

## The Human-Based Sustainability: a Responsive Approach towards Cities Redevelopment

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### 1 ABSTRACT

Cities are complex and dynamic systems facing multiple challenges, such as environmental degradation, population growth, urban sprawl, social inequality, economic instability, and others. Environmental and physical sustainability approaches are insufficient to face these challenges. Cities need to adopt a more sustainable and flexible human based approach that takes into account the needs and aspirations of their residents, as well as paying attention to applying simple affordable environmental techniques and systems. The paper presents a new vision for achieving success when transforming existing cities into sustainable cities by creating a human-based sustainability model through an applied study.

Firstly, it reviews recent literature on the concept of human-based sustainability strategies, presenting the goals of sustainable development, principles and process for transforming existing cities into sustainable cities. Presenting some examples of sustainable projects that have failed, analyzing them and mentioning the reasons. The paper's novel perspective emphasizes the crucial role of the humans in achieving sustainability. This comes after it has been established that the mere application of advanced environmental techniques is insufficient for transformation success. This perspective serves as a starting point to underscore the importance of human-based approaches in sustainable practices. Seven theories of human needs will be discussed to identify key needs that can influence people's shift towards sustainable behaviour. This will serve as a prelude to highlight the significance of merging five crucial elements, known as the 5A elements (attractiveness, accessibility, awareness, affordability, availability), with sustainability strategies.

Finally, the theories of human needs and the five elements that instigate behavioural change will be amalgamated based on their priorities and relative importance, so as to set up a human-based approach model to be applied to existing Egyptian cities for sustainability transformation. This will be followed by a conclusive summary as a guide to practical application, as this process demonstrates the significance of the human factors in achieving sustainability, as opposed to solely relying on modern physical and environmental sustainability technologies.

Keywords: human needs, human behaviour, humanitarian actions, human based sustainability, transformation

### 2 HUMAN-BASED SUSTAINABILITY

Human-based sustainability is a new axis that focuses mainly on changing people's behaviour towards sustainable behaviour instead of focusing solely on applying new technology and technologies. Many international experiences have proven that the application of modern technology alone does not guarantee the success of sustainable projects, as the wrong use of people is a sufficient reason for the failure of sustainable projects. For example, implementing public transportation systems does not mean that people will use them and dispense with their private cars. Likewise, implementing the idea of energy-efficient homes does not mean that people will be able to use them in the manner intended to conserve energy, and other examples. Because of this, it was necessary to focus on how to change people's behaviour towards sustainable behaviour to ensure the success of sustainable projects. The paper methodology will be processed as in (Figure1).

