Neighborhood sustainability and livability in Qatar: National Development Framework 2032

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ABSTRACT
This paper studied whether QNDF 2032 adequately addresses Doha’s current sustainability and livability problems; and if so, what are the proposed means to achieve these goals, specifically on a granular level? This study employed several methods to address these questions: comparative and theoretical analyses of QNDF sustainability and livability perspectives and a series of semi-structured interviews of experts from various government, NGO, academic, and private organizations and entities. The study concluded with an assessment of the document’s efficacy with regard to neighborhood sustainability and livability, pinpointing areas of improvement to ameliorate future implementation. QNDF 2032 is a recently released master plan that has not been academically examined. This is the first study that examined Qatar’s plans of urban development as laid in QNDF 2032, with special regard to neighborhood sustainability and livability. In addition, this research sought to identify the extent of flexibility in QNDF 2032 to undertake emerging ‘smart transportation and communication technologies’ to make Doha more sustainable and livable.

INTRODUCTION
QNDF 2032 sets a long-term, strategic vision for sustainable development and provides plans for the country at large; for the metropolitan capital, Doha; and for the Municipalities that make up Qatar’s principal geographically-administrative structure. The framework declares that there shall be “Municipal Spatial Development Plans” for all Qatari municipalities. As of date, these Plans are pending development by individual municipalities.

Qatar is divided into 8 administrative municipalities and they are further subdivided into 98 zones. The first professional master plan for Doha in 1972 recognized that the Doha Municipality should become the central downtown core for all other established urban centers in the vicinity. Many of Qatar’s major urban centers, were once separate residential settlements such as, Al-Rayyan to the northeast and Al-Wakra to the South of Doha. However, Qatar’s rapid population growth, fueled by hydrocarbon exploitation and subsequent accumulated wealth, accelerated an urban sprawl that effectively merged the separate settlements of Al-Rayyan and Al-Daayen with Doha into one conurbation (Al-Thani et al., 2019). Today, this precedent is reflected in the Capital’s governance, where there are still separate administrative municipalities for Doha, Al-Rayyan and Al-Daayen.

In the context of QNV 2030 and the importance ascribed to achieving its sustainability and livability goals, several questions have emerged from studying QNDF 2032. Does QNDF 2032 adequately address Doha’s current sustainability and livability problems? And if so, how does it propose to achieve these goals, specifically on a granular level? Does QNDF 2032 allow for enough flexibility to take on advantages of the modern, emerging “smart transportation and communication technologies” to make Doha truly more sustainable and livable?

Historical background
The discovery of oil and gas resources in the Arabian Peninsula during the second quarter of the 20th century...
Figure 1. Qatar’s municipalities.

had a number of far-reaching consequences that shaped not only the region but also had an impact on the entire world. In particular, the discovery was a catalyst for the unprecedented pace of urbanization in the region. Small tribes and communities scattered across vast tracts of desert laid the seeds of what would become modern cities within 50 years.

Oil production in Qatar began shortly after World War II. Parts of the revenues earned were invested in developing the infrastructure of the country. From the 1950s until the early 1970s, urban planning proceeded in a haphazard, uncoordinated manner (Salama and Wiedmann, 2013). The absence of a central planning jurisdiction can be explained by the nascency of the Western model of government, which for Qatar represented a break away from the traditional local governance of the majlis system. During that period, basic road, water, electricity and sewage infrastructures were laid out, effectively determining the settlement patterns of the period. Also pertinent is that from 1950 to 1970 the population of Qatar increased from 25,000 to over 100,000. The increase in population was due largely to the influx of migrant workers from Arab countries and South Asia. Growing wealth and spending power and the proliferation of automobiles and air conditioning promoted low-density, cement-block architecture and road-grid topology at the expense of the then-traditional structures (Salama and Wiedmann, 2013).

