UNDEVELOPED LAND: IS IT A DEVELOPMENT OPPORTUNITY OR A PLANNING PROBLEM?

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ABSTRACT

Land policies have become prioritised in the political agenda in many nations in a way that ensures the sustainability of supply within urban boundaries. This is due to the negative implications of sprawling cities. While many studies regard undeveloped land as a development opportunity (whether for the present or the future), it can be argued that the existence of undeveloped land can, in dissimilar urban contexts with dissimilar situations, be a planning problem. The city of Riyadh is chosen as a case study to show how undeveloped land can be a planning problem. It was established that undeveloped land can be divided into three categories; undeveloped land that is located in the urban-rural fringe, currently undeveloped brownfield land (i.e. it has been previously developed) and undeveloped white land (i.e. virgin land). While the first two categories can be a development opportunity, the undeveloped white land can be a sign of a planning problem. It is vital to explain this as future studies should deal with the issue of undeveloped land differently (i.e. whether it is a development opportunity or a planning problem).

Keywords: undeveloped land, brownfield sites, white land, Riyadh.

1 INTRODUCTION

Since the last century many cities have started sprawling (Munafò et al. [1]). This is due to several reasons such as the global rapid urban growth rate, from only 14% in 1900 (Rogatka and Ramos Ribeiro [2]) to 54% in 2014, to an expectation of 66% in 2050 (United Nations [3]), simultaneously with the dependence on using the car that can lead to lower density (Kubeš [4]). It has been found that such urban sprawl is seen as a serious problem in the development process as it is a negative externality. Many empirical studies, for example, have explained the damaging implications of urban sprawl environmentally, economically, socially and from a safety viewpoint. Such serious negative impacts of sprawl have, in the last four decades, stimulated governments, organisations and specialists to think about potential solutions such as compact city, smart growth, infill development and so on. These suggestions mainly aim to rethink development inside the city, for instance by raising the density and urban regeneration, instead of further sprawling. Undeveloped lands within cities, therefore, can be considered a "development opportunity" to meet the uses and densities needed. In this paper, however, it is argued that while such undeveloped land can sometimes be a "development opportunity", it can in different conditions be a "planning problem" as little theoretical discussion is conducted in this domain.

To investigate this, two main sections will be covered. The first will, based on the relative literature review, discuss when the undeveloped land can be a development opportunity. The second part will, conversely, demonstrate when undeveloped land is seen as a planning problem, using Riyadh as a case study.

2 UNDEVELOPED LAND AS A DEVELOPMENT OPPORTUNITY

The majority of scholars in connection with undeveloped land are interested in two distinct ideas explained in a way that show that such undeveloped land can be a development opportunity; 1) undeveloped lands that are located in the urban-rural fringe and 2) the benefit

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from brownfield land. The two points, indeed, can closely correlate to each other, as explained in this section.

2.1 Undeveloped land in the urban-rural fringe

Regarding the undeveloped land that are located in the urban-rural fringe, it can be argued that if such undeveloped land currently gives advantages to the whole society by remaining undeveloped for future development, then it would be a development opportunity for future development (rather than being a planning problem). It is, therefore, vital to know whether urban sprawl of cities on such undeveloped land involves negative externalities. If so, then encouraging keeping such land undeveloped for the future, in order to curb sprawl (not organised growth), could be warranted.

Indeed, it is a well-documented fact that urban sprawl is often associated with some detrimental consequences, from environmental, safety, health, and economic perspectives. From an environmental viewpoint, sprawl has negative effects on both air pollution that can be increased by using the car, and on consuming landscape at the expense of using brownfield sites [5], [6]. It was found that unquestioning urban sprawl can increase the rate of vehicle use, with higher levels of smog emissions which could exacerbate the threat of climate change (Thompson [7]). This type of development can also play a negative part in damaging the surrounding nature, such as damaging agricultural land (Jiang et al. [8]).