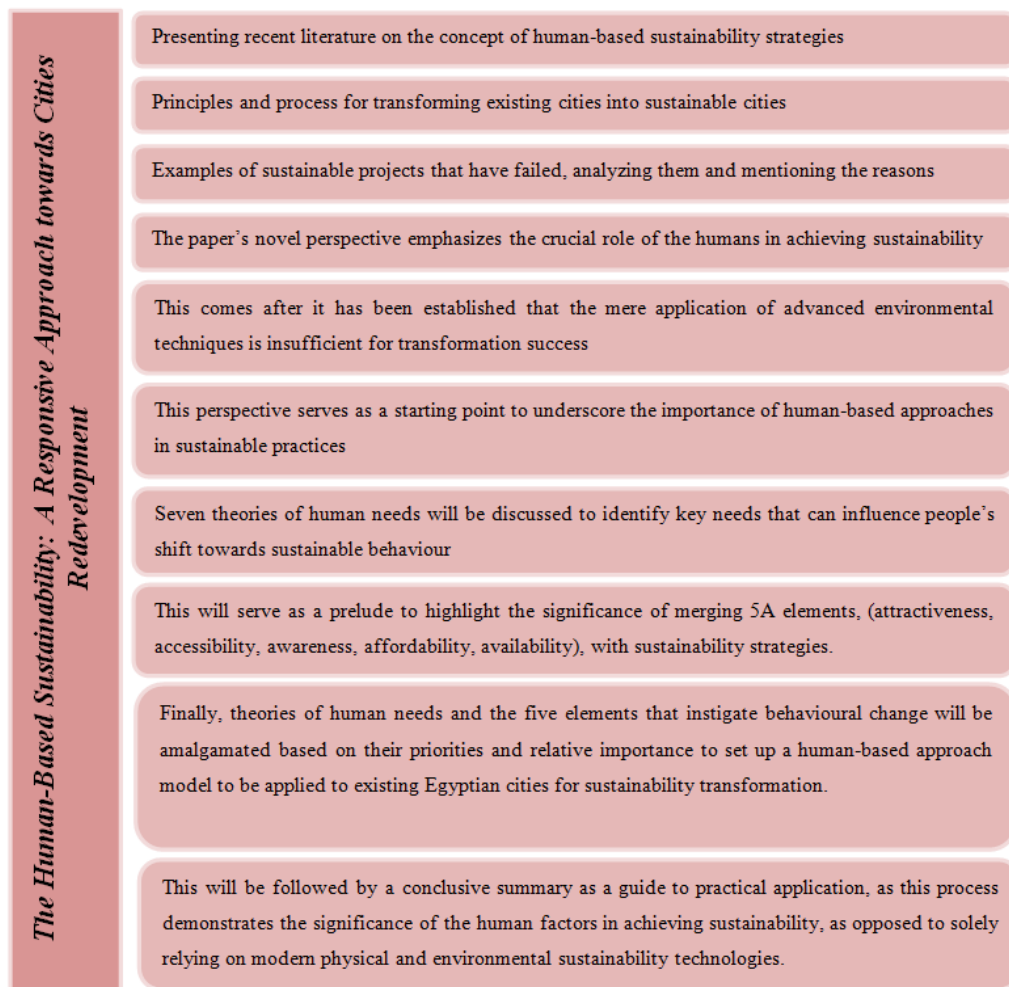


Figure 1: Research Methodology Skeleton. Source: (Authors, 2023).

### 3 SUSTAINABLE CITIES

It is a concept based on creating a new shape for cities by achieving economic growth through an economic base that does not deplete natural resources through irrational use and does not pollute them, and it also adopts the principle of reusing the product through recycling as an input in another production process while recovering the energy invested in this product (Locke, 2021).

Sustainable cities achieve social justice for their residents as they reinforce the concepts of democracy, self-reliance and participation in decision-making, as the sustainability of the city comes from the society's dependence on itself by meeting the basic needs of its members, ending the gap between the rich and the poor, and the different levels of income, and ensuring Participation and accountability, ensuring the minimum acceptable quality of life for all members of society, and using technical techniques compatible with their local conditions (Locke, 2021).

The sustainable city is a green environmentally friendly city in which the absorptive capacity of local resources and ecosystems is balanced by raising the efficiency of resource use and achieving the least possible amount of polluting outputs and preventing pollution by reducing waste. It is a zero-carbon city and thus contributes to reducing carbon dioxide production. And other organic compounds that lead to an increase in the severity of climate change. And it works to use structural transformations to reduce the use of fossil fuels to a minimum, and to increase reliance on renewable energy resources such as wind energy, solar energy, wave energy, geological energy, and others (Monga, 2020). Human Factor can be integrated in sustainable cities as shown in (figure 2).

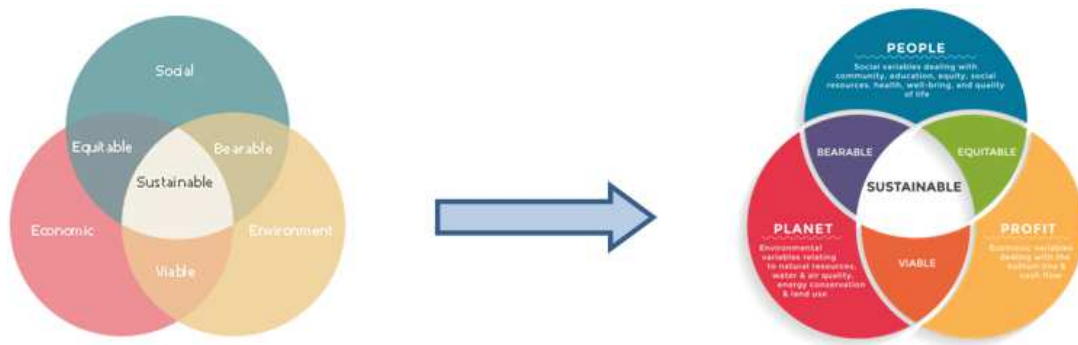


Figure 2: Sustainable City. Source: (Venn Diagrams, <https://conceptdraw.com/a2058c3/preview>)

These important structural transformations not only require integrated industrial ecological systems to manage and recycle liquid, solid and gaseous waste, while also requiring cultural shifts in consumption patterns, transportation and entertainment. For example, sustainable cities are characterized by a (relatively) compact fabric in order to reduce the travel distances between work, housing and services, and thus reduce energy use in transportation, and thus requires planning land uses in a way that enhances these perceptions (Monga, 2020) as shown in (figure 3).



