



Impact of Sustainability Transition in Moroccan Cities' Identity: The Case of Benguerir

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Abstract

Whether internationally or in Morocco, the construction industry is one of the world's most energy-consuming industries. Nationally, this sector is estimated to account for 33% of total energy consumption. In addition, the construction industry is one of the highest producers of GHG emissions. For these reasons, Morocco has taken steps to reduce the sector's impact on the economy and the environment. That's why the green sustainable cities trend has started in the last decade. Globalization trends and efforts to keep the concept of sustainability alive in a concrete city have brought along many conflicting choices. Moroccan cities are known for their strong identities due to the long process of shaping these cities throughout history. But new sustainability trends seem to introduce new colors that can strip them of their identity. This article is a research paper for the arid climate city of Benguerir, located in the South, one of the green cities of Morocco. Green represents a challenging context for implementing sustainability. This study reveals the different parameters of sustainability in cities, how important urban identity is, and how it can be perceived and discusses the transition and identity changes of cities. The case study exemplifies the Moroccan context, the reason behind the need for Moroccan green cities, the efforts of the government, and the problems green Moroccan cities may face when trying to preserve their identity. Benguerir is an example that has achieved various sustainability parameters and represents the policies of Moroccan green cities. The city can also represent upcoming challenges for cities in a similar context.

Keywords:

Moroccan green cities, sustainable transition, architectural identity, Morocco, Benguerir

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INTRODUCTION

The term sustainability derives from the word “sustain”. It was first mentioned in the field of forestry, with growing forest segments in Europe becoming harmful to the system and increasing concerns about forest regeneration. The term then was introduced as a “sustaining method for forestry” towards the end of the nineteenth century (Wheeler & Beatley, 2014). Since then, the word had been integrated into several fields. The concept has long been glued to the “green term” and environment field. One of the earliest pieces of literature mentioning it was by Ebenezer Howard, in which the author described the problem of the spread of industrial cities in contrast to farming fields. The book “Garden Cities of To-morrow” had been a reference for urban designers and planners (Howard, 1898). It also inspired fantasies about the integration of gardens into every corner of the city and created the excessive garden suburbs that spread across American cities. Mumford had been vocalizing about the same problem of the scary spread of the cities’ size and population with no breathing space (Mumford, 1938). The growth of the cities was not the only problem, the growth was uncontrollable with many compacted buildings disregarding the dweller’s own interests. After the Second World War, the fight between nature and human seems to not subside yet, (Leopold, 1949). Until the sixties, it was not realized that cities should emphasize the relationship between buildings and users. The cities should no longer be economic boosters but also a place of belonging and living. Small-sized neighborhoods with streets that encourage pedestrian usage were actually more favourable (Jacobs, 1961). Another scholarly work that made a sensation in the seventies was the optimistic approach of Ian L. McHarg on living in harmony with nature as he proposed in “Design with Nature” (McHarg, 2014).

It appears that the concept of sustainability had since then shifted from the simple integration of nature and greenery to the design to go beyond it. This shift could be clearly stated in the book “Limits to Growth”. It was a quantitative study that put sustainability in the mainstream again. It started all the current problems with the overgrowing economy while disregarding the limitations of the resources, the excessive population growth, and the wide gap between rich and poor (Meadows, Meadows, Randers, & W., 1972). “Sustainability [...] speaks of the greatest change in human thought and behaviour for 3000 years” (Nhamo & Mjimba, 2019). The authors have actually marked by this expression a turning point in human history. It is no longer a matter of surviving by any means but a matter to survive globally. Thus, new models for economy and development were needed after the predicted failure of past growth. New measures for development should be introduced, so that these new measures take into consideration the human well-being factor. The progress was finally glued to an overall approach that took world’s sustainability into account (Daly, 2014). The oppressing climate change and its consequences had also played a big role in catching international concern to the dilemma between economic progress and

decline of human, which led to the launching of the United Nations Governmental panel in 1987 (World Commission on Environment and Development, 1987). Sustainability since then has been taken seriously by the United Nations and the committed countries. Rio Declaration had set 27 principles to take into account as well as the famous eight United Nations Millennium Development Goals (The Rio Declaration on Environment and Development, 1992).

The committed nations of 125 countries are obliged to give a five-year report on their progress. Despite the progress made, the continuing efforts are still lacking to save the world. The cities had decided to join the inclination especially construction sector consumed the most after transportation (International Energy Agency, 2019). Over the years, the trend of sustainability had been even more reinforced and prominent which had made the term lose its vitality. The claim has been long to seek the best balance between the natural and the manmade, as some of the extremists would find that the return to the starting point of evolution is a must (Campbell, 1996). However, sustainability, as a term, is about moving forward for a better future. In the following years, the eight-millennium goals had been revised into 17 Sustainable Development Goals, which were more global and targeted the pressing matters of the world (United Nations, 2015).