Even though the need for better urban planning had been recognized, it was not until the early 1970s, following the declaration of independence of Qatar in September 1971, the ascension of Sheikh Khalifa Al-Thani to power and the establishment of formal administrative institutions (Crystal, 1995) that concrete steps were taken: the British planning architecture firm of Llewelyn Davies was commissioned by the Ministry of Municipal Affairs to prepare the first Master Plan for the newly declared capital city of Qatar, Doha. Llewelyn Davies’ plans for the city were based around the ring-road concept, radiating inland from the city center of Doha on the sea side, with functional distribution of land use in between (Adham, 2008).

As for the city center itself, a landmark decision was the reclamation of land along Doha’s coastline. Proposed by architect William Pereira, this included the creation of an entire district – the Northern District of Doha, known as Al-Dafna – out of the northern part of bay of Doha that could be planned and developed ab initio, allowing the government to exercise its planning and executive ability unfettered (Figure 1). This process also gave Doha its
characteristic convex coastline and reaffirmed the city center as the seat of power and governance through the establishment of the AmiriDiwan and ministerial buildings. It is no exaggeration to state that Doha’s identity – and by extension, Qatar’s – is inexorably tied to its Corniche, with open spaces/water on one side and signature buildings and lofty towers on the other. This phase of Doha’s urbanization coincided with a period of exceptional economic prosperity following the discovery of natural gas and rising oil prices (Naqy, 1997).

Later efforts did not achieve quite the same level of success; the period leading up to the 21st century was punctuated by multiple drops in the price of oil throughout the 1970s and 1980s, the Gulf War in 1990 and 1991 and an increase in population that wildly exceeded projections. While several other firms had been contracted to develop aspects of urban development that supplemented the work of Llewelyn Davies and Pereira, the aforementioned changes in oil price and the impact of the War meant that most of these plans had little practical influence on the urban evolution of Doha (Rizzo, 2014).

Rapid urbanization changed Qatari and expatriate lifestyles and associated social norms. A low-density, car-dependent society emerged where Qataris now live in villas on an average land plot of 1,200 square meters on the outskirts of the city center. The post-1996 economic boom encouraged the state of Qatar to invest, and as a result witnessed the emergence of semi-governmental bodies such as the real estate company Qatari Diar, education, science and research and community development, the establishment of the Qatar Foundation for Education, Science and Community Development, and the residential artificial island of The Pearl-Qatar, all of which created their own urban centers within the greater Doha area, fragmenting the city (MMUP, 2018).

The Council of Ministers approved QNDF by Decree No. 77 in April 2014, aiming to regain control over master plans for Qatari cities and ensure compliance with world standards, adopting the Document as the country’s Master Plan. His Highness the Emir of Qatar approved the Council of Ministers' decree in December 2014. The aim and the vision of the decree was to wean Qatar away from the dependence on fossil fuel, transforming Qatar to an environmentally responsible and sustainable country. It is within this context that QNDF 2032 has emerged.

METHODOLOGY

Comparative and theoretical analysis

Comparative and theoretical analysis herein weighs similarities and differences of policies and guidelines laid out in QNDF to European (mostly compact) cities and urban planning theories, respectively. While the frame of reference is sustainability and livability of neighborhoods, grounds for comparison are features of urban planning, at large, that is density, walkability, urban form (spatial design), etc.

QNDF 2032 tackles topics like urban (city) form, mobility and infrastructure. QNDF 2032 also touches upon urban-planning movements such as the New Urbanism theories, Traditional Neighborhood Development (TND) and Transit Oriented Developments (TOD). Theoretical analysis of QNDF 2032 herein evaluates the efficacy and applicability of broad guidelines onto Doha’s existing neighborhoods, making them sustainable and livable.

Expert interviews

QNDF 2032 includes governmental and semi-governmental entities as stakeholders of Qatar’s Master Plan (Qatar National Master Plan Team, 2018). As this research examines QNDF 2032 elements of urban form, mobility and smart technology, interviewed experts were from establishments that operate in these fields. Selected organizations include:

- Of Municipality and Environment (MME),
- The Ministry of Oriental Consultants Co. Ltd.,
- The Ministry of Transportation and Communication (MoTC), and
- Qatar Railways Company (Qatar Rail).