Figure 3: Pillars for achieving sustainability of cities. Source: (The United Nations, 2013)

In this paper, the social aspect will be in-depth and linked with an important axis, which is human-based sustainability which will include two major factors: Theories of human needs and 5A's factor (Availability, Accessibility, Attractiveness, Affordability, Awareness), to reach a successful methodology for transforming urban cities into sustainable cities.

#### 4 PRINCIPLES AND PROCESS FOR TRANSFORMING EXISTING CITIES INTO SUSTAINABLE CITIES

According to Crane 2020, urban cities can be transformed into sustainable cities by balancing all the elements of sustainability (the social element, economic element, and environmental element), so that each of them aims to mitigate the environmental impact of the city. The idea of converting to a sustainable city aims for the city's residents to reduce the city's necessary inputs of water/energy/food, etc., and reduce its output of gases/waste/polluting materials. The city provides the needs of its residents at the present time without affecting the needs of future generations of its residents. One of the most important foundations for transforming urban cities into sustainable cities is to transform the city from an energy-consuming city to a city that produces it. Therefore, the goal is to reduce the energy derived from petroleum fuels and to use renewable energies. Applying the theories of water efficiency education, rainwater collection and reuse, sustainable and collective transportation instead of individual transportation, which reduces gas emissions Harmful, connected pedestrian paths to reduce the use of environmentally harmful transportation (Crane, 2020). This is in addition to changing people's behavior towards sustainable behavior for the success of the process as shown in (figure 4).

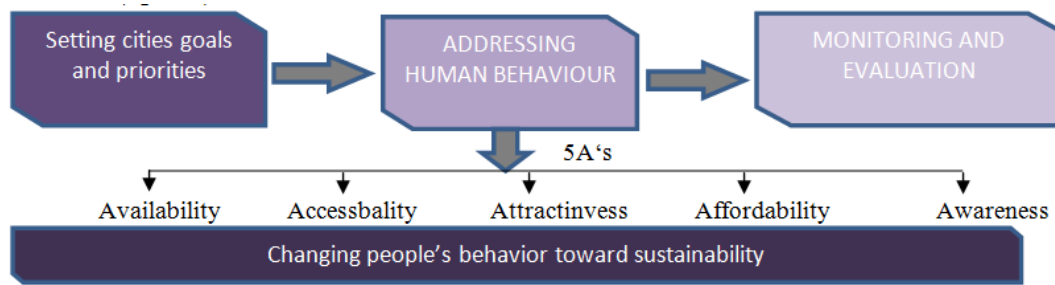


Figure 4: Holistic approach, Transforming existing cities into sustainable cities. Surce:(Author, 2023)

Some cities aim to reduce carbon emissions by creating walkable green neighbourhoods or by tracking emissions by developing high-tech greenhouse gas inventory systems. An example of this is the United Arab Emirates, the cities of Masdar and Dubai working to integrate green spaces, zero emissions targets, urban agriculture and water reuse systems. Nairobi, Kenya, uses modern slum mapping techniques to help planners provide better services (Hawley, 2014). Curitiba, Brazil was the first to introduce the Bus Rapid Transit (BRT) system, and it has since been widely adopted. He took 'human ecology' methodologies for urban sustainability, in addition to creating 52 square meters of green space for every person in the city. Bogotá devised an integrated Trans Milenio transportation strategy to counteract congestion in the city starting with the Bus Rapid Transit system and its four lines extending 55 kilometres above the city (Hawley, 2014). Another example, the Caribbean region has the first sewage treatment plant, as Port is one of the largest cities in the world that does not have a sewage system, this treatment plant with trucks collecting sewage from canals, private sewage pits and latrines (Hawley, 2014). However, with many cities trying to transform some of their areas into sustainable areas and trying to implement sustainable projects, many of these projects faild when implemented on the ground due to failure to take into consideration the behavior and needs of people, but rather only modern technology was applied.

