Densification as New Urban Agenda implementation tool toward smart cities
The Riyadh's case
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Many of the transformative commitments today in the Kingdom of Saudi Arabia (KSA) strongly align with the New Urban Agenda (NUA), which is proposing indicators within a Monitoring Framework for cities to accomplish the Sustainable Development Goals (SDG) while targeting and enhancing the quality of life (City Prosperity Index) (UN-Habitat, 2020).

Density is one of the most significant factors: globally, cities are expanding faster than the urban population, with an urbanization growth rate of 1.8 versus the 1.2 rate of population growth. This phenomenon generates urban sprawl, a cyclic issue. Whenever cities grow too fast, faster than possible, policymaking can respond.

Riyadh, the capital city of Saudi Arabia, and accounts for 25% of its population, has a unique record of having one of the fastest population indexes, increase growth and the lowest density index increase. As understood from the recent announcements, the current intended transformation for the city is mind-boggling in terms of targeted population growth, 15 to 20 million by 2030 from the current 7.5 million inhabitants. That will need a huge reharl of existing policies that have been had stalled in the past - like the 2001 Riyadh Metropolitan Development Strategy (MedStar) (RCRC, 2019), which called for an increase in density and the provision of a wide-ranging range of mobility solutions, including public transport. While the new state-of-the-art public transport system is being delivered and is anticipated to be operational by mid-2022, the advice of increasing density in association with the public transportation deployment that came out in 2001 has never really happened, and still, the set density targets are not achieved. Many of the initiatives we hear today were matters discussed back in the 90s, with much less ambition, and at the time, there was not much of the political will to take those on.

Also, the definition of local development was not clear and everything was applied as national policies and standards. That's how ambitions and visions failed due to a lack of actions and management.

Developing a dynamic urban growth strategy is the first step to densifying the city and achieving the expanded targets while also keeping the city from additional urban sprawl infringing on sensitive environmental ecosystems that have been there for thousands of years. It is much more important when the outbound is the infinity of the desert: not having clear boundaries drives ongoing development. Urban boundaries have been defined in KSA already from 1990 with a 40-years plan, to be periodically reviewed every five years. However, the selected metropolitan area was huge. The interim boundaries were always breached due to demand on new subdivisions due to high demand for land to accommodate population growth in a low-density environment and respond to the growing land speculation pressure on the urban development. It resulted in uncontrolled subdivision expansion and approvals inside the urban structure at the same low density of the 80s. Incremental density was allowed to adjust the roof level or detachment from the boundaries. It happened when the stock market gave low profits, so the land became the new stocking.

Moreover, the regulation allowed to build, just with a commitment to the infrastructures-to-be, but without providing them. Land supply sometimes came 20 years ahead, committing the city for additional expansion rather than disinfection; by 1996, about 650km² was already subdivided. That's why, in the 2000s, when the new concept of the dense city came, the infrastructural change became economically almost impossible. The challenge of densification nowadays would be to curb the urban sprawl. It would limit further land consumption and seal and generate a controlled sprawl, with regular reviews of the defined borders according to expansion needs. Finding a solution, as explained, is not that obvious.

How to reverse the low-density trend within the urban boundaries and gradually move to a multi-centered, polycentric model? Increasing density, facilitating access and connectivity, planning along with the public transport system and transit-oriented development-strategy (TOD), generating a strategic distribution of facilities and attractors (for citizens and investors) within the city, and finally, introducing and implementing policies to encourage infill and urban regeneration, making the housing stock newly available within the city. Private investors will show up and commit once the government, on its side, is granting a strategic vision and its coordinated implementation in terms of timing and consistency so that each investment gets capitalized and synergic supported by all the others.

Despite its 7.5 million inhabitants, Riyadh has building codes for residential neighborhoods that mandate low-density levels, relaxed over the years, but not enough. The problem is here that the municipality, which is not concerned with affordability and the housing mandate, is not responding in allowing people to densify, and if we compare Riyadh to other, sprawling cities like Melbourne or Los Angeles: we have all the inefficiencies of those cities. Applying higher density to existing neighborhoods is not an automatic thing, as issues regarding infrastructure capacity and services need to be reviewed and upgraded, which is also an additional challenge.

In developing new Urban Codes, it is important not to focus on aesthetics but approaching strategic themes, as density challenge and urban sprawl, and re-structuring the urban texture in terms of economic growth, sustainability, and quality of life. Is the application of the new Code feasible? Is it creating affordability? Or extra costs to cities and citizens? Linking codes to measurable development outcomes, such as the enhancement of quality of life, the improvement of local economic opportunities, and growth with the reduction city's carbon footprint are crucial. Involving people into the new vision of the city is also important; differently, the change can be quite dramatic or unsustainable. For example, the public and private space in our cities have always tilted to the private side: people were seeking to build bigger homes because of the absence of public space. So if you're starting to densify, you need to be aware that you need to be offering public space. Wadi Hanifah is a very true example. It was a backyard in the past; junk had been thrown into it and precious building material was exploited from it. It took 30 years to turn that around. Now it's beautiful, but when people see it and experience it, they don't know how much it took. Green facilities are important attractors to compensate for the density enhancement, and the social change can be incredible. Once people are aware of benefits and opportunities, they can make positive adjustments to their lifestyle and catch investment opportunities.

The density upgrade requires a conjunct effort between the public, providing the legal infrastructure and proper incentives, and private investors through public–private partnerships (PPPs) to finance the costly Infill development and urban regeneration projects. Private-sector investment can be a good source of capital if the local government can ensure that private investments meet public needs. Tax waivers and subsidies are commonly used to incentivize the development of affordable housing or urban regenerative processes and encourage building housing and mixed-use spaces and rezoning; however, they must be designed intelligently to avoid misuse of public funds. Moving further from PPP to the PPPP (people-public–private partnerships) process, the government can capture the value generated from developers and stakeholder engagement. Participatory approaches will increase the willingness of private investments in the city and benefit from residents' local knowledge, making them part of the transformative process instead of feeling it as a top-down imposition. The thing that is probably holding us back is that we're always trying to wait for the big idea while we could have done lots of small gradual ideas and small steps and let people experiment. You set all these objectives and ambitions for how you execute. And waiting for the grand plan to come out, you're missing lots of opportunities. The community will start to adjust once they see the opportunity. Don't underestimate how people can adapt.

Cities are the engines of economic productivity. Density plus a systemic infrastructure make these an aggregation of services, customers, supply chains, knowledge centers. Proximity or aggregation creates "spatial capital" and allows investments for a larger return. A too-rapid expansion without planning can cut the poor off from essential public services or, as in the case of several GCC large cities, increase the sprawl, urbanization costs and introduce a capillary public transport system. Studies show the costs for peripheric districts the public administration manages to be 10 to 100 times higher than rehabilitation in infrastructures as water pipes, sewage, rainwater drainage, electric power networks, access and circulation roads, urban equipment, health, and education accessibility, police surveillance, and sports and recreation.

To summarize, keywords to densification could be accessibility, connectivity, and natural as well as open spaces, targeting a wider quality of life. These issues become even more crucial to smart cities. If considering "smart" as a low footprint city, density reduces the soil consumption and creates a scale

economy; density can contribute to a smart urban economy. Considering "smart" urban digital solutions, censoring and social interaction are more significant in dense urbanism (NUA, 2020).

Too often, governments go for immediate beneficial goals, but rehabilitation takes time, so there's no quick fix: the devil is in the details. We have lots to offer in terms of our culture and how we lived in this region for about 4,000 years in a sustainable way. We now talk about the circular economy as something new, and we used to apply that in a low-tech environment.

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