Sustainability is now globally accepted as fulfilling the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). Therefore, green sustainable cities are cities that can compensate the needs of their citizens while having the ability to provide the same for future generations (McGeough, Newman, & Wrobel, 2004). According to (Hald, 2009), a green city is a city that provides an acceptable standard of living for its human occupants without depleting the ecosystems and biochemical cycles on which it depends.

In summary, this paper aims to trace Moroccan cities' identity and sustainability transition. It would first discuss green cities and sustainability parameters of literature, then introduces cities' identity parameters. Finally, the paper represents a study case; Benguerir Moroccan green city to discuss its sustainability transition and identity.

GREEN SUSTAINABLE CITIES, PRINCIPLES, AND HISTORY

Sustainability in general embodies different aspects that developed into different approaches undertaking social, economic, and environmental aspects. The intersection of these approaches as well as the constant management of them would make a green sustainable city. As sustainability means "changed development measures", nowadays "the three Es": economic development, environment quality, and equitable society are the pillars of any successful green sustainable city (Doug & Wrobel, 2004). The integration of the economic and environmental aspects to development was due to the anticipated decline of the economy after all energy is used and pollution accumulated (Morrisey, 1999). Therefore, an acceptable standard of living does

include the social and economic, and environmental aspects of the city that provide such standards (Hadi, 2008).

As more cities are willing to integrate sustainability, various standards to measure sustainability were made for international uniformity. Those standards measure the city's performance from a citizen's point of view, as well as its vulnerability to future impacts, and its' adaptation capability. Since sustainability cannot be implemented for a short time efficiently, the assurance of the durability of the principles implemented should also be guaranteed by the measures. According to ethnographic research conducted to investigate the experience of citizens in different cities, four different city clusters could be defined: Balanced Innovators, Post-industrial Opportunists, Evolutionary Cities, and Fast-growing Megacities (ARCADIS, Design and Consultancy for Natural and Built Assets, 2018). The clusters actually reflect the behaviors of the city thus explaining their index rating and the results of the measures. For instance, Istanbul as well as our case study, Benguerir are evolutionary cities. They are quickly developed and change constantly. People's involvement in these cities is limited, thus it makes them perform inadequately in such index.

A few models for sustainable green cities were developed such as McGeough, Newman, and Wrobel's (2004) model which classified the parameters into Natural Systems, Land Use Systems, Mobility Systems, Energy Systems, Environmental Management Systems, Building Systems, and Governance Systems. These systems were translated into more practical parameters to be analysed by urban designers and architects later on.

Table 1. Sustainability parameters for green cities in literature, source: (Rharbi, 2023).

Author	(Wheeler & Beatley, 2014)	(McGeough, Newman, & Wrobel, 2004)	(Fraker, 2013)
Urban Design And Function	*	*	
Environmental Planning	*		*
Sustainable Energy, Resources	*	*	*
Social Equity	*	*	*
Environmental Justice	*		
Economic Development	*	*	
Land Use Optimization		*	
Transportation	*		*
Food System and Health.	*		
Material Use	*		*
Water			*
Waste			*

As the above table shows, common parameters can be highlighted as following:

Social Equity: The city should be able to provide an infrastructure for all mix, and opportunities for all, be it immigrants, middle class, or poor. The

social aspect is essential, therefore social equity is considered an important point for the quality of life in the cities (Pacione, 2003).

Sustainable Energy and resources: Sustainability, essentially embodies immediate impact of the construction on the environment, thus any measure that could minimize the greenhouse gases is primordial. Limitations to energy consumption for cooling and heating needs are imposed by kWh/m² yearly depending on the building usage. The calculation methods could differ according to the simulation software used, as well as the occupant behavior could play a role in changing the expected consumption. In order to answer those needs, sustainable green cities should provide a clean resource that would at least partially cover a part of the demand, such as solar panels, it also refers to self-energy production by integrating green energy resources: Solar, wind, etc...

Materials: Even though it was not considered as a primordial parameter by some researchers, however following our study, construction materials should be as local as possible to prevent transportation fees and energy waste, the longevity of materials is important as well as their life cycle.

Environmental Planning: Integration of nature in the best way possible, the greenery should be planned where to be put, and how to be used, it is not just for aesthetic purposes only.











Urban Design and Function/ Land Use: It is the most crucial parameter that generally determines the choices made to integrate sustainability and the city's identity. To do so, the involvement of citizens in urban design choices is essential. There should be a place for people, that ensures mixed-use for a wider range of the society to settle down, diversity of form and functions as well as well management for the community (Yeang, 2000)

CITY IDENTITY

Identity is a wide concept that cannot fit one dimension. It can hold various meanings depending on the context used. The identity of a person could have signified the name age and maybe security number. It also could mean the culture, history, memory, or simply the sense of belonging (Heidari, 2016). One cannot define identity without context, which is why Berger said: Identity is "socially bestowed, socially transformed" (Berger, 1963). Lynch classified identity into two categories such as the sense of recognition and the emotional aspect (Lynch, 1960). The sense of recognition is the sense of belonging, the ability to recognize a group, space, an environment and predict it. The second category is the bound that is created by the sense of recognition. For Castells, identity is seen as a process and not a fixed definition (Castells, 1997). It is a process to identify, recognize, and get attached to it.