### 5 VARIOUS FAILURES IN URBAN SUSTAINABILITY PROJECTS

The previous aforementioned projects were very successful on paper, but when implemented on the ground, this was not the case, as many of them proved to be failures. (Table 1) compares the projects and the reasons for the success of some and the reasons for the failure of others to extract the most important points. As all the projects mentioned in the table proved successful when they were planned on paper, but when implemented they proved to be failures, and the reason for the failure of all these projects was the same reason, which is to focus at the time of planning on implementing technology and applying modern technologies only and not looking at The needs and requirements of the population and how to change their behavior towards sustainable behavior, which led to the incorrect use of modern technology implemented in these projects, and thus energy was wasted, as well as people not using the applicable means of public transportation and continuing to use their private cars due to the lack of any incentives that motivate them to choose the sustainable option.

COUNTRIES	NEW SUSTAINABLE PROJECTS	
	SUCCEEDED on paper	FAILED when implemented
Chicago	Has the second largest public transportation system in the United States (Chicago Transit Authority, 2017). Chicago has been rated the most bike-friendly city in the country.	More than 70% of the population drives their own cars, and only a small percentage use public transportation.
Phoenix Arizona	The opening of the Metro Valley railway, in addition to the construction of a pedestrian path and a bicycle path surrounded by landscapes for shading.	The field study showed that residents still use their own cars, and only a few use the metro or bikes (Hurtado, 2016).
City of Linz, Austria	The implementation of the Solar City project, which won several awards for sustainable urban development, as it is characterized by sustainable design, energy-saving buildings, solar panels for district heating and renewable energy generation, and the provision of public transportation stations (Lins, 2009) to motivate residents to leave driving and go to public transportation. This project received many awards due to the sustainable technical solutions that were presented on paper.	It did not succeed in achieving sustainability as it was planned. As the post-occupation evaluation deals with the behavioural and social aspects of the building occupants and how they use sustainable technologies in it, but the pre-occupation evaluation deals with the technical aspects of the building only (Wener, 1989). Follow-up showed that only 15% used public transportation, while only 1% used their own bikes or walked (Lins, 2009), and more than 80% still use their own cars. Also, because a large percentage do not understand how to use ventilation and heating systems, this led to inefficient use and waste of energy that could have been preserved.

Table1: Reason of failer of some sustainability projects. Source: (Author, 2023)

With the previously mentioned examples of some cities that are trying to create sustainable projects, many of these projects have proven to fail for several reasons, including people's behavior, as the largest percentage of people still use their own cars and do not use public transportation. It also turns out that many people use energy-efficient homes incorrectly, which increases energy consumption and does not reduce it as planned. This is in addition to the absence of achieving the five elements that help guide people in choosing the sustainable option. People choose the easiest and least expensive option for them, regardless of the interest of the city. Therefore, sustainable options must be attractive to people and more economical than other non-sustainable options, and sustainable options must be available and easy to access so that people do not struggle to access them, and in addition to being attractive so that people turn to them and leave unsustainable options. Hence, we conclude from the previous examples that the reason for the failure or success of sustainable projects is several factors united together and not just the application of new technology and techniques. Therefore, it is necessary to study people's behavior through seven theories that will be listed and analyzed, as well as studying the most important elements that help change people's behavior towards sustainable behavior, which is called the 5A's, and then integrating all of the above to conclude the most important success points when transforming urban cities to a sustainable city.

## **6 HUMAN NEEDS THEORIES**

### **6.1 Maslow theory**

divided human needs into five needs: first, physiological needs, such as shelter, rest, and food; second, safety needs, which is the need for individuals to feel safe and secure; third, social needs, such as the desire of people to form acceptable relationships with others; fourth, self-esteem needs, which is the need for individuals to feel safe and secure. With appreciation and respect, fifthly, self-actualization needs, which are individuals' desire to feel self-actualization, accomplishment, and independence (McLeod, 2018).

### **6.2 McClelland's achievement motivation theory**

McClelland divided individuals' need motives into three motives: firstly, the power motive, which is the individuals' need to feel powerful, secondly, the achievement motive, which is the individuals' need to achieve and strive for success, thirdly, the affiliation motive, which is the individuals' need to feel belonging and form friendships, and his feeling that he is accepted in society (Kurt, 2021).

### **6.3 Adams' equity theory**

according to Green 2022, Adams' equity theory states that people seek to preserve their input and are motivated to compare their results with the results of others in similar situations.