Our semi-structured interviews tackled six points about sustainability strategies:

i. The overall objective of a sustainable and livable city through its Master Plan is examined by utilizing the knowledge and information of QNDF 2032, most relevant planning theories and traditions, known livability and sustainability questions in Doha, and suggested solutions that may help Doha become a more sustainable city.

ii. The future urban form of Doha is considered, starting with the planning process, the locations of the metro and inter-city railroad stations, the last part of each journey (last mile) to transportation hubs, and the extent to which future technologies have been incorporated, especially in Last Mile Transportation (LMT).

iii. Social norms and behavior are studied in terms of the factors that could assist in convincing Qatar is to live in denser forms of housing, and the challenges of social integration in Doha.

iv. The arrangement of car parking spaces/lots in the future and the means/technologies that may discourage private car transportation.

v. Design at the neighborhood/micro level with regard to the improvement of mixed use and walkability in neighborhoods.
iv. The assistance of emerging smart technology, such as drone deliveries and video conferencing in reducing transportation trips along with the ways smart technology can help increase city self-sufficiency, walkability and the use of car sharing schemes.

INTERVIEW PARTICIPATION AND PRIMARY FINDINGS

The Japanese Oriental Consultants won the bid for the development of the Framework, already in possession of an elaborate portfolio of urban planning projects in Qatar, the UAE, Saudi Arabia and Egypt, as well as in other countries in Asia (Oriental Consultants, 2019). The firm confirmed that their work includes 40 detailed volumes covering many aspects and areas of Qatar’s cities, and incorporates plans related to the 2022 FIFA World Cup as well as many ongoing strategic projects, all distilled in the final revision of QNDF2032. The interviewed representative (A), as an urban planning expert, had been involved in the development of the Framework, starting in 2007 and through the handover to MME in 2011. The expert confirmed that the bid for a new Master Plan of Doha was tendered out by the Urban Planning Authority (now part of MME). The introduction of key concepts such as sustainability, livability and good urban planning practices were developed by the Consultant. The benchmarking of conceptual design guidelines in Qatar was based on three elements: QNV 2030; a study of regional cities in terms of their history, climate, livability and sustainability; and international standards and urban planning movements like New Urbanism. However, two conflicting aims dominated Oriental Consultants’ bench marking: a full signature-architecture trophy city, and a more livable, scalable and sustainable city like Doha Historical Center. The feedback on the proposals showed that the first view was favored as Qatar was a rich nation that wanted to exhibit its wealth, and at the time the concept of livable and sustainable cities was relatively new.

The current Doha form is a polycentric, low-density city, driven by real-estate market influences and government encouragement to populate new areas. Most areas of Qatar need to be renovated and infrastructure upgraded. In five years, Oriental Consultants managed to complete, in detail, plans for Qatar’s cities that looked into as small a micro level as residential neighborhoods. In addition, Oriental Consultants introduced many key concepts that impact the form of the Master Plan—the metro, TOD, 2022 FIFA World Cup stadiums and detailed services linked to the Geographic Information System (GIS). The Document allowed for flexibility and provided the minimum required for vibrant, sustainable, livable cities.

Sustainable cities are often associated with dense and compact forms. However, Qatari representatives in the Master Plan Development Committee have always rejected a denser urban form due to social conventions. A majority of expats in Qatar do not mind high density, according to the Oriental Consultants’ representative (A), as it means they can save money on accommodation and transportation. Denser urban forms, often seen in some regional cities, are considered acceptable by the resident expat community in Dubai.