Another study conducted in China using GIS and remote sensing describes that there is a strong correlation between urban sprawl and high temperature, and that the more surface that is covered with utilities, specifically asphalt, the higher the temperature the city can amass (Weng [9]). Such environmental problems may also give rise to some health harm where the smog emitted by vehicles may bring on serious illnesses. In fact, one study shows that approximately 440 people are killed annually in Toronto due to such smog (Thompson [7]). Sprawl pattern can also increase obesity rates (Ewing et al. [10]) owing to the main dependence on the car.

From a safety standpoint, traffic danger can increase with the enormous urban expansion. Messelihi [11] suggests that the travel duration inside cities should not be more than 15 minutes. When the city's parts are spaced out with huge urban expansion, drivers tend to drive faster and consequently, as explained in a study completed by Ewing et al. [10], the probability of pedestrian traffic fatalities rises.

It has been illustrated that urban sprawl is greatly ineffective from an economic angle. A city can lose a massive amount of money for constructing both extra infrastructure and services [2]–[12]. As an example, the Municipality of Halifax has recently found that hundreds of millions of dollars could be saved with less urban expansion (Thompson [7]). Likewise, it is clarified by Burchell and Mukherji [13] that it would require an expected spending of approximately 190 billion dollars to supply sewerage and water infrastructure for only single-family dwellings in new subdivisions (around and beyond the city's boundaries). With respect to public services, it is also found that government services, such as hospitals, schools, police stations, firefighting services and so forth, in denser areas nearer the central area do not cost as much as that of outer areas because economics of absorption and scale of present excess volume can minimise the need for costly further expansion (Burchell and Mukherji [13]).

Likewise, Brueckner [14], in his justification for government intervention to preserve open space, has identified three elements that make sprawling cities associated with market failure, namely open space, individual commuters and costs of public infrastructure. He discussed how the loss of open space, long commuting and costly infrastructure can worsen

when the preserving of undeveloped land that is located in the urban-rural fringe is neglected. In this regard, the optimal city size model tries to identify whether the city should be controlled, taking into consideration both monetary (i.e. economic impacts of sprawl) and non-monetary factors (i.e. environmental, social, safety and health impacts of sprawl). It is problematic to identify the optimal size because of both the difficulty of measuring the non-monetary costs as well as the fact that the optimal size for one social category might be too large for another (Balchin et al. [15]). Nonetheless, it is well acknowledged that there is a limit beyond which the city ought not to expand. This limit is explained by Harvey and Jowsey [16], who consider the benefits and costs for the whole society.

The average cost in the beginning of the city growth, as the population increases, falls slowly up to *Pm*, where the size is optimal only for the beneficiaries (residents) but is too costly for public budget because the city can easily accommodate more people (Fig. 1). The average cost *AC*, however, will then increase when agglomeration diseconomies happen. The optimal city size for the whole of society, therefore, can be achieved when the marginal cost *MC* meets the marginal benefits *MB* at *Po*, which are derived from the average benefit and cost curves. More importantly, it should be noted from this model that "city growth", which can be a natural dynamic process, does not always imply "sprawl", which is seen as a negative externality. If development in the urban-rural fringe is controlled, it is most probable that the whole urban area grows regularly in a positive way, and that is one thing that the advocates of "smart growth" call for. In this regard, many studies concentrate more on the ideal time for developing lands that are located in the urban-rural fringe, accepting the fact that cities grow. Without assessing the ideal time for development in such locations, the urban area might sprawl rather than grow. This is the case because preserving undeveloped lands in these areas will not only ensure this natural resource is available for future generations, but also offer open spaces to the public (positive externality). Such lands are regarded as an opportunity for (future) development as those interested scholars generally think that open space on the city edge should be preserved for as long a time as it can be without "leapfrog" in development, thus they are interested more in measuring (often quantitatively) the ideal development-timing (for more discussion, see for example [17]–[21]).