### **6.4 Alderfer's ERG model**

tried to combine the five levels in Maslow's theory to form three groups existence, relatedness, and growth. Existence and relatedness, which equals the third and fourth levels of Maslow's theory, growth, which equals the fourth and fifth levels, such as respect and self-awareness (Kurt, 2023).

### **6.5 Findlay theory of human needs**

In which four human needs were identified: firstly, psychological needs, such as providing various basic services to people, such as education, health, care, and others. Secondly, natural needs, such as physiological needs for food, drink, safety, and others. Thirdly, needs for self-realization through appropriate work and Ability to afford costs. Fourthly, social needs such as people's sense of belonging and interaction with society (Findlay, 1982).

### **6.6 MAX-NEEF Theory of Human Needs**

according to Gasper 2022, this theory indicates that people's needs are variable needs that depend on other factors such as culture, environment, life efficiency, etc., and are not fixed needs with a hierarchy, as Maslow indicated. This theory indicates that human needs are divided into two parts: value and existence. Value includes participation, creativity, protection, and freedom. Existence includes interaction, possession, and action.

### 6.7 Costanza's theory of paraphrasing human needs

This theory reviews people's needs as follows: the need for security, which includes security inside and outside homes and safety from crime. Second, basic living needs such as food, environmental services, shelter, clean air, and health care. Third, affection, which is achieved through tolerance, empathy, community participation, and citizenship. Fourth, understanding, through obtaining intuitive and rational information. Fifth, spirituality, through participation in society and access to nature. Sixth, creativity, through artistic and emotional expression and imagination. Seventh, Freedom and finally identity (Costanza, 2007). Through the previously mentioned theories, human needs can be divided into two basic parts, the psychological aspect, which includes personal feelings that affect the behavior of individuals, and social aspect, which includes social relationships between individuals in society and their sense of belonging. (Table 2) will convert these needs to study points that can be achieved in the built environment to ensure that people's needs are met to achieve sustainability.