Two meetings were held with representatives from MME. The first interviewee (B), an architect with practical and academic experience, was involved in the QNDF 2032 Steering Committee and carried on the work after implementation. He is an expert in urban planning and has published many books and research papers on Qatar’s Master Plan. The second interviewee (C), also an architect, has overseen some of the formwork tasks including the renovation of existing residential neighborhoods. Interviewees confirmed that only the introductory chapter of the framework has been shared, only with academic bodies in Qatar, and that the detailed plans will not be shared at all as they might be not be suitable for the current form of cities in Qatar. Atkins, appointed because of their experience in Australia, took over the framework development after Oriental Consultants. They established a Central Planning Unit (CPU) and were responsible for the implementation of the Detailed Master Plan for all Qatar’s cities. However, not much had been accomplished when their five-year contract ended in 2015.

In both meetings, interviewees had very idealistic and theoretical views of Doha’s Master Plan. The first (B) confirmed that MME believed walkability to be an important factor in improving the sustainable and livable conditions of the city. MME has conducted many architectural and urban planning studies to investigate the link between behavior and outdoor comfort. One of their key conclusions was that Qatar is and many experts may share the same social norms as both may represent wealthy social groups. The implementation of walkability or alternative transportation needs to consider demographics at a micro level to ensure success.

The second interviewee (C) had overseen the Consultant, was involved in the design and renovation of some residential areas and worked in the department supervising the implementation of QNDF 2032. He confirmed projects are underway to preserve the historical neighborhood in the center of the old capital, therefore focusing on walkability and alternative transportation; however, these projects are more likely to be for commercial or cultural rather than residential use. The interviewee shared a proposed project for an eco-neighborhood with walkability as the main means of commuting. It had a variety of public spaces, mixed use, and building and housing typologies. Road coverage was limited to 5%, the selection of materials and design of the outdoor environment ensured comfort and safety and it
was mainly low density. This proposal complies with many urban planning theories like New Urbanism and the neighborhood unit. The problem with both discussed projects was that they were not targeting existing Qatari neighborhoods.

In the MoTC, our interviews were limited to the Land Transport Planning and Digital Society departments. The first interview (D) was with one of the main managers in MoTC who was involved in planning a comprehensive land transportation system for Qatar in 2009, aiming to improve the sustainability of mobility and mitigate the impact of private car use; this project proposed linking the metro to Lusail City. The manager confirmed that there is a great interest in the impact of the metro in to achieve the department objectives for Sustainability and Livability. As a stakeholder in QNDF 2032, MoTC has been involved in development of this Framework, however, although it has implemented many of the proposals, it has not been engaged by MME to participate in the development of their plans. Each ministry works independently, inhibiting the development of a sustainable and livable Master Plan.

The second interviewee (E) was a senior traffic engineer at MoTC, involved in the concept development of many projects, with some research experience in the field. He stated that the future Master Plan will minimize, but not abandon, the use of private cars by providing other options like the metro and TOD. He considered car use still important for operating a low-density city. At the end of the interview, the interviewee discussed a project for a double-decker highway near the dense business district, showing that walkability and metro use is not a priority for the department of Land Transport Planning and further illustrating that QNDF 2032 stakeholder entities are working independently rather than towards a unified goal.

Interviewer (F) from the Department of Digital Society in MoTC, discussed the future of technology through the Master Plan. They stated that many cities are currently going through their biggest period of growth in recent times. However, this brings about increasing pressure on resources and greater disparity in different socio-economic livable factors such as health, income and education. Owners (real estate and businesses) and residents need to collaborate on sustainable development projects at neighborhood level to help address this gap, thus introducing resilience and climate protection on a smaller, observable and controllable scale. Neighborhoods provide an opportunity to government and smart transport integrators to test easy-to-implement, scalable, proof-of-concept solutions before they are rolled out across the wider city. The Department of Digital Society believes Qatar is implementing many smart technologies in the city, and that if an integrated smart solution is implemented, it will bring about improvements such as reduced traffic congestion, urban sprawl, carbon footprint, faster bureaucratic response-time and quicker, resilient crisis management.