For instance, identity can be given or defined. The new city's identity is essentially premade on the marketed image; however, this instance can be changed according to citizens' interactions with the city. The sense of place planned by means of architecture can strengthen the local identity (Yeang, 2000).

Table 2. City architectural identity parameters and patterns, source: (Rharbi, 2023)

Identity characteristics	Definition	Pattern
Spatial Optimization	City general organization and planning design principles (Ex: circular city; Al falah project Dubai; Grid City; New York; Organic City: Medina of Fez)	   Circular City Grid City (Mass in voids) Organic city (Voids in mass)
Semantic Organization	Signs, perceptions, and experiences that keep the community's identity	-
General Design Principles	Forms used to organize the urban space such as parcels distribution	   Closed parcel Semi-open parcel Continuous parcel
Shapes and Forms	Buildings' forms and shapes	  Courtyarded building Multi-storied one-block building
Materials	The material used for which aims, such as opacity, transparency, local materials...	-
Relationship with Context	The physical relationship of buildings with their surroundings: Physical one, visual one by using transparency, uniform color or design...	  Physical relationship Visual relationship

A city's identity specifically can be attributed to several features such as religion), language, climate, topography, and landscape these attributions actually create a unique environment that is then linked to the people. How they interact with it is what creates the identity of the individuals, (Oktay & Bala, 2015). It is then a mutual relationship where the city gives, people take, and they give back. To understand how architecture can manifest the identity, Torabi and Brahman had identified the main characteristics on which we will base our research in Table 2 (Torabi & Brahman, 2013).

TRANSITION AND IDENTITY

Transition or any form of transformation in architecture is essential for continuity (Chris, 1997). The case is that architecture needs to keep up with time. To ensure that, various elements need to change be it architecture styles, forms that reflect how we live our lives, etc. If identity ensures the continuity and the link between architecture and people, then we can conclude that transition holistically should not conflict with identity.

Architectural transitions usually try to consolidate, reorganize or revitalize the history in an attempt to keep the identity (Akkurt, 2012).

The aim is to keep the memory as it is what makes people realize their identity (Tran, 2010). The architectural transition may state “a new identity” or continue “an existing one”, that is why it is important to know the context of implication, its’ past and present, and try to develop new opportunities for new architectural narratives that would contribute to the development of the place (Bruzzone & Borghi, 2013).

According to world urbanization prospects back in 2014, the urbanization rate is the fastest and is estimated to increase especially in developing countries around the world. The African continent is not an exception to these changes. This fast rate has various implications such as the demographic growth not matching the economic growth of the country leading to internal migration to the cities for better opportunities. This leads to a housing shortage and thus shows itself as a catalyst for fast urbanization. It is also caused by the fast economic growth, implying a fast market change, and the need for new infrastructure, and new lifestyle, as it is experienced in many of the Gulf countries. Regardless of the reason from which the fast urbanization stems, it is also known that it is not only an expansion of urban footprint but also a spatial transformation of the society and therefore represents a cultural evolution (Wheeler & Beatley, 2014). In a way, urbanization itself is a transition in many fields.

MOROCCAN CONTEXT

Moroccan cities' identity

It is widely known that Moroccan cities have a long history from pre-Romans, Roman, Amazigh, Arabic Conquest, Portuguese, French, and Spanish Colonization, both post-war, and post-dependency. The cities have unique characteristics and strong identities displayed architecturally by materials, geometry, urban texture and hierarchy... Each period has distinct characteristics adding to the existing identity of another layer. The current state of Moroccan cities is the overlaying of strong identities impacting each period and coming together. Unfortunately, the dominant narrative of the Middle East or North Africa region, Morocco as included had for long ignored these aspects and only focused on the “narrative of the underdeveloped” as if the identity of these cities is the state of underdevelopment. The Moroccan cities had been, for centuries even before colonization, in constant development and self-creation, thus way before modernism. The impact of colonization had only contributed to the continuation of the development (Elsheshtawy, 2004).

Most of the imperial cities have distinct features: walled cities or fortresses for protection reasons. The overall organization is growing organically with the growth of the city around a center. The growth is spatially around mosques with the presence of necessities such as fountains, schools, or high education institutions called “madrassa”. The houses were spatially inspired by the Andalusian courtyard houses typical for the region of Arab cities, and Amazigh “Ksours” or fortified villages that are known for their geometrical shapes and clay use. Overall,

the cities had strong characteristics influenced by the culture and the climate needs, (Escher & Petermann, 2001), (Figure 1).