Aspects/Needs		Theories of human needs	Study points	The scope of its realization in the built environment (Urban design)
Basic needs	Physiological needs	Providing the basic requirements for individuals of security, shelter, food, decent living, and transportation.	Provide comfortable accommodation	Providing comfortable housing through housing characteristics, large room spaces, and the interconnectedness of the interior spaces of the residential unit to achieve privacy for its residents, providing comfortable finishing materials for the occupants, providing good insulation materials to protect against disturbance and provide privacy. Taking into account the appropriate orientation of the dwelling to provide appropriate temperatures and natural lighting inside.
		Clean environment, ventilation, protection from Pollution and green spaces.	Protection from Pollution, (Environmental services such as clean air)	By providing green spaces in every neighborhood, increasing public transportation to encourage fewer private cars, increasing a forestation, avoiding the passage of private cars in the internal streets between residential buildings, and trying to make public transportation the only thing that passes through the internal streets.
		Environmental services, such as water, clean air and health care.	Provide healthy comfortable environment	Taking care of people's health by providing a healthy walking environment by providing pedestrian paths, bicycle paths, trees, green areas, and gardens.
	Safety needs	Individual's sense of security, safety and protection, maintaining an adequate standard of living and ensuring income.	Individual's sense of security inside dwelling	People feel safe inside the house by achieving privacy for the residential unit by providing large spaces between the facades of the residential buildings and each other, spacing the windows and balconies of the residential units apart from each other, providing green elements and landscaping around the building instead of concrete materials such as awnings, locks, and others. In addition to the distances between residential units should be satisfying.
		The individual's sense of justice compared to others by achieving security for their home and family.	Individual's sense of security outside dwelling	Providing safety elements outside the home by providing night lighting in all neighborhoods, in sufficient numbers for good lighting at night, provide clear traffic signs and pedestrian crossings, providing gardens and gathering places in every neighborhood, reducing car traffic on internal streets, especially at night, and can be replaced by public transportation, avoiding streets passing between buildings. Residential areas and replacing them with well-lit bicycle paths and pedestrian paths.
		The need to feel safe and secure inside and outside home, sense of security, uniqueness and difference, Privacy, privacy of life.	Density characteristics	Reducing density in residential neighborhoods to increase the individual's feeling of safety, as the higher the population density, the less the individual feels safe. This is done by reducing the number of residential units within one building, reducing the number of floors per building, reducing the number of residential buildings on the same street, and placing parks, green areas, and landscaping instead.
Self-esteem needs	Individuals' need for appreciation and respect, a sense of self-efficacy, a sense of respect, achievement, and appreciation from others, in addition to self-confidence, Passion, self-esteem, solidarity, tolerance, and generosity.	Improve quality of life	Through the characteristics of the facades of residential units in terms of acoustic properties, the walls are insulated to prevent the transmission of sound from one residential unit to another, and attention is given to the visual characteristics of the facades in terms of aesthetic form, ornaments, and windows with large areas and in an orientation that provides good lighting and ventilation, as well as balconies, and that respect is given to Principles of architectural design in terms of shape and colors. Implementing external painting works for buildings from all sides instead of red stone blocks, in addition to landscaping the roofs, especially for buildings of low height.	
		Feeling of familiarity and affection for places	Through afforestation and pedestrian paths, increasing the clarity of the urban environment, which provides an easier opportunity for individuals to roam through it. It makes it easier to get to know others in a healthy environment.	
		An adequate standard of living	Distributing facilities and services in a way that meets the needs of the residents of the area by providing all the necessary facilities and various services that people need on a daily basis, including restaurants, cafes, supermarkets, and others.	
		Artistic expression and creativity	Respect principles of architecture design. The design of building facades has a tangible impact on individuals' feelings of appreciation and respect or not.	
Belonging needs	An individual's sense of belonging to the place they lives in and being accepted by society. Developing friendships and personal relationships. Calm, Fantasy and Relaxation, Equal rights, Familiarity and affection for people and places. A sense of place, belonging and distinction.	Feeling of spatial distinction	By paying attention to the aesthetic values of the buildings, including the aesthetic elements of the facades, the colors and the proportion of the building compared to the neighbors, in addition to the natural environment surrounding the buildings by providing green spaces and landscaping around each unit, especially in the setbacks facing the streets.	
		Develop personal relationships, and develop close friendship	Focus on creating and caring for shared corridors leading to residential units, creating gardens and recreational spaces for each group of buildings, and providing suitable places for public gatherings, along with providing play areas for children.	
		Equal rights	The equal rights for people increases their sense of belonging, by providing housing units that are similar in characteristics, spaces, style, and aesthetic form of the facades, and that low-income housing is suitable housing that provides all the services available to middle- and high-income housing, whether from interior spaces or external services surrounding the building.	
Social needs	People's desire to join them as acceptable members of a group and their desire for belonging, love, sympathy, and forming acceptable relationships with others. Managing and directing community members. A sense of justice in society comparing members of society in similar situations. Form friendships and close relationships, the sense of belonging to a social group and the resulting constructive social interactions. Social security, Friendship, social environment, solidarity, cooperation and interaction. Participation in the community, Calm and Relax.	A sense belonging and distinction	A sense of belonging and distinction for all segments of society, especially those with special needs and the elderly. For example, providing special pedestrian paths for them surrounded by trees, providing private parking lots for them that are close to the entrances, providing special housing units for them and special elevators to meet their needs, providing special services and entertainment for them, providing pedestrian lines and traffic signs necessary to preserve their safety when walking on the streets. Also, through the participation of community members in the decision-making process, their sense of belonging increases. This is done through conducting a questionnaire and meetings to present the goals to be achieved and giving community members an opportunity to participate in the decision-making process and express suggestions and ideas.	
		Sense of justice	Individual's sense of justice increases when they feel equal. Such as all people having access to housing that meets their needs in terms of interior spaces and surrounding services, fairness in the provision and distribution of various services and the ability to obtain them easily, and the ability to choose the appropriate place and the nature and type of housing on the basis of needs and non-discrimination between people. In addition to the characteristics of the dwelling in terms of appropriate architectural appearance and efficient functional performance at various levels of the dwelling.	
		Participation in the community	By encouraging social participation in spaces by creating large spaces with shaded seating and landscaping suitable for individuals to gather, and providing appropriate services around them. It accepts the participation of individuals in positive change by expressing opinions, presenting ideas, and evaluating these ideas, instead of each person implementing his idea individually, which distorts the general appearance of the buildings. Knowing that the more individuals feel a sense of belonging, the more their participation in society increases.	
Self-actualization needs	Using their abilities, developing and benefiting from them with a sense of independence and dependence on self-realization. The need for achievement and excellence. A sense of self-awareness and the possibility of self-reliance. Quality of life in the area, obtaining work, the appropriate income, ability to bear the cost of residence. Work, Treatment. Creativity, imagination, artistic and emotional expression.	Achieving comfort and calm	This is done by increasing green spaces around buildings, increasing parks and gathering areas, reducing car traffic on internal streets, providing basic services at close distances from residential units, and moving craft workshops and heavy equipment stores outside residential neighborhoods.	
		A sense of accomplishment	The individual obtains housing that meets all the basic living requirements and luxury for him and his family, including internal spaces, the interconnection of internal spaces, and external services surrounding the residence.	
		self-realization, and self-reliance	This is done by listening to people's opinions and applying them in a way that does not harm the residential neighborhood. Implementing the new ideas proposed for the development of the neighborhood. Holding monthly meetings to present the additions that residents want to implement in order to discuss them, implement them, or find alternative solutions to them, in order to avoid people acting individually that distort the general view.	
		Quality of life in the area	Providing a quality of life in the region that meets people's basic and recreational needs. This is done by providing all the services that people need on a permanent basis, in addition to providing facilities, open seating areas, public parks, places for celebrations and gatherings, and children's play areas and others.	
Self-actualization needs	Using their abilities, developing and benefiting from them with a sense of independence and dependence on self-realization. The need for achievement and excellence. A sense of self-awareness and the possibility of self-reliance. Quality of life in the area, obtaining work, the appropriate income, ability to bear the cost of residence. Work, Treatment. Creativity, imagination, artistic and emotional expression.	Using individual abilities and developing it	Taking advantage of people's individual abilities. For example, instead of people drawing randomly on walls and buildings, which distort the general view, specific areas are identified, specific drawings are chosen, and they are drawn under the supervision of a supervisory committee in the neighborhood.	