One interviewee from Qatar Rail (G), in a managerial position, confirmed that Qatar Rail inherited many projects that were initiated and supervised by MME. In planning the metro and rail networks, station locations have been selected based on a combination of QNDF 2032 and the physical plans of the municipalities. The precise location of some stations was governed by the construction method used, the number of stations being constructed simultaneously (37) and the fact that Doha had to be kept moving. Therefore, the stations are normally not located underneath major road junctions as is the case in many other cities, but in adjacent plots so junctions could be kept open and traffic flow maintained.

In the last part of each journey (last mile), Qatar Rail has considered all modes of transport: walking, cycling, carpooling, feeder buses, on-demand transport, taxis and Park & Ride. It has also looked at autonomous feeders, but deems the technology not yet fit for purpose. Qatar Rail discourages people from driving to the metro stations as it normally does not provide any parking, wanting space for people to live within walking distance of the stations, and has at least 12 mixed-use developments around the stations in the form of TODs. On the extremities of the network, dedicated Park & Ride facilities, initially for 300 cars each, can be increased in case of growing demand. Qatar Rail has considered future technologies for the "last mile" including a pilot scheme for on-demand transport. Other technologies such as journey planners and mobility applications will be developed under the lead of the Department of Digital Society. Qatar Rail have suggested transport demand management measures to MoTC to discourage people from using private cars. The interviewee (G) has confirmed that they are looking at such measures. The advent of new technology such as drone deliveries and video conferencing that mean people can work from home are not seen as being relevant enough in terms of traffic volumes to have a measurable impact on Metro Traffic Analysis. The main peak-hour traffic consists of people going to work and students going to school/university. Interviewee (G) thinks will not change dramatically, since there is no big push towards working from home or similar. Table 1 summarizes Interviewee views on neighborhood sustainability and livability as dictated by QNDF 2032.

ANALYSIS OF FINDINGS AND DISCUSSION OF SUSTAINABILITY AND LIVABILITY IN QNDF2032

Neighborhood sustainability and livability

The theoretical development guidelines offered in QNDF2032, except in relation to semi-governmental
centers, notably neglect to identify the smallest urban unit – the neighborhood. For instance, in envisaging a “Hierarchy of Mixed-Use Centers” to boost urban sustainability and livability, QNDF 2032 did not clarify the allocation of such centers: whether they should be within neighborhoods or independently established to serve surrounding neighborhoods. More broadly, expression of the “urban block size” in QNDF 2032 is not defined, furthering the ambiguity as to what is the most rudimentary unit in Qatari urban planning.

The few semi-governmental “centers” mentioned by name in the Document—notably Qatar Foundation’s Education City, Qatari Diar’s Lusail and the Pearl—evidently operate in almost complete isolation from their surroundings, having no interrelation with nearby smaller centers or towns. Some existing neighborhoods have complied with the conventional concept of neighborhood: walkable with a center that accommodates a school, places of worship, amenities, places of work and entertainment, with a strong sense of community (Perry, 1929), such as the Government Housing projects of the 1970s and 1980s (Al-Thani et al., 2019). More recent housing projects only comply with design guidelines for the environmental sustainability of buildings and marginalize the functionality and livability aspects of neighborhood planning—fundamental to the overall urban sustainability and livability. Parting completely from previous urban planning strategies, most of the old and even recently developed neighborhoods are neglected in the document. The framework further admits to the inapplicability of municipal regulations in Doha’s past master plans, emphasizing the fact that many ministries and governmental bodies function in separate force fields. These detachments eventually led to an impaired ability to implement integrative urban planning schemes, raising serious doubts about the proposed municipal spatial development plans and more granular documents.

Under the aegis of QNDF 2032, detailed plans for municipalities and locales within municipalities are to be prepared. Analyses in the Document are mostly conceptual, and, as the Document percolates down to a finer scale, more and more details are relegated to supporting documents (namely, the metropolitan Doha and municipality structure plans). At the lowest scale (local centers), relevant documents appear to indicate that these plans have not yet been developed (Qatar National Master Plan Team, 2018). Figure 2 illustrates the hierarchy of spatial planning in Qatar.