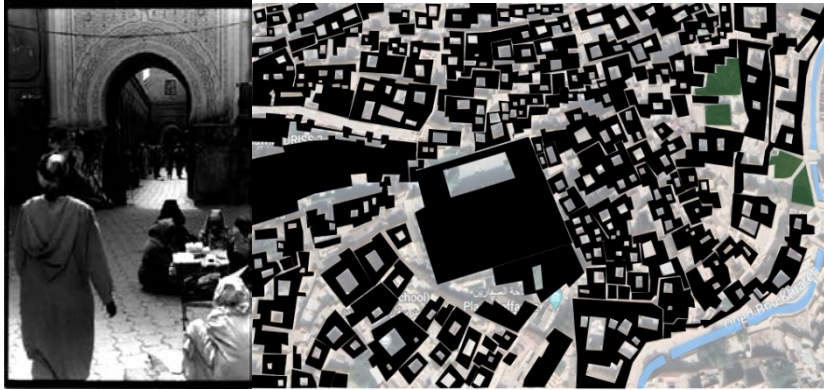


Figure 1. Left: Old Medina Compositions: Narrow streets, (Escher & Petermann, 2001). Right: Fez city old town mass and void, Authors

With the start of colonization, city centers had shifted from the traditional center of the walled cities to the exterior of the cities (Ezeddine, 1984). The new French center that they called “Ville nouvelle” was planned by foreign architects and urbanists, French in particular. The cities were built with French design principles as possible to familiarize with the French people accommodated in the new city center. The big boulevard ended with the train station or the city councils, the central post, and hotels laying on the side of the boulevard, then the residential apartments and villas were planned behind it. The post-French colonization had a significant impact on shaping Moroccan cities. One of the reasons behind it is the need of bridging the old historical parts of the town with the new settlements created by the radical changes. However, Post-colonization Moroccan architects were mostly graduates of French schools. Thus, the French style dominated the so-called Moroccan post-colonial architecture. The years between the 1980s and 2000 were marked by economic problems and intense drought leading the agricultural country to lose its youth population from rural areas to urban areas. The consequences were fast urbanization, slums, and unshaded cities with problematic neighborhoods that showed intense social, and economic segregation (El Otmani, 2018). This period is also marked by the resettlement of the Medina dwellers. The economic crisis affected the dwellers of the old town, making it harder, for families, to take care of the old historical houses. Another reason for the shifting of the dwellers from Medina to the “new center” was the work opportunities for the younger generations created in the newer parts of the city as well as the augmented proximity and accessibility.

Table 3. Architectural identity characteristics of Moroccan cities through time. Source: developed from (Rharbi, 2023)

Time Frame	Spatial Organization	Semantic Organization	General design Principal	Formal Approach	Building Materials	Relation with the existing context
Imperial Period 1100-1600	Organic growth. Voids in mass	"Privacy" reflected in society and buildings	Walled cities or fortresses	Vernacular architecture	Clay, stone, wood	Related
Colonization period 1912-1956	Strong hierarchy, Mass in voids	"Oppression" by introducing bigger forms, massiveness	Foreign Aesthetic, Purist Approach,	Art décor, Modernism	Concrete	No relation
Post Colonization 1960-2000	Semi-structured planning, Mass in voids	French dependency by reflecting the same shapes	Simple and functional	Modernism, Deconstructivism	Concrete	No relation

After 2004, intensive development programs were undertaken to bridge the different parts of cities and to minimize the gap between these differences. The country's politics has made it clear that sustainable development is the only solution for the country, unlike other countries in the MENA (Middle East and North African countries) region that do not have Gas or Oil. As reflected, more slums have been eliminated by the intensive redevelopment of segregated areas of the city, especially after 2010. (Dahir n°1-10-200 dated 23 moharrem 1432 (December 29, 2010) promulgating the Finance Act n° 43-10 for the budgetary year 2011, 2010). In addition to new urbanization acts, another phenomenon had begun, particularly with the country's efforts to sustain and promote the tourism industry. After that, foreign-accommodated communities had formed in the old Medina such as artists or retired Europeans might easily afford to maintain the city's historical areas (Escher, 2016).

Table 3 shows that pre-colonial, colonial, and post-colonial Moroccan cities all have distinct identities. The initial period is characterized by vernacular architecture. The second period exhibits the modernist movement in a colonial environment. The final period is characterized by a return to vernacular architecture while preserving the French legacy.

Law and regulations that framed sustainability in Morocco

As it is assessed so far, a general policy was implemented in various fields framing sustainability in order to boost the development of the country. In urbanization sectors, different actions were taken as shown in Table 4. Within the frame of regulations, a thermal regulation was, for the first time, implemented to minimize the energy consumption in the building sectors.