Table 2: Theories of human needs as study points and how to achieve it in build environment to achieve sustainability. Source: Author, 2023.

After analyzing the seven theories of human needs, extracting the most important points, and determining how they can be achieved in the built environment to ensure the success of sustainability projects. This is to contribute to setting specific points when transforming current cities into sustainable cities or when establishing sustainable projects within the region. These points can be relied upon directly to ensure the success of sustainable projects., now will move on to clarify five factors called 5A elements (attractiveness, accessibility, awareness, affordability, availability) that in turn contribute to the success in changing people’s behavior towards sustainable behavior.

### 7 FIVE FACTORS TO CHANGE PEOPLE'S BEHAVIOR

From the previously mentioned examples of a group of sustainable projects that proved to fail when implemented on the ground due to people’s behavior, it is important to change people’s behavior towards sustainable behavior to succeed in transforming urban cities into sustainable cities. The most important thing is to provide sustainable options and reduce the availability of unsustainable options to encourage people to choose sustainable options over others. Researchers found that people's behavior can be changed towards sustainable behavior through five factors called 5A’s which are Availability, Accessibility, Attractiveness, Affordability, and Awareness (Stieninger, 2013).

5A'S	Definition	Examples
Availability	Sustainable options must be available, and on the other hand the availability of the unsustainable options must be less, limited, and hard to reach.	Walkable distance to be not more than 500m to the train or bus from any point, with limited parking in all areas in the city to encourage people to use the public transportation.
Accessibility	Sustainable options must be legally and physically accessible, on the other hand the unsuitable options must be less and limited.	Access to public transportation in the city should be facilitated. Improving the use of means of transportation and reducing urban sprawl through growth limits regulated by law.
Attractiveness	Sustainable options must attract the people in the city in terms of quality, safety, beauty, and comfort. On the other hand the unsustainable options must be less attractive and hard to reach.	Train and bus frequencies to be every 5-10 minutes as a maximum. The public stations to be good in naturel lighting and the pedestrian areas to be clean, safe, and comfortable.
Affordability	Sustainable options must be less expensive and affordable comparing to the unsustainable options.	Free crossing paths for buses, trains and public transport. Increased tolls on streets and highways for private cars. Cooperate in the prices of public transport tickets as a monthly subscription value that is less than the weekly or daily subscription.
Awareness	People should be aware of the benefits of sustainable choices from availability, accessibility, attractiveness, affordability, and the benefits of choosing them instead of choosing unsustainable options.	Create awareness of benefits of sustainable options by laws and regulations, information and education (such as car free day), and by obvious design (such as visible subway stations).