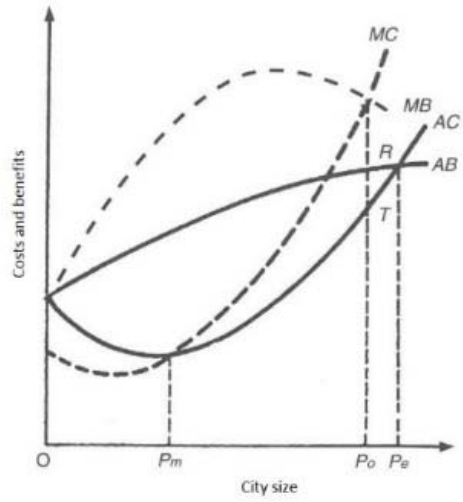

Figure 1: The optimal city size [16, p. 279].

2.2 Brownfield land

While the undeveloped lands that are located in the urban-rural fringe can be a (future) development opportunity, encouraging infill development and benefitting from brownfield land can, consequently, be a development opportunity. This is because, as mentioned previously, preserving undeveloped land around the city (as a future development opportunity) can closely correlate with seeing brownfield sites as a current development opportunity, both resulting in curbing urban sprawl. One crucial point is to define what brownfield site means as it helps to understand why such sites can be a development opportunity.

Generally speaking, brownfield sites are defined as "*any land, which has been previously developed, including derelict and vacant land, which may or may not be contaminated*" (Dixon [21], p. 241). This definition indicates that brownfield sites tend to be associated with any land within a city's boundaries that has been previously developed. This can be equivalent to the argument that says that peripheral sites (greenfield ones) are cheaper for developers due to the fact that they do not need to stand the costs of demolishing and cleaning what was formerly in the site (as in brownfield sites) (Carruthers [22]). Adams et al. [23] have compared brownfield development in two different regions; Britain and North America. They have found out that; whilst "brownfield" is generally related to previously developed land in England and Scotland, it is narrowly connected with contaminated land (due to the process of deindustrialisation) with redevelopment potential in the USA and Canada. Furthermore, whilst the concept of brownfield can be subject to the particular institutional and cultural context of each nation, benefitting from such sites is considered, thought by Adams et al. [23], as a development opportunity. Concepts such as compact city and smart growth were introduced to support the idea of redeveloping brownfield sites. They are, therefore, concepts of "looking inward" for the target of accomplishing the full revival of inner urban areas, by recreating the underutilised areas inside cities (Varma and Varma [24], p.7).

In more detail, urban regeneration often takes place as land uses invade each other. This explanation is shown by Balchin et al. [15]. The constant changes in property values, due to the increasing demand, is the key rationale behind renewal processes. This is because land is generally fixed in supply and a scarce resource. Overall, there are two basic values related to urban property; the capital value of a site and a building in their current use, and the capital value of a cleared site in its best alternative use. The latter, as depicted in Fig. 2, is capable of maintaining its value and the former, meanwhile, declines as the building converts to be obsolete or inefficient for its present use. After *x*, therefore, redevelopment ought to occur.

Balchin et al. [15] continue clarifying that when redevelopment takes place, it tends to be, assuming planning permission, in a higher density use (because the city grows, hence demand for its scarce sites becomes higher, resulting in more valuable land). Otherwise, the converted building would not be the best alternative use and, consequently, the *ss* (Fig. 2) would fall. That might be one reason why the compact city concept, in order to be economically more effective, assumes more intensive use (see for example [24]–[28]).

Accordingly, governments generally regard brownfield sites as a development opportunity. As only an example, in England there is a commitment by the government to build at least 60% of new residential units within brownfield sites (Urban Task Force 1999 cited in [29]). It is, however, worth mentioning that most of the debate related to brownfield sites is strongly connected with the developed countries. While there is a weak connection between industrialisation and urbanisation with rarely any decentralisation process in developing countries, decentralisation does exist in developed countries and it, combined

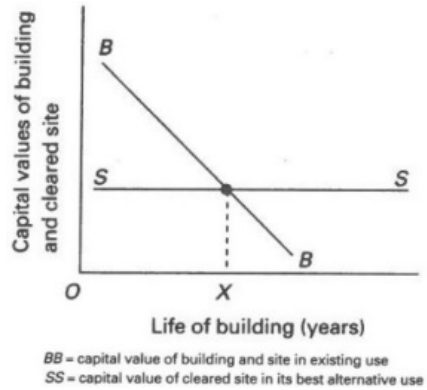

Figure 2: The maximum economic life of a building [15, p. 25].

with de-industrialisation processes, has created some brownfield sites within a city's boundaries (Burgess and Jenks [30]). This, therefore, could be an evident indicator that the reasons for the existence of undeveloped lands in developed countries differ from the reasons in developing countries. This is to claim that undeveloped land that is situated in brownfield sites can be a development opportunity by redeveloping them and benefitting from them again in a way that more suits the present needs in terms of both density and type use (for more discussion see [23], [31], [32]). In different urban contexts, on the other hand, there can be a dissimilar process of development that creates undeveloped lands that could be a planning problem. This will be illustrated in the following section.

3 UNDEVELOPED LAND AS A PLANNING PROBLEM

It was explained, in the preceding section, that undeveloped lands can be a (future) development opportunity if they are located by the city's boundaries, and a (current) development opportunity if they are situated in previously developed land within the city's boundaries, including abandoned buildings. This section, however, tries to clarify how undeveloped land inside urban boundaries could be a planning problem. This happens when the city accommodates undeveloped "white land", which has not been developed yet (virgin land). White land is defined as "*large plots of idle urban land*" (Wahbah et al. [33], p. 6). Likewise, it is defined as "*any idle land designated for residential or residential/commercial use within the urban boundaries*" (JLL [34], p. 2). While the first definition refers to only large urban plots and the second to any residential or residential/commercial land (whether large or small), this study refers to "white land" as any land within the urban boundaries that has not been previously developed, whether subdivided or not.

This is an underlying argument so as to differentiate the existence of white land (planning problem) from both the land located in urban-rural fringe and the brownfield sites which have been previously developed (development opportunity). The main distinction between brownfield land and white lands is that the market fails to develop the latter, bypassed by the development process moving outwards without any development to them, exacerbating urban sprawl (that is why I call it a planning problem).The market, however, does not originally fail to develop the former (i.e. brownfield sites) and the process of development (has) covered such sites but currently no longer with valid uses, which provides an opportunity to redevelop them again with more ideal uses.

In other urban contexts, in contrast, the development process, by leaving white land without development, might be totally different. A case study of Riyadh will, therefore, be conducted in a way that only shows how the process of development has left significant portions of white land. This means that the process of understanding, investigating and addressing this issue is out of this paper's scope. This is not to say that such a problem (undeveloped white land) cannot be turned into a development opportunity by examining this issue and applying suitable techniques to tackle it, but again without admitting the existence of this problem in the real world, the studies would not be concerned with understanding, investigating and addressing it. Thus, this issue will be described using Riyadh, Saudi Arabia as a case study.

3.1 The development process and undeveloped white land (case study of Riyadh)

This part briefly describes the wide spread, through highlighting the development process, of white land within Riyadh's urban boundaries. This not to state that the proliferation of white land would not exist in other developing countries, especially in The Gulf region, but Riyadh is selected here, as supported by Al-Mogren's argument [35], because it is the perfect indicator, as a very extreme example, to describe the side effects of the phenomena of Gulf urbanism.

Riyadh, the largest city in the Arabian Peninsula, has witnessed a considerable transformation concerning urbanisation. The annual growth rate in Riyadh is very high compared to other developing capital cities, with a rate of 4% between 2010 and 2015 (HCDA [36]). Considering solely residential dwellings, Riyadh is the fastest growing city in the world (Al-Oteibi et al. [37]). Suburban areas created in the 1970s are located today between the city centre and the modern boundaries (Garba [38]). Six consecutive phases can describe the process of development and urbanisation in Riyadh (Al-Hathloul [39]).

First of all, Riyadh (the walled city). In 1930 Riyadh had an area of only 1 km^2 with a population of just 27,000 (HCDA [40]). It began to transform physically when King Abdul-Aziz in the 1930s decided to build his palace and a complex for the city administration north of the city. This area is called Al-Murabba and it covers about 160,000 m^2 (Philby [41]). King Abdul-Aziz, after constructing Al-Murabba, set a precedent for the future planning system in Riyadh (Al-Hathloul [39]). It seems that King Abdul-Aziz building his palace to the north of the walled city gave a general trend for the direction of urban expansion. Al-Hathloul [39] argues that the Al-Murabba plan had a major impact on Riyadh in two different ways. Firstly, it extended the city and gave a clear sign that the walls around Riyadh never became a barrier for physical growth. The second effect is the fact that Riyadh started to depend on the car as a main transport means. As a result, the districts inside Riyadh started to become moderately disconnected.

Construction of the Al-Malaz district (the new Riyadh) is the second phase. This neighbourhood is located five kilometres north of Al-Murabba (Fig. 3) (Al-Hathloul [39]). Interestingly, as illustrated in Fig. 3, the main districts in the city have become obviously disconnected due to the dependence on the car, with a complete absence of public transport, thus a plethora of vacant land created itself among such areas, where the land was almost free. It also seems, by constructing the areas disjointedly, that the government gave an evident sign for its intention for enhancing urban and population growth in Riyadh, as a new capital city, to be more powerful in the region. It is worth mentioning that the population during the 1950s does not even reach 100,000 inhabitants [42], which may have encouraged the government to take diverse strategies to increase the population in this new capital. In comparison with the traditional districts, Al-Malaz followed a modern formation of physical

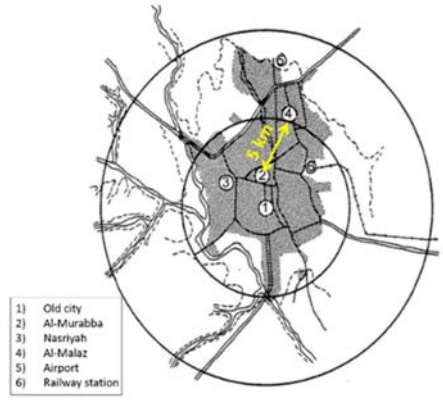

Figure 3: Major areas in Riyadh during the 1960s [39, p. 100].

planning that relies on a gridiron master plan including different levels of streets and large blocks in which every block consists of eight or six lots with (often) a lot size of 25 × 25 (625 m^2) [39]–[43]. As a consequence, Al-Hathloul et al. [44] think that some new ideas regarding space evidently arose. These include a dramatic decrease by 80% in the population density compared to that of traditional homes to become only 60.38 persons / ha; three times as much allocated area for streets as that of traditional plans; and the absence of semi-private spaces which was substantial in the traditional. The sharp and dramatic rise of the lot area from traditionally 100 m^2, as mentioned previously, to 625 m^2 can be a basic indicator of this density decrease.

With reference to the third phase (i.e. the first master plan), dissimilar to the 1930s, legislation and planning regulation has come under the bureaucratic control of official organisations (Mubarak [45]). With the sharp rise in urban growth in the capital city, the Saudi government realised it had to control it in a professional way. Hence, an agreement was signed with Doxiadis Associates for the purpose of providing a programme and a master plan to direct the development process of Riyadh until 2000 (HCDA [42]). In this project, a total area of 304 km^2 was assigned to accommodate 760,000 and 1.4 million up to 1985 and 2000 respectively (HCDA [46]). At this point, residential development in Riyadh began to differ from many other cities in the world. This is, according to Alskait [47] because each housing plot, already owned by a citizen, tends to be built on from scratch by its owner, and the owner usually acts as a consultant and contractor to build their house. Two core reasons could be behind why inhabitants usually build their dwellings from scratch: firstly, it is the traditional style of construction and secondly, they are motivated by the fact that the government often gives the Saudi residents a grant plot with a loan to assist them to build their houses themselves. Therefore, the vast majority of the inhabitants have become familiar with such a pattern of house acquisition.

Unpredictably, on the other hand, there were some extremely rapid changes in terms of urban and population growth, which was not taken into consideration by the Doxiadis plan. Consequently, the city began to expand quickly everywhere (HCDA [42]). Evidence of the acute urban growth of Riyadh is that its area reached approximately 450 km^2 and its population went up significantly to almost 1.4 million in 1987 (Al-Mogren [35]), although the proposed area, as mentioned earlier, should not have exceeded 304 km^2 with no more than 1.4 million citizens in 2000. It is worth mentioning here that, though the population

reached 1.4 million in 1987 rather than 2000 (as thought by Doxiadis), the proportion of planned areas surged to 450 km^2 in 1987 instead of 304 km^2 in 2000 (as planned by Doxiadis). This means that, with taking the Doxiadis plan into account, the percentage of the adopted areas for living skyrocketed much higher than that of the population within the same period of time. During that time, the Municipality, apart from the large-scale projects sponsored by the government, issued more than 12,000 building permits per year, resulting in some critics saying that Riyadh experienced the largest building site in the history of humanity (Al-Hathloul [39]). The final outcome is that the urban development rate far exceeded Riyadh's boundaries, which are specified by the plan of Doxiadis. Despite the lack of planning expertise of the government at that time, it urgently called for another master plan that could alleviate the problem.

The second master plan (the fourth phase) was commissioned in 1982 to a company known as SCET International/SEDES (HCDA [42]). Generally speaking, the proposal of SCET Int followed the main principles of the Doxiadis master plan, for example the superblocks (2 × 2 km^2) (HCDA [40]), but it was intended to make it more flexible in order to absorb the greatly increasing growth with an allocated area of 850 km^2 for urban development until 1990, 250 km^2 of which was subdivided but undeveloped (HCDA [46]). The underlying aspect at this point (1980s) is that the growth of urban development was impressively faster than the population growth. To put it differently, Al-Oteibi et al. [37] state that whilst the population increased by 100% from 1976 to 1987, the construction area skyrocketed by 1000% at the same time. For this reason, one subdivision takes a massive 30 years to be filled with houses, nevertheless one can find some vacant land within it (Alskait [47]). It seems that the SCET Int master plan did not, unfortunately, monitor or control the urban development growth during a period of both an oil boom simultaneous with a sudden population growth. This leads us to the fifth phase (i.e. urban growth boundary).

Urban growth boundary (UGB) was introduced in 1989 after the realisation that the problems stemmed from the fast sprawl (HCDA [40]). When this programme was introduced, the size of undeveloped subdivisions in Riyadh, as explained by Mubarak [45], was roughly equal to that of the actual urban development, which had already been accommodated. In addition, in 1986 there was also an official decision by the Council of Ministers to suspend subdivision of any new land (Al-Hathloul [39]) for the objective of preserving the natural environment around the city, minimising the infrastructure cost for unplanned land and encouraging the development in infill sites. The UBG programme was made up of three phases. The first phase is Urban Limit 1 (UL1) with an area of 632 km^2 for development up to 1995, the second is Urban Limit 2 (UL2) with an area of 1149 km^2 for urban development up to 2005 and the final phase is an external protection zone (Urban Environs Limit UEL) allocated for future urban development with an area of 3110 km^2 (HCDA [40]). One advantageous point is that by applying such phases, a median of 1150 ha of vacant land, already served with infrastructure, was brought into use by 1993 (Al-Hathloul [39]). Therefore, the urban growth and, more importantly, the phenomenon of vacant land spread should have been controlled since the introduction of the UGB.

Unfortunately, however, a major problem arose in that some developers took advantage by providing infrastructure in the second phase, whilst the time of the first phase had not officially ended, benefitting from the government permission given to them (Al-Hathloul [39]). This was certainly a challenge and, as mentioned by Al-Mogren [35], mismatched with the UGB aim.

In fact, despite the increasing population (3.1 million in 1996), one year later (1997) there was a hefty 500 km^2 of subdivided land in the UL2 undeveloped, 170 km^2 of which were adopted after introducing the UGB policy in 1989 (HCDA [40]). The number of subdivided

Table 1: Developed and undeveloped land in Riyadh [50, p. 19].

Category	Area (km^2)		Total	Percentage (%)
	Developed areas	Undeveloped areas		
Urban Limit 2015	969	941	1910	49
Urban Limit 2030	1020	1413	2433	58
Urban Environs Limit	1219	4164	5383	77

and adopted tracts in the UL2 between 1989 and 1992 is 17 (HCDA [48]). Worse, when the UL2 officially began (1995), 37% of land was undeveloped from the total areas of UL1 (HCDA [40]). This mass of undeveloped land in the UL1 should have been an apparent indicator against the allowance of urban development in the UL2 because, as pointed out by Mubarak [45], the existing population at that time could be doubled for another 10 years without the need to transfer to the UL2. In other words, the pieces of vacant land which had been subdivided by the year of 1997 could accommodate Riyadh residents up to 2017 without any extra subdivisions (HCDA [49]). Another study, conducted by (HCDA [46], illustrates that the total of the subdivided land by 1997 could accommodate six million inhabitants if it was developed.

The final phase is the comprehensive strategic plan. It has been proposed to guide Riyadh's development in the future and keep up with the increasingly steep growth of population. Basically, the plan focuses on alternatives for developing Riyadh, for instance establishing two suburbs accommodating one million citizens each as well as introducing a modern system of transport (Riyadh Metro), which has commenced and will be completed before 2019 (HCDA [36]). More importantly, the comprehensive strategic plan has revised the UGB and then suggests urban limits for the future, namely Urban Limit 2015 with an area of 1910 km^2, Urban Limit 2030 with an area of 2433 km^2 and Urban Environs Limit including an area of 5383 km^2.

Interestingly, which is relevant to this paper's focus, although Riyadh is still expanding at the present time with a population of over six million (HCDA [36]), a report conducted by HCDA [50] shows that the percentage of undeveloped land in Riyadh is about 77% from the Urban Environs Limit, approximately 58% from the Urban Limit for 2030, and roughly 49% from the Urban Limit for 2015 (Table 1). As the population of Riyadh has skyrocketed from only 27,000 in 1930 to over 6 million today, one could say that the rationale behind the undeveloped white land is the quick urbanisation. Some evidence shows that the slow reaction of supply to the rises or falls in demand could cause lag-time that might result in "leapfrog" in development leaving some undeveloped land (Balchin et al. [15]). Again, however, the central objective of this paper is not to examine, address or fully understand the reasons behind such an issue (though it is important). Rather, it only aims to argue that the undeveloped white land does exist in some urban contexts, which are different from most developed country cities, and they can be a planning problem.

4 CONCLUSION

This paper tries to distinguish between the case of undeveloped land as a development opportunity and the case of it as a planning problem. When undeveloped land is located in the urban-rural fringe, it can be a future development opportunity. If it is situated within the urban boundaries that have been previously developed, it also can be a current opportunity to orient development into it with more feasible uses and/or densities. It has, however, been explained that when the development process bypasses some portions of white land without

any previous development, then it can be a planning problem. This is because the market originally fails to develop it, encouraging further urban sprawl.

This is a call for further research that establishes a relevant theoretical framework that can help those who are interested in considering the issue of the existence of white land in increasing proportions within urban boundaries. Such a framework should offer a fuller understanding of the reasons behind the market failure to develop these portions of land. This implies that using quantitative methods to measure the suitable development-timing, as used by many, would not be as useful tool as these which try to closely examine the reasons for this issue from the stakeholder perspective (i.e. actors and potential users of these undeveloped white lands).

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