Table 4. Moroccan Government efforts for sustainable cities

Years	Actions
2004	“Cities without slums” Program
2010	ADEREE: Development Agency of Renewable Energies and Energy Efficiency
2011	Zenata Sustainable City: CDG development, Call for expressions of interest, New City of Zenata
2012	Benguerir Green City project: Launched by OCP Group
2016	AMEE: Moroccan Agency for Energy Efficiency
2016	Eco-Projects: Djemaa neighbourhood, Gueliz neighbourhood by BET International "Territorio y CUIDaD"
2017	Referential for sustainable town planning
2018	RTCM: Implementation of Moroccan Thermal regulations of construction by the Decree No. 2-13-874
2020	Eco-City Benslimane: Ministry of Development, town planning, housing and city policy; Promotion of an ecocity in Benslimane

BENGUERIR CITY

Benguerir city is not an imperial city. The settlement there had been mostly due to the military presence in the region. The city is 50km from Marrakech, one of the oldest imperial cities of Morocco. The development of the city was only due to the necessity of the growth of the phosphate mining industry nearby.

In 2012, “Office Cherifien for Phosphate”, more known as OCP (Moroccan state-owned phosphate mining company) had the idea to stylize the city of Benguerir. Their new vision was to create “a green city” that is centered on research, thus creating a research hub. Their focus point was to create a university that would help start and boost the city (SADV (Société d’Aménagement et de Development Vert, OCP), 2012). The city aims to hold 91000 dwellers. The initial phase had been achieved containing; Education Quarter: Excellency High School, phase I of the Mohammed VI Polytechnic University; Tech Park zone including Data Center, Innovation Incubator, Green Park Energy Center, Green Smart Houses Park with Solar Decathlon 2018 prototype houses; Residential Quarters: Research villas neighbourhood “Villas Chercheurs”, Marguerite villas neighbourhood. The old and original part of the city that was the initial settlement, had continued its growth, especially with the economic boost of the green city and the increased job opportunities. New neighbourhoods are still built in the North part of the city. Accompanying this growth, the continuation of the green city of Benguerir is in the South direction (Figure 2).

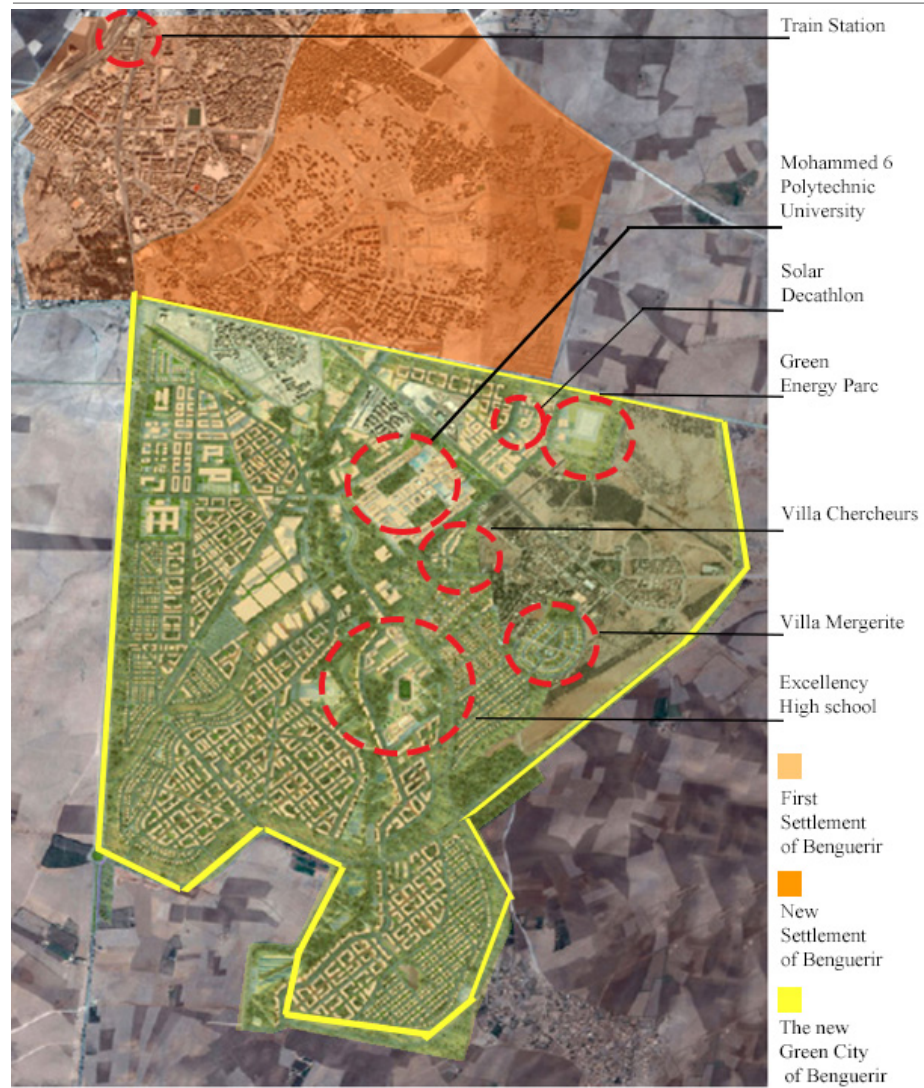


Figure 2. Benguerir City and two examples of the existing city and the new green city, Densities and Urban Forms Referential, Urbanism and Territory Ministry, 2016

Benguerir Context

Benguerir is situated at the south of Morocco with dominant semi-arid climate. It has long months of dry summer, where the temperature reaches its highest point in July, and a short cold season (Figure 3). The region was known for use of earthen materials especially clay for housing in order to offer comfort inside the building. However, with years of quick urbanization and the concrete domination, the buildings of that region lost their thermal efficiency as concrete do not have the same thermal masses and insulation capacity as the Clay.

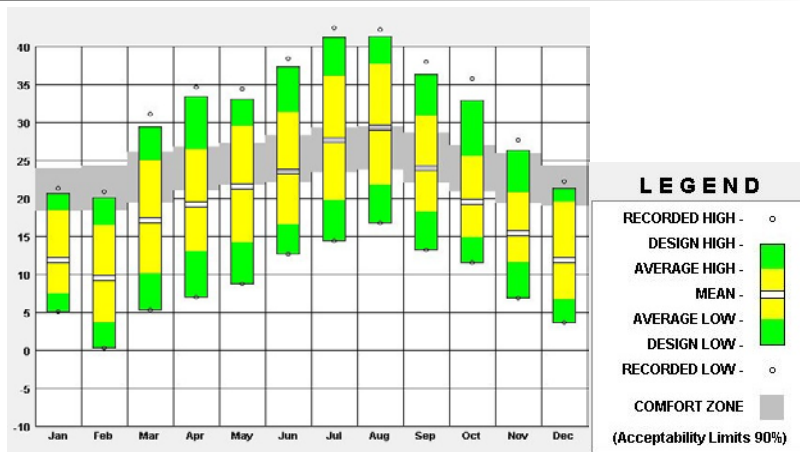


Figure 3. Temperature range of Benguerir using Climate Consultant Software.

Despite the transition from clay to concrete, the government attempted to re-establish the region's identity, particularly in Marrakech, which is known as the "Red Pearl" due to its ochre colour. However, by enforcing this colour on all buildings, the efforts remained purely ornamental. This dark paint on the concrete, on the other hand, has less reflection and hence holds more heat.

Benguerir green city had targeted the issues in residential areas especially and tried to adopt more adequate solutions that would create sustainable and green buildings. One of the executed projects is "Villas des chercheurs" (Researchers Villas) in the Moulay Rachid neighborhood which was also mostly funded by OCP Company. The project was to create residential villas that use mostly passive solutions in order to minimize energy usage. The villas are built in the traditional approach with courtyards, stone and clay materials, and domes for the living spaces (Figure 4).



Figure 4. Left: Villas Marguerite; Right: Researcher villas. Gated neighborhoods, Benguerir Green City, Morocco, 2021, Noussaiba Rharbi.

The heat is stored during summertime with the natural cooling effect from the wind tower system installed on the roof of each villa. It is a simple chamber with captors and a plastic cover to maximize the heat stored. Then the system is linked to a packed bed that is layered underground the building with stones that retain the heat for the winter months. In the winter, temperature captors would activate the system to release the heat through the house if needed (Singh, R.P.Saini, & J.S.Saini, 2010). In summer, the thermal mass of the thick walls delays the heat access until nighttime when it is colder, and some heat would not harm. Other projects were designed with the same targets such as reducing energy usage, renewable energy integration, and spatially holding on to

the identity of the region. Even with bigger projects such as the Polytechnic University campus, the main targets were still present such as the usage of local building methods and typology.

Benguerir City Challenges

Benguerir City is a Moroccan paradigm for green, sustainable towns. It serves as an initial Moroccan step for other towns and construction businesses to follow in the government's new experimentation with sustainability and renewable energies. In terms of the previously established sustainability metrics, the city attempted to touch each parameter in a variety of ways. As demonstrated in Table 5, social components are implemented by improving the city's living conditions, particularly with limited resources such as agricultural and water supply issues. The city's initial boost is the establishment of the campus, which may have a domino effect in attracting researchers, as well as the establishment of other facilities such as incubators surrounding the university.

Table 5. "Sustainability Cities", parameters and ways of implementation in Benguerir City, by authors

Sustainability Principles	Measures Taken	Ways of implementation
Social	Better living conditions Gender Equality	<ul style="list-style-type: none"> • Generation of job Opportunities, the attraction of students, investors, and companies to settle. • Cooperative boosts through the university
Environmental	Energy reduction CO2 footprint reduction	<ul style="list-style-type: none"> • Passive solution implementation • Usage of renewable energy, Planting trees zones • Implement LEED certification for building
Economic	Create Job opportunities	<ul style="list-style-type: none"> • Construction jobs • University staff • Innovation incubators • Local Tourism • Green energy sector new jobs

The city was consciously planned and constructed, meaning that it aims to reduce its energy consumption by providing autonomous solutions for the generation of energy such as photovoltaic integrations to provide electricity as well as passive solutions to provide cooling such as evaporative systems or packed bed systems for heating. Co2 footprint was taken into consideration by planting olive trees to minimize the footprint of the students. The general economy was boosted by the constant generation of new job opportunities. In the phase of construction: The use of local earthen materials generated jobs for extractors, craftsmanship, and site workers. The phase after construction generated constant jobs inside the university: janitors, service providers such as delivery and taxis, professors, researchers, and sports instructors for the users outside of the campus. In addition to the new job

opportunities, new buildings such as the new headquarters were built. Especially the hospital project, and OCP headquarters would generate more income for the region.

Table 6. Parameters of Identity of Residential Architecture in Benguerir City: comparison of the old settlement and Green City, by authors.

	Spatial Organization	Semantic Organization	General design Principal	Shape and Form	Building Materials	Relationship with the context
Benguerir old settlement (1920 and after)	Planned organization, City center around the train station and marketplace (Souk), Mass in voids	No specific semantic organization	2 to 4 floors of typical low-cost social housing	Volumetric box type	Concrete, masonry	Regulated façade color: ochre
Benguerir Green City (2012 and after)	Grid System, Planned organization, City center around University Campus. Mass in voids	Reflection of the Old Moroccan, Medina (old city) typology	Residential villas inspired by traditional Moroccan Design, 2 floors.	Courtyard type,	Stone, Clay,	Harmonious in itself within the gated neighborhoods, Lack of bond with the old and new settlement of Benguerir.
New Settlement around Benguerir Green City (2012 and after)	Planned organization, No defined center, Spontaneous solutions in parcel blocks	No specific semantic organization	2 to 4 floors of typical low-cost social housing, Mixed-use (commercial and residential)	Volumetric box type	Concrete, Ochre colored exteriors	Regulated façade color: ochre, Cubist facades in harmony with university buildings,

In relation to the objectives of the new development, the city has a concise and precise narrative on what to expect, the strategy to promote it, and ways to implement it. However, sustainability is not only a matter of technical implementations. Sustainability, as discussed before, is the ability to sustain and maintain. It has three important pillars: Economic; social, and environmental. However, maintaining history, tradition, and identity are also an important element of sustainability. It does not matter if the green-sustainable city of Benguerir is new or a development of the existing city. The new implementations should be delivered in a way aligning with the existing ones.

Benguerir city is at the same time, an opportunity thanks to its strategic position in the commerce and economy axis of Benguerir-Casablanca, and a challenging city since the settlement did not have a distinct and recorded deep history, especially before phosphate discovery in the region. The challenge is reflected in the existing part of the city as the dominating architectural type is a simple economic two-story apartment with commercial space on the entrance floor. The whole design is painted in Ochre color according to the urbanization laws of the

region. The point in a way does maintain the unity and the language of the city as a whole. However, it does not serve anything beyond it.

Identity, according to Lynch, is a sense of recognition as well as an emotional component. The social level of the people varies from one side of the city to the other in both portions of the city, indicating a noticeable division. The historic section of the city is made up of rural entrants to the city, which means that no emotional link could be formed with the new settlement. In general, the lack of space expressing the uniqueness of the place had made it more difficult to recognize the city and establish any sense of recognition. Normal inhabitants in the green city portion include OCP researchers and engineers. They are generally newcomers to town and have no emotional attachment to it. However, the city itself with the presence of a distinguished university campus and neighborhood had created a sense of recognition.

The city has the challenge to eliminate the social segregation and physical segregation made by the gated communities widely spread in the green city sections. The homogeneity of the existing and new sections should start by creating at least a distinct feature to create a sense of recognition. The city is still new and thus has a limited history in order to offer an emotional bond. As one city can still hold many architectural styles, the problem is that each settlement does not hold any identity even on its own. Even if the sustainable green cities concept is exported from Western countries. It was adapted to the Moroccan context in each part of the project. But the overall general aspect does not merge well. The university campus stands by itself with its own boundaries. The residential gated cities hold their own boundaries. The layering of the green city and existing settlement could not blend for one main reason: The urban planning of the city did not take into consideration the identity and features of Moroccan urban planning to complete the image.

DISCUSSION AND CONCLUSION

As discussed before, Moroccan sustainable green cities are still a long way in order to become a model for the African cities. A big amount of sustainability concepts and examples come from the Western world, which conflicts with the context and the physical environment of Morocco. The country is going for an imported challenge since it does not propose solutions to develop with its own resources. Unlike the majority of the MENA region countries, it does not have any oil or gas resource for a direct striking development as is witnessed in the Gulf region. Thus, the current policies are toward sustainable development in all fields to have a lasting development with the natural resources available: sun, wind, and a long coastline.

Benguerir is at the same time the first example of a Green sustainable city in Morocco, the first city developed around as a research hub, and even the first city to introduce LEED certification for its' buildings in Morocco. In a way, it has put a milestone for the upcoming Moroccan green and sustainable cities. However, it is still in its first phase with more than three-phase to construct. The city should learn from the problems

that it is facing for better development. One of its biggest challenges would be unifying the architectural identity of the existing sections of the city and its new developing sections. Architectural language reflects the culture and identity of the citizens through familiar forms. Architectural unification means cutting out the segregation represented physically in the city plans and psychological segregation between the habitants of the different parts of the city.

The city is a model of a sustainable transition from a mining town to a Moroccan model of a Green sustainable city. There are different challenges observed in the sustainable transition of Benguerir:

Identity rupture: The city of Benguerir did not develop as a big city in the first place, it is a small town for miners. The presence of such a large state company has pushed the city into new transitions in order to follow the social movement and the development of the country. However, while it planned to be the country's first example of such a sustainable transition, it failed to create a continuation of the old city. The rupture in identity in the claim of sustainable identity is illustrated in the social, physical and psychological separation of urban planning and architecture, as shown in Table 6.

Sustainability as an “estranged identity”: Giving a new identity to a place for the development of the revival of a place is not necessarily harming the identity of the place, (Bruzzone & Borghi, 2013). The project of Benguerir Sustainable City is developed by the motivation of creating a “new cities” image in Morocco. The existence of the new green city besides the old town had created the estrangement factor. Moroccans can still adapt to the new city over time, but the old dwellers would always regard it as a foreign element in their city.

The green city has managed to achieve certain sustainability points. Each parameter of sustainability was implemented in the green city as follows:

Social Equity: The city was promoted as a sustainable transition to the old miner city to make it a research hub and green development, it was also promoting new jobs opportunity and balanced integration of all social categories. In reality, the city is still struggling with the integration of old parts, the job opportunities are limited and often unbalanced and thus creating a gap between the old settlers and the new ones.

Sustainable Energy and Resources: The city has two Silver LEED-certified buildings on the university campus, and the neighbourhood projects are often integrating new passive solutions as well. The green sustainable city is actually achieving its set goals, however, the growth of the old part of the city does not follow up these goals.

Materials: The promotion of earth materials is observed as an achieved goal, especially in the “Villa Chercheur”'s project. Continuous research for better clay usage was also carried out in Solar Decathlon houses. These materials do not only provide sustainability and longevity to the project, but it is a continuation of the identity representation of the place. On the contrary, the concrete and low efficient masonry used in

new constructions at the old part is hindering the general development of the place.

Environmental Planning: Integration of nature is taken as the plantation of olive trees field to minimize the carbon footprint of the city. There are no general guides that promote the integration of nature and greenery apart from the trees on sidewalks. The city in different phases does not claim any parks and other greenery. The university campus, which is covering the biggest part of the new city, includes very few fields of olive trees. It seems that the struggle to maintain this kind of greenery in a semi-arid context hinders various greenery planning. Thus, the question of green identity should be questioned in such context.

Urban Design and Function/ Land Use: The green city of Benguerir is solely using the land of the state, and the construction is also conducted by the state company OCP. There is little diversity in the mixture as the settlers in the green city part are usually the engineers, researchers in the firm, and the university. The functions promoted do not include much space for the miners and other workers. The same is noticed in the housing projects launched in that area as well.

Sustainability parameters were implemented especially in the university campus. The upcoming phases of the city would achieve other sustainability goals.

The sustainability transition in the African context in general, or in the case of Morocco, as a concept in itself is a challenge. The theory of many of its parameters can be easily found in local Moroccan architecture. However, economic and social burdens may prevent such a rapid transition from happening. Identity is about time; it builds up and grows over time. The Moroccan example represents a transition with a methodology: a return to the local solution and matching it with technology. The vernacular architecture ensures the continuity of the identity and the technology ensures the sustainability of the countable practice. This method is debatable in terms of success and social analysis after years of experimentation. Therefore, the Moroccan experience is too early to accept the sustainability transition as effective or not.

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Resume

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