Density is one of the critical elements determining a city’s urban form, comprising an intricate relationship with both sustainability and livability. It is commonly believed that high-density cities are more likely to be sustainable, although often with a poor quality of life. However, livability is typically associated with low density (Stretton, 1996). The document highlights that Qatar is not typical in terms of common concepts about sustainability and livability and that Qatari social norms will resist higher density forms (Al-Thani et al., 2019). Heavily influenced by British standards density distribution, definitions of “net density” and “gross density” are introduced. Gross density ranges are low (0 to 60 persons per hectare of land), medium (60 to 120) and high (200 to 300). For each density range, the Document determines the appropriate, respective building form(s) as well as the appropriate location within the Doha city. In Doha, low density exists only in suburban areas—single- or two-story penthouse detached or semi-detached houses, or housing compounds with villas with private open spaces. Medium density is split into two types; the first is in inner-city districts/neighborhoods and the second is residences adjacent to significant landmarks and/or metro stations. High-density buildings are apartment buildings with higher dwelling yields. The areas of high density

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●, Applicable and effective by QNDF 2032; ○, applicable with no implementation strategy; ▼, not applicable.
and specified by name are the C-ring road neighborhoods, Al-Sadd, the three capital centers (West Bay, Doha Downtown and Airport City) precinct and centers that are linked to the 12 TOD projects (Qatar National Master Plan Team, 2018).

QNDF 2032 defines a sustainable city as an efficient city, which reduces negative impacts on the environment and has a good quality of life where people and business thrive. In general, most cities do not satisfy both the environmental and social aspects, being too focused on one or the other (Al-Thani et al., 2018). A sustainable city in Qatar has to have sufficient density to maintain social interaction, a feasible public transportation infrastructure and allows people to walk around the city. Currently, the most salient challenges to sustainability in Qatar are ongoing, disruptive mega projects – spatially fragmented developments that are almost exclusively accessible by private vehicles, with low-density villas built on large land plots as preferred by Qataris, pushing residential areas to the edges of the city, away from facilities and amenities. All of these aspects accelerate emission rates of greenhouse gases and further the chronic self-sufficiency problems that are challenging to Qatar and the region (Rizzo, 2014; Al-Thani et al., 2019).

“Livability” is used frequently throughout the Document but has no clear set definition. Its aim, to “create a role model for sustainable urban living in the 21st Century and the most livable towns and cities,” refers to “livability” as a good quality of life through equal access to education, health and public transportation. In other sections, “livability” refers to vibrant neighborhoods and social integration. The document compares the current demographics of Qatar to an inspirational future by the year 2032, assuming that by then jobs will not be dependent on highly labor-intensive roles but will rather be focused on light industries and technology, fulfilling the vision of a knowledge-based economy (MDPS, 2008). This is where an understanding of the current and future migration patterns is integral to urbanization of Doha and Qatari cities. For nearly the past forty years, migrants/expats extensively moved to Doha, as it is the case for all other Gulf cities, in pursuit of higher pay. All socially interacting under the umbrella of globalization, the newly formed demographics constitute bases for unprecedented urbanization forms that require rigorous socio-economic study. Accommodating the urgent needs of consumption rather than integrating and reflecting cultural diversity (Salama and Wiedmann, 2013).

The term “Greater Doha” is used in the document, emphasizing the lack of visual boundaries between three municipalities (Doha, Al-Rayyan and Al-Dayeen). Metropolises are inherently polycentric, with multiple urban centers. Polycentricism can be classified into two types:

- Unified Polycentricism: where the trips to the nearest work and entertainment centers within the metropolis are shortest in distance; or
- Fractured Polycentric: where trips within a metropolis are lengthy and are made to various centers for different purposes (Jenks et al., 2008).

Doha is of the fractured type since its centers are functionally (sector) based. Long commutes and mobility patterns prove that people who work in these centers mostly live in other, often more affordable, distant parts of the city, sometimes served by more/better amenities and facilities. The document suggests increasing density around those centers as one solution to fragmentation and also suggests constructing 12 new TODs, a concept...
coined by the new urbanism movement (Carlton, 2009), inside or adjacent to Doha’s centers.

Qatari social norms and expatriates’ expectations work against the philosophy laid out in QNDF, challenging zoning regulations and needing a city designed to the human scale or pedestrian scale. In only a few cases, such as the unique Education City, does the QNDF model work (Al-Thani et al., 2019).

The case studies of several Australian cities that share many similarities with Qatar demonstrate the level of participation and desire required by the government to bring TOD to low-density, already-built, car-centric urban areas (Curtis, 2008; Curtis et al., 2009). Several impediments have forestalled TOD efforts or posed challenges in the way of transition, including lack of clear and consistent policy-making (Curtis, 2012), lack of incentivizing to overcome implementation hurdles (Tan et al., 2014) and lack of community engagement, much like the case in Doha. Careful land-use planning is another must-have for successful TOD development, with detailed neighborhood-level analysis and planning (Curtis, 2012). While the QNDF does categorize land very broadly into urban, non-urban, greenbelt, etc., these plans, at the scale of tens of squares of kilometers, are not detailed enough.

Smart technology: Agency of sustainability and livability

Hi-Tech/smart technology can pave the way to increased sustainability and livability and, in many instances, can obviate the need for physical proximity to satisfy certain basic needs. It does not appear that the QNDF 2032 has considered the use of smart technology or how it can help tackle Doha’s livability and sustainability problems (Al-Thani et al., 2018).

Smart technology could provide solutions to tackle the proliferation of private car culture in Qatar, especially among the local population, promoted by low oil prices, economic prosperity and social and cultural norms. QNDF 2032, rather than proposing utilization of smart transportation technologies to alleviate mobility problems (a key emerging aspect of sustainability and livability (Peñalosa, 2019), suggests elevating densities around centers with the hope of promoting walkability and the use of public transportation. The previously mentioned problem of a lack of indicators to measure sustainability and livability could be greatly mitigated by novel use of smart technology (Cottrill and Derrible, 2015). Small measurement sensors (remote and local) can be placed almost anywhere, measuring the performance of a myriad of parameters including pollution and traffic.

Until 2010, the smart city concept was limited to a view of improving the management and operation of city infrastructure, in particular services such as energy generation and supply, water consumption and waste management (Allam and Newman, 2018). This has been reflected in the content of QNDF 2032, which is split into three basic sections: city and building form (spatial planning), transportation and utility. Understandably, more human resources are needed to monitor and operate infrastructure and utilities. Centralization of operations and monitoring in a “control room” is, after all, a common concept in smart city. The document supports centralization through proposing the dissection of the city, and areas as small as neighborhoods, into independent parts fed by central plants that will aggregate the utilities of smart technologies such as smart power grids, solar- and wind-harvested energies, treated sewage effluent (TSE) balancing lagoons and district cooling.

Discussion

Though QNDF 2032 has a great number of guidelines, policies, etc., there is no evidence that this document has any actual impact on the current city form, or even on those projects that were specifically created to accomplish goals set by the framework, such as the Doha metro, stadiums and sports facilities for the FIFA World Cup. It is believed that the restrictions and standards of QNDF 2032 might be an obstacle. Many of the interviewed entities had their own agendas for the future master plan, with the common goal of supporting the current low-density and multi-center form of Doha.

Answers from the interviewees varied depending on the objective of the represented entity. The MME, the MoTC, and Qatar Rail were at one time a unified entity. The successful implementation of a sustainable and livable master plan for Doha shall be led by one entity, and in the interviews, most entities referred this responsibility to MME.