Table 3: Five factors to change people's behavior examples. Source: (Auother, 2023)

COUNTRIES	NEW SUSTAINABLE PROJETSCS		Reasons for failure	Fail in achieving 5A's approaches				
	SUCCEEDED	FAILED		Availability	Accessibility	Attractiveness	Affordability	Awareness
Chicago	-Has the second largest public transportation system in the United States (Chicago Transit Authority, 2017).  -Chicago has been rated the most bike-friendly city in the country.	More than 70% of the population drives their own cars, and only a small percentage use public transportation.	-Driving is still attractive to the population			✓		✓
			-Residents see no advantage in taking the train or public transportation			✓		✓
			-Distances from public transportation stations is far		✓			
			-There are no fines or penalties for those who use their own cars daily					✓
			-There are no incentives for those who use their own bicycles or public transportation.			✓		✓
Phoenix Arizona	The opening of the Metro Valley railway, in addition to the construction of a pedestrian path and a bicycle path surrounded by landscapes for shading.	The field study showed that residents still use their own cars, and only a few use the metro or bikes (Hurtado, 2016).	-Driving is still attractive to the population			✓		✓
			-Residents see no advantage in taking the train or public transportation			✓		✓
			-Distances from public transportation stations is far		✓			
			-There are no fines or penalties for those who use their own cars daily					✓
			-There are no incentives for those who use their own bicycles or public transportation.			✓		✓
City of Linz, Austria	The implementation of the Solar City project, which won several awards for sustainable urban development, as it is characterized by sustainable design, energy-saving buildings, solar panels for district heating and renewable energy generation, and the provision of public transportation stations (Lins, 2009) to motivate residents to leave driving and go to public transportation. This project received many awards due to the sustainable technical solutions that were presented on paper.	When evaluating the project after the works, it showed that it did not succeed in achieving sustainability as it was planned. As the post-occupation evaluation deals with the behavioural and social aspects of the building occupants and how they use sustainable technologies in it, but the pre-occupation evaluation deals with the technical aspects of the building only (Wener, 1989). Follow-up showed that only 13% used public transportation, while only 1% used their own bikes or walked (Lins, 2009), and more than 80% still use their own cars. Also, because a large percentage do not understand how to properly use ventilation and heating systems inside homes with energy-saving technologies, this led to inefficient use and waste of energy that could have been preserved.	The focus was on new technologies without focusing on the needs of users and their requirements to change behaviour.			✓		✓
			The success of sustainability projects does not only depend on modern technologies and innovative technical design, but also depends mainly on the needs, preferences and behaviour of users.					✓
			Driving is still attractive to the population			✓		✓
			Residents see no advantage in taking the train or public transportation.					✓
			Distances from public transportation stations are far.		✓			
			There are no fines or penalties for those who use their own cars daily.					✓
There are no incentives for those who use their own bicycles or public transportation.				✓		✓		

Table 4: The relationship between the failure of sustainable projects and failure to achieve the 5A’s. Source: Author, 2023.

After presenting the five factors that affect people’s behaviour, the previously mentioned examples of sustainable projects that have proven to fail when implemented on the ground will now be analysed, with an analysis of the causes of failure and a comparison to the extent to which the five factors have been applied to change the behaviour of the aforementioned people or not. As shown in (Table 4).

## 8 SYNERGY BETWEEN SUSTAINABLE HUMAN BEHAVIOUR AND THE USE OF NEW TECHNOLOGIES

Synergy can be created between the use of new technology and sustainable human behavior to achieve overall sustainability in cities.

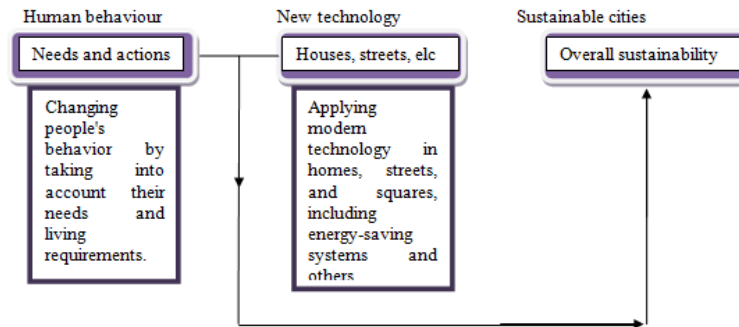


Figure 5: Synergy between human behaviour and the use of new technologies. Source:(Author, