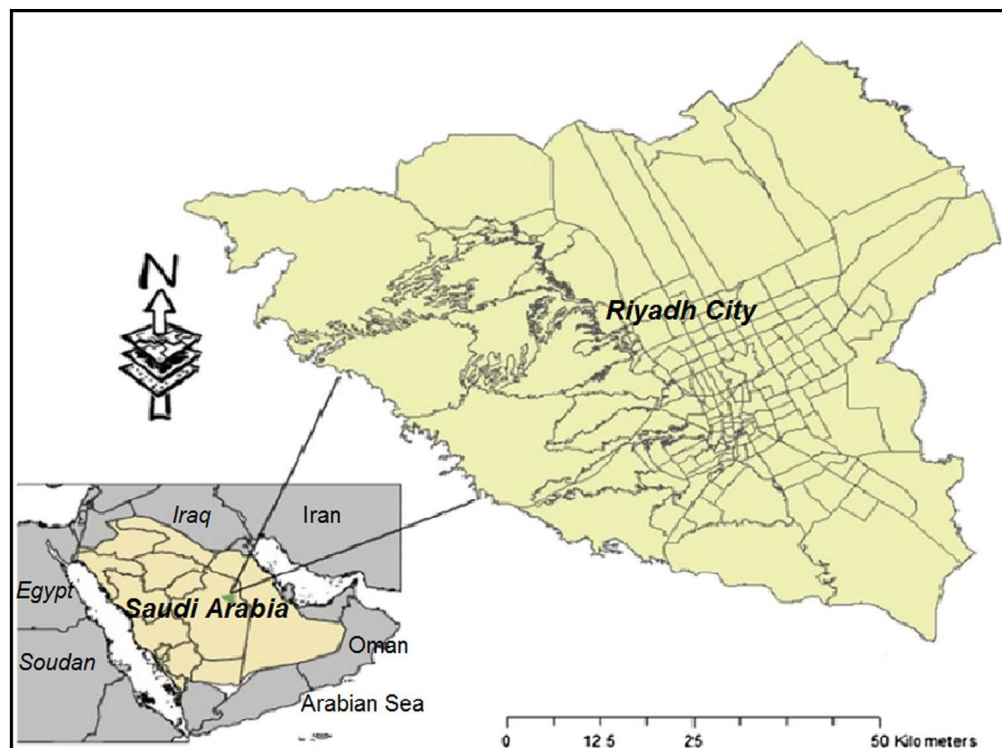


Figure. 1 Location of Riyadh and Al Riyadh UGB (Alotaibi & Potoglou, 2018)

The urban transformation of Riyadh is divided into five stages, coinciding with the urban development of the city (see Fig. 2). The first stage began with King Abdulaziz constructing of Al-Murabba' administrative complex outside the old town. The next phase to the mid-1960s, influenced by modern designs that were introduced to the city. Then, in the late 1960s, the third period began with the introduction of the Dioxides urban master plan. Afterward, stage four commenced with the oil boom of the mid-1970s and updating of the Riyadh master plan. The fifth phase,

managing urban growth, came at the end of 1989 when The Ministry of Municipal and Rural Affairs (MOMRA) undertook the UGB projects. The primary purposes of the UGB project were to control sprawl by encouraging infill development, reduce the cost of the provision of infrastructure and amenities for new development through better coordination, and ensure the sustainability of the natural environment around the city through proper preservation measures (Al-Hathloul, 2017).

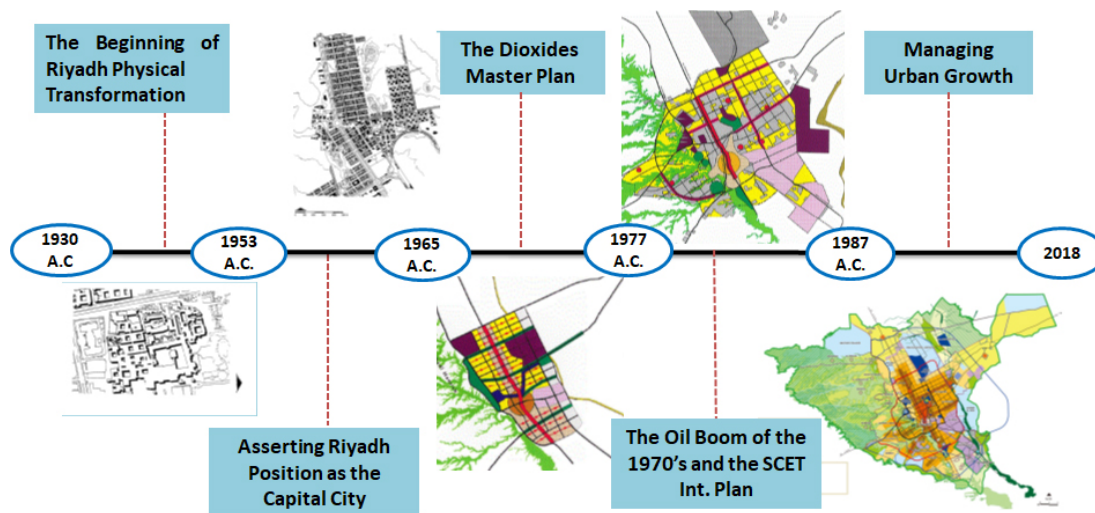


Figure. 2 Timeline of Riyadh Urban Growth Phases

In 1986, the Council of Ministers suspended the approval of new land subdivision projects in all Saudi cities due to the unplanned and unmanageable rapid urban expansion of these cities. Subsequently, MOMRA launched the Urban Growth Boundary Policy (UGBP) between 1986-1989 for 100 Saudi cities, Riyadh city was on top of them (Mubarak, 2004). Therefore, the research finding will reveal its significance in rectifying the process of UGB as a tool in managing the growth not only in Riyadh but also in the 100 cities where the first stage of UGB was implemented.

In a recent study, Altuwaijri (2018) used remote sensing and GIS Techniques to measure Riyadh urban extension between 1987 and 2017. He concluded that the city experienced sprawl, especially to the northern part. Rahman (2016) used Shannon's Entropy to analyze urban land use and sprawl in Riyadh. He found that the city was sprawling towards the North, South, and South-East. Many studies have shown that Riyadh UGB has seen limited success ((Mubarak, 2004; Rahman, 2016; Al-Hathloul, 2017; Altuwaijri, 2018).

This research is undertaken under the contention that UGBs that fail to inhibit sprawl may cause some counterproductive effects that cause sprawl to be stimulated rather than restricted. This paper seeks to answer the fundamental question: was UGB's plan-making stage and implementation and monitoring stage properly done to promote sprawl-restraining procedures? In other words,

what went wrong during plan-making and in the implementation and monitoring phases?

2. Methodology

In-depth face-to-face semi-structured interviews were undertaken with nine experts in the urban management sector between April 10th and May 20, 2019 (see Table .1). Prior to the in-depth interviews, a pilot study was conducted with three experts on the first draft of the open-ended questions to check their wording, reliability and validity. Based on their feedback, some questions were reformulated accordingly. The expert interviewees were selected to represent the three institutions involved in managing Riyadh UGB, i.e. the Ministry of Municipalities and Rural Affairs (MOMRA), Riyadh Municipality, and Al-Riyadh Development Authority (ADA), which has just been renamed the Royal Commission for Riyadh. Their job titles range from deputy minister, deputy mayor, head of a department, to advisors. They all have well over 20 years of experience respectively. Thus, their positions and years of experience matter much in their designation as experts of Riyadh UGB.

Table. 1 Experts profile

Expert code	Position	Date of interview	Years of Experiences
Expert 1	Former Deputy Minister	May 18, 2019	30+
Expert 2	Former Deputy Mayor	April 21, 2019	30+
Expert 3	Former Deputy Minister	April 25, 2019	30+
Expert 4	Urban Planning Advisor	April 21, 2019	30+
Expert 5	Urban Planning Advisor	April 15, 2019	30+
Expert 6	Urban Planning Professor	May 10, 2019	30+
Expert 7	Head of Department	April 16, 2019	20+
Expert 8	Head of Department	April 24, 2019	20+
Expert 9	Urban Planning Advisor	April 12, 2019	20+

The interview questions were structured to provide the researchers with in-depth knowledge on many aspects such as: the UGB delineation process, how regulations were developed, the role of Riyadh urban agencies on plan-making and implementation, sprawl drivers, urban decision making, infrastructure provision, subdivision procedures, and the coordination between different urban departments. Appointments

with interviewees were made either by phone calls or visits to their offices in the workplaces. They were made fully aware of the purpose of the research and why they were selected for the interview. Well before the interview meetings, copies of the questions together with an A1-sized, hardcopy color map for Riyadh built-up area and UGB limits were shared with all participants (see Figure 3).

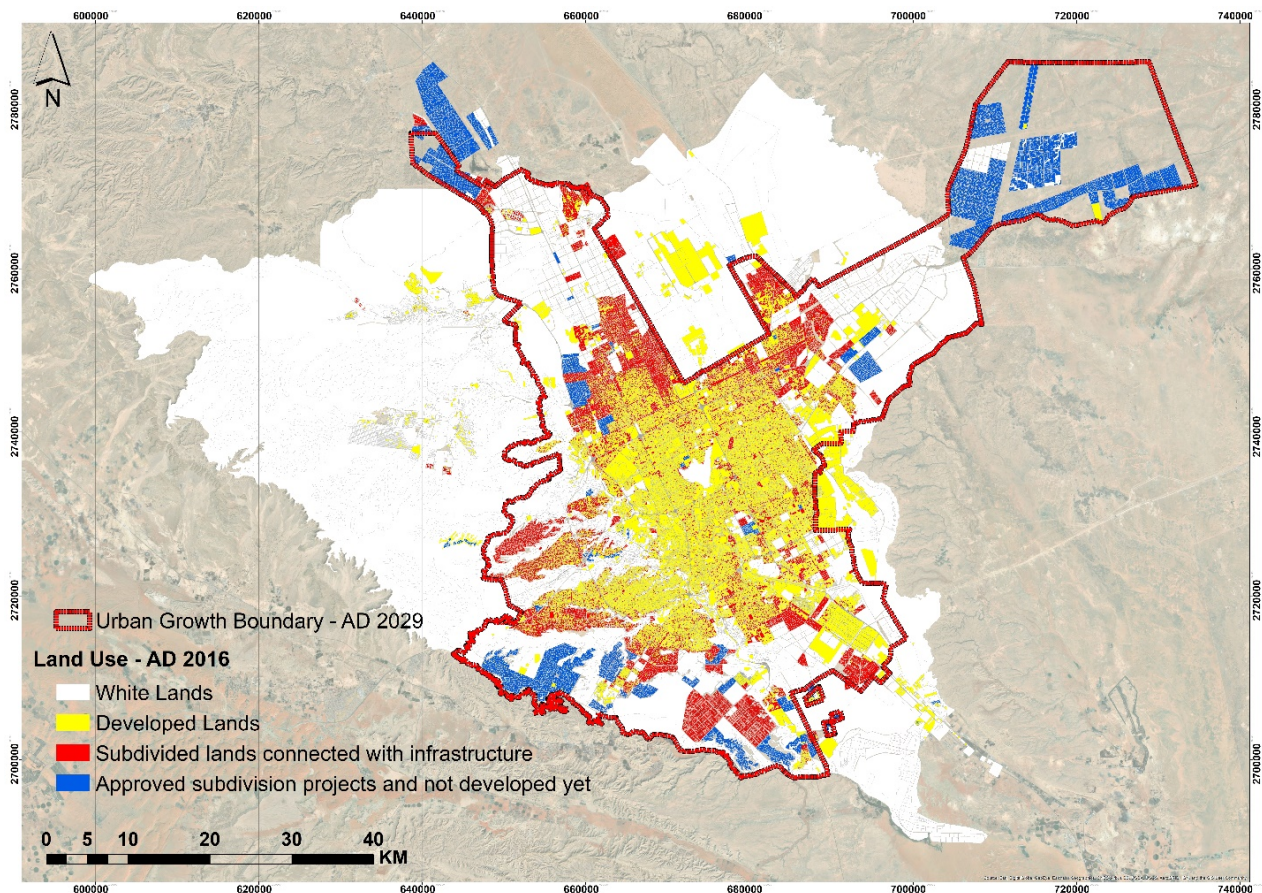


Figure. 3 Riyadh Urban Growth Boundary AD 2029 and Land Use - AD 2016, (Developed by the researchers)

The recorded data were transcribed and translated into English. Soft copies were sent back to the participants to ensure that the translations accurately reflected their views. NVivo 12 plus qualitative data analysis software was used to generate themes and the coding process to categorize the research variables. Tools like Matrix coding and word frequency were used to analyse and interpret the coded data to ensure that the findings of the interviews echoed the viewpoints of the respondents correctly.

- Absence of impact fees and taxes
- Incoherent public policies and regulations
- Intended low-density
- Lack of coordination between urban authorities
- Lack of plan monitoring and evaluation studies
- Neglecting local engagement
- Over-optimistic population projection
- Permitting land speculation
- Provision of free Amenities and Infrastructure

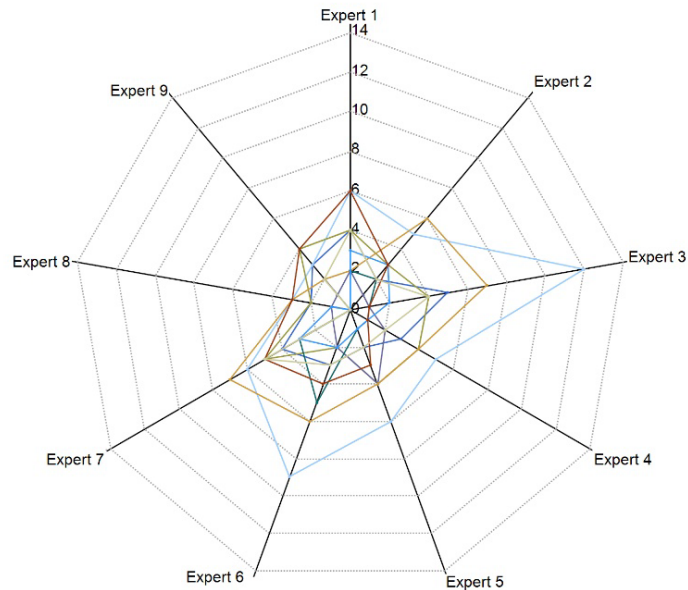


Figure. 4 Experts' perceptions of the factors influence UGB effectiveness in curtailing the sprawl in Riyadh (created by NVivo 12).

3.1 Plan Making Stage

The expert interviewees concurred that the main weakness of Riyadh UGB lies in the study elaboration stage. Three significant drawbacks in the study preparation made the UGB less capable of halting sprawl from taking place in Riyadh.

3.1.1 Over-Optimistic Population Projection

The Riyadh UGB was supposed to house some 12 million inhabitants by the year 2020. The actual number of Riyadh residents to date does not exceed 6.5 million. This overestimation has led to larger areas of vacant lands within the UGB, which represent something around 45% of the total Riyadh area. As Expert 3 put it:

“Riyadh policymakers have overestimated the city population growth. They have thus included more land into the UGB to meet the future expected demand. However, what Riyadh got out of this erroneous population growth estimate, has been scattered and leapfrog development”.

Expert 3 said that *“the vacant land required was calculated on the basis of population projections to the year 2020. Then a safety net of twenty percent was added. It is believed that a big mistake was made by*

3. Results and Discussion:

This section discusses the finding with regard to the crucial factors underlying the inefficiency of Riyadh UGB as a measure to curtail sprawl. The data collected through interviews with experts were processed to answer the primary question of the study. The purpose was to identify the factors that influence the success of the UGB by analyzing the planning stage and the implementation and monitoring stage. Figure 4 illustrates the experts' perceptions of the factors that influence UGB's success in controlling growth and curbing sprawl in Riyadh. Also, it presents how many times each expert coded the factor.

adding twenty percent. This safety margin should not have been added in the first place. This safety margin was largely to blame for the sprinkled low-density city sprawl”. This argument has been endorsed by Expert 5

(personal interview, April 15, 2019) and Expert 9 (personal interview, April 12, 2019).

3.1.2 Intended Low-Density

The average residential density within the UGB was about 60 People/Ha, whereas, the United Nation average density standards is 150 People/Ha. Many respondents have emphasized that such density has not only led to consuming many acres of lands but also to increase the cost of infrastructure.

“Riyadh residential density is among the lowest in the world. Most of the residential dwellings consist of villas with an average area between 400 to 600 square meters. With a density of ten to twelve dwellings per hectare, Riyadh cannot sustain its urban challenges,” argued Expert 4 (personal interview, April 21, 2019).

3.1.3 Neglecting Local Engagement

The participation of residents and other stakeholders in discussions about the development scenarios, and which lands can be developed first is necessary for the efficiency of UGB. As one respondent put it:

“If the UGB policy is to succeed, it has to win the support of all concerned parties, residents and stakeholders.” By Expert 6 (personal interview, May 10, 2019).

“three planning institutions, Al-Riyadh Development Authority (ADA), the Ministry of Municipalities and Rural Affairs (MOMRA) and Riyadh Municipality, collaborated together to set up the city UGB. Unfortunately, this work was done in the absence of community participation.” Said by Expert 1 (personal interview, May 18, 2019).

Expert 5 argued against community participation in Riyadh UGB. He said: we in the MOMRA have deliberately ignored it because we believe that city residents are not well aware of what the UGB is all about. For local stakeholders, they seek only their own profit over the public interest. Another expert replied if there is a lack of awareness among the public, it is therefore incumbent upon the planning authorities in the MOMRA, ADA, and NGOs to explain the role of the UGB to the general public and increase their awareness of the general interest over the private one.

3.2 Implementation And Monitoring Stage

3.2.1 Lack Of Plan Monitoring And Evaluation Studies

Plan monitoring and evaluation studies are essential to check the performance of the urban growth boundary. Effective monitoring and evaluation studies can not only assist city planners in determining the factors of success or failure of a plan but also to supports policymakers to make any adjustments to the UGB if necessary. With regard to the lack of plan monitoring and evaluation studies, respondents said:

“Riyadh Municipality was forced to ignore its role in conducting monitoring and evaluation studies because it was overwhelmed with the implementation process.” by Expert 3 (personal interview, April 25, 2019).

“Urban sprawl is a major issue in Riyadh. It is unsustainable and leads to many other problems like inciting car movement, causing strip development, declining the city centre, hampering walkability, etc. The problem is, there has not been any study to evaluate the UGB so far. Such evaluation is more than necessary.” by Expert 6 (personal interview, May 10, 2019).

The absence of plan monitoring and evaluation in Riyadh has promoted new residential developments to spillover within the UGB and beyond. Pieces of evidence can be seen in the scattered development to the North and North East of Riyadh.

3.2.2 Incoherent Public Policies And Regulations

For the Riyadh UGB to work efficiently, it has to be coupled with a set of planning policies and regulations to control and manage urban growth. Rules related to building codes, land subdivision approvals, and infrastructure provision regulations need to accompany UGB implementation phases. Interviewees tend to agree that the current building codes favoring lower densities challenge the concept of compact development. Riyadh urban regulations prohibited multi-families housing and commercial uses inside the districts; Only two-story single-family housing is permitted. Multi-story apartments are only allowed on roads 30 meters wide and over. The commercial ribbon development encouraged expansion along the arterial roads, even outside the current built-up areas.

Current policies encouraged people to build their houses and live everywhere within UGB regardless of the distance between the current built-up areas and the new developments.” Said, Expert 5 (personal interview, April 15, 2019).

“I would say that policies contributed to sprawl in different ways. Any developer can subdivide his land at any time, regardless of the location of the project within or beyond the UGB. Furthermore, the planning regulations do not link the approval of subdivision projects with the actual supply and demand for housing in Riyadh. Lack of actions to penalize investors who develop areas not connected to the main built-up area of the city.” by Expert 4 (personal interview, April 21, 2019).

Expert 6 agreed with the idea that urban regulations tend to support development to occur anywhere within the UGB. He said:

“Planning policies in Riyadh seem to be geared to favor speculation. Any developer can subdivide his land to sell the parcels without any requirement to develop and build the lots.”

“Municipal regulations have promoted single land use, low-density development, providing free infrastructure, and zero land fees. All these have encouraged land speculation that led to the scattered, leapfrog, and ribbon development patterns.” said by Expert 9 (personal interview, April 12, 2019).

Many expert respondents mentioned the outdated regulations have contributed to increasing vacant lands within the UGB. It is essential to formulate land-use regulations that support continuity and concentration of new development while inhibiting scattered growth from taking place in any location on the urban periphery neglecting the cost of the infrastructure and negative impacts on the environment.

“Urban regulations allow commercial use development alongside all streets with 30 meters wide and over. Developers usually insist on land subdivision planners to provide more 30 meters wide streets so that they can sell more larger lots for commercial use, which is financially rewarding to speculators.” by Expert 6 (personal interview, May 10, 2019).

“By law, we cannot exclude any land inside the approved UGB from the development or change the advantages that have been given to that

land. The existing regulations do not support shrink's decisions. Therefore, the rules of UGB should be promoted to do its function effectively. I would say, the city officers should develop the current regulations to managing the growth, reducing land speculations, and transforming the city into compacted growth." by Expert 7 (personal interview, April 16, 2019).