Quality of life and sustainability have emerged as priorities in documents from the MoTC; however, the conceptualization of quality of life and sustainability is not clear. For example, the Land Transportation Department restricted its implementation of sustainability to comply with the environmental impact assessment, which is a very limited method of measuring sustainability for transportation and communication. The Department of Digital Society’s sustainability objectives are more profound and coherent as exhibited in the department website and documents and aims to fill the city’s operational gaps to fulfill its sustainability and livability objectives.

Semi-governmental bodies, such as Qatar Rail, have significant influence over the future of urban form. These bodies are working at a rapid pace, but their sustainability projects lack connectivity. On the other hand, it is evident through the interviews that government bodies like MME and MoTC still have not gained control over the current
Doha Master Plan, even though they specifically assume ownership. MME emphasized walkable communities and livable street strategies, yet there is no evidence that any of these ideas have been implemented to date. MoTC documents mentioned many forms of public transportation, but only buses are currently operating, and these are disliked by many Qataris and expats. The approach of semi-governmental bodies is different: Qatar rail will provide Park & Ride services to maximize the use of the metro, change behavior and reduce congestion within the city center.

Although all parties believe that they support sustainability and good quality of life, when discussing their projects, it is clear that there is a strong tendency to preserve cars as a basic transportation method and to keep the city low density. Additionally, metro projects emphasize that Doha remains multi-centered. MoTC and Qatar rail stated that, although they are supervising their own projects, they believe that sustainability and livability concepts are the responsibility of MME.

MME does not promote any measurable change to the current city form because it might interrupt the rapid development of 2022 World Cup projects. This might mean Doha will upgrade its sustainability and livability only after 2022. However, upgrading efforts could at least begin at the microcenters—which remain neglected, most importantly in residential neighborhood.

The importance of the neighborhood as the building block of city planning was originally espoused by Clarence Perry. Later scholars and planners have built upon this concept and incorporated it into the New Urbanism movement in a way that incorporates social and technological advancement and the new challenges of modern living (MoTC, 2010, 2015). The neighborhood is the smallest functional unit in the city, self-sufficient in many ways and at the same time related to the whole. This concept ties in closely with TOD, the main theme and philosophy of QNDF2032, in that the transit system is at the heart of a neighborhood and establishes how neighborhoods are interconnected.

To conclude, QNDF 2032 has a strong vision for Doha at a high level, however, analysis and planning needs to start at a much lower level, namely in the neighborhood. As it stands, the document lacks the level of detail needed to enable a thorough, cohesive and multi-faceted evaluation of its practical applicability.

**Conclusion**

This research is meant to tackle some gaps in the Framework and found:

- All stakeholders are mostly working independently because of lack of leadership;
- Sustainability and livability are implemented in the semi-government projects while government bodies do not have clear sustainability or livability objectives;
- MME is still believed to be leading the reformation of the Master Plan for Doha, even though the planning reality suggests otherwise;
- No serious attempts have been made by MME to renovate existing neighborhoods and integrate them into a hierarchical relationship with other centers;
- The current view of the implementation of technology is conventional and new innovation is not considered in the current development plans for Doha;
- Creating indicators that measure local sustainability, urban quality of life (livability) and performance of implemented measures is essential for continuous improvement.

In recognizing the efforts to date, it is important to consider that the State of Qatar is a developing country and that the proliferation of laws that would rigidly enforce sustainability and elevated livability level to the current master plan may very well impede its rapid growth. However, following the FIFA World Cup 2022, the pace of urban growth is expected to slow down, offering the opportunity to reconsider the existing form of Doha. The recommendation this research promotes is that MME should not wait until 2022 and should start experimenting with small-size projects, using selected pilot neighborhoods as test beds for Doha’s sustainability and livability plan.

**Supplementary materials**

Due to world limits in this article, important literature review on national urban planning strategies; historical context of Qatar; description of the Qatar National Development Framework; are available in the Supplementary Materials file attached. Also, the file includes the questions for the structured interviews, the Institutional Review Board (IRB) approval.

**REFERENCES**