The idea of shrinking UGB was raised since the current boundary is too loose, but there was a dilemma as the supportive legislation was lacking. Planning authorities also realized that the existing regulations were much in favor of the private developers. As Expert 2 put it:

"Regulation has to be developed to consider the actual need for land, economy, and society. Furthermore, we did our plans for 25 years, which has been proven that it is not efficient. We should do a framework for the development for five years to achieve our 25-year plan."

Expert 4 said that:

"To be frank, right now, the legislation we use is only to manage the existing urban development. Therefore, there is a need for new legislation to control growth and reduce sprawl to a minimum".

"The issue can be corrected at the next stage of the UGB. By developing regulations to support the municipality on the decision of UGB shrinking to curtail leapfrog development and impose new land fees structure for infill development. To control the scattered patterns of developments, then it is necessary to establish the UGB only for the next five years instead of twenty-five years currently adopted. All the above can encourage the developer to invest in ample sites within the pre-existing urban growth boundary that can be found to meet the housing needs of the projected population of Riyadh." by Expert 8 (personal interview, April 24, 2019).

Since the Cabinet has approved the urban growth boundary and its regulations, the local authority cannot withdraw the right of developing lands from the people after giving them that privilege. The municipality should accept and approve all subdivision plans as long as these projects are within UGB, and they follow the building codes. Policymakers should formulate resilient land-use regulations to deal with the changes in UGB, facilitate the high-density developments, and define the needed lands precisely for the next five years to avoid the problems associated with the overestimated areas for 20 years.

There is a famous saying "planning must have teeth," but the municipality's planning department teeth seem to be extracted to the point that many affluent developers do no longer fear them. Said by Expert 6 (personal interview, May 10, 2019).

UGB was primarily generated to promote the creation of a well-managed urban growth by restricting leap-frog expansion over surrounding rural areas. Policies are designated to create well-ordered urban areas by promoting new developments. Municipal regulations should, therefore, introduce the 'carrots' and 'sticks' approaches, to avoid scattered and low-density urban expansion and push towards high-density in areas suitable for infill development.

3.2.3 Provision of free Amenities and Infrastructure

Generally, urban amenities and infrastructures such as schools, hospitals, water and wastewater, roads, and transportation services are necessary components in containing and managing the growth when used correctly. Many respondents emphasized the role of amenities and infrastructure in causing sprawl in Riyadh. By law, the municipality must provide infrastructure to any project within the UGB in the current phase regardless of how far they can be from the existing built-up area.

Expert 2 said, *"The sprawl is a result of the failure of the market in the distribution of resources such as public services and infrastructure."*

The development in the west part of Riyadh is a glaring example of the role of infrastructure in encouraging sprawl. West of Riyadh was restricted from residential growth due to the geographical obstacles like the valley known as "Wadi Hanifah." When the Municipality constructed bridges, paved roads, and supported the necessary services, the low-density residential development expanded over the prepared lands. Two interviewees reported that the defective design of the boundary of urban growth led to the failure of the growth management as the west part of Riyadh was linked to the current phase of UGB. Because of these linkages, the valley does no longer plays its role as a natural limit to development.

3.2.4 Lack Of Coordination Between Urban Authorities; Municipality, MOMRA, And ADA

Another factor that has been taken to account for exacerbating urban sprawl was attributed to the lack of coordination between different planning agencies. The responsibilities of the three leading planning institutions in Riyadh, namely the Municipality, MOMRA, and ADA, were overlapping and even sometimes conflicting. This conflict has led to inconsistencies in the decision-making process between different planning authorities, which has, in the end, negatively impacted city growth management. As an example, the establishment of the UGB was made by MOMRA, whereas its implementation and monitoring were held by Riyadh municipality. The ADA, however, took in charge the role of making Riyadh Strategic Plan and regulating the land uses within the limits of the UGB. Three different missions for three different planning institutions on the same UGB.

It must be stressed that the UGB is a much more potent instrument than the strategic plan. The UGB gets its power from the Cabinet of Ministers, which is the highest institution in the country, whereas the strategic plan gets its authority from the minister of MOMRA, which is a lower institution than the former. As a result, the strategic plan was taken loosely so much so that the Municipality has taken many actions not always in accordance with the strategic plan stipulates. The ADA itself has allowed many development projects in total breach of its own strategic plan orientations. One expert respondent cited many examples where the Municipality has breached the not only approved some residential subdivisions but provided them with

the necessary services and infrastructures in complete disregard of its own UGB guidelines.

Two MOMRA delegates for urban management pointed out that:

“The lack of integration between the respective urban authorities in Riyadh resulted in overlapping powers and negatively impacted the management of the city’s growth significantly.” by Expert 5 (personal interview, April 15, 2019).

“Riyadh has the privilege of having the Riyadh Development Authority, that can use the power of providing services to control the development, but it has not used this power yet.” by Expert 7 (personal interview, April 16, 2019).

“There is not only a lack of coordination among different authorities such as the ministry of transportation, housing, and MOMRA but also between the various departments in the same ministry.” Argued by Expert 8 (personal interview, April 24, 2019).

3.2.5 Absence Of Impact Fees And Taxes

Impact fees and taxes have not ever been used in Riyadh before 2016; in other words, taxes have been used after 28 years of implementing the UGB in Riyadh. The current tax computation system has increased the price of housing instead of encouraging infill development. A former deputy minister and several other experts said taxes play a vital role in increasing vacant lands within UGB. However, the current fees system is rising the price of land because of the low percentage of taxes, which makes developers add this amount to buyers. Policymakers used a "one size fits all" approach to design the tax system as they took the whole city as one unit. They should have categorized vacant lands according to their locations instead.

Many experts discussed the absence of impact fees and taxes encouraged developers to consume more lands providing residential projects with very low density and single land use to get much revenue using the advantage of the free infrastructure. Although not necessarily the purpose, the absence of taxes has encouraged residents to live in big houses for a single-family.

3.2.6 Permitting Land Speculation

Six out of nine interviewees mention to consequences of the speculation on the efficiency of UGB on restricting sprawl in Riyadh, where people tend to invest in vacant lots "white lands," considering land as the safest place to hold cash. The formidable issue with speculation is that it decreases the supply available for the current development and reduces the willingness to in-fill development. Another problem with land speculation within the UGB is that the inflation of land appreciation near the urban-edge caused some speculators to keep their lands out of the real estate market.

Due to the allocation of substantial land for housing projects within the UGB in numbers far beyond the projected future need, insufficient regulations of land development, absence of taxes on surplus property, and the leniency in the approval of land subdivisions have led speculators to make easy money by

taking advantage of buying and selling vacant lands without building real projects. Such activities promoted premature growth as a consequence of a lack of adequate planning foresight that does not lead to actual residential developments. The result was leapfrog and fragmented development patterns.

4. Conclusion

In this paper, the researchers employed semi-structured interviews with experts who played a significant role in managing the growth of Riyadh for many years to determine and interpret the reasons behind the weaknesses of Riyadh UGB that have ultimately promoted urban sprawl. The findings provided a deep understanding of the vulnerabilities that adversely impacted the efficiency of the UGB. Recognizing the weaknesses in the preparation and implementation of the urban growth boundary is the first step for city planners and policymakers to potentially produce worthwhile insights into managing the growth as well as curtailing sprawl.

Findings show that the deficiencies of UGB in Riyadh were driven by some flaws that occurred in the preparation at the legislation stage (e.g., overestimated required lands for future growth, disregard of public involvement, absence of impact fees, and tax regulations, and low-density development). Many other mistakes that happened during the implementation and monitoring phase (e.g., providing free amenities and infrastructure, overwhelmed municipality by implementation tasks and overlooking monitoring and evaluation studies, applying outdated regulations, and approving more land subdivisions regardless of land speculation activities). And above all, lack of coordination between various planning agencies and miscommunication among them.

Riyadh's urban authorities, such as MOMRA, ADA, and Riyadh municipality, should develop more stringent regulations to combat scatter development and promote compacted growth. Impact fees, permitting density in the built-up residential area, and infill development incentives, all these strategies, and others work effectively against urban sprawl and support the compacted development. The study's implications would boost urban management to reduce sprawl, not only in Riyadh but also in the other 99 Saudi cities that used the same approach as Riyadh.

These results spark several new research opportunities. It would be beneficial to investigate these influential causes quantitatively, including assessing the sprawl and the effect of each factor on it. Furthermore, the position of urban governance and urban finance will directly affect UGB performance, which should be explored in future research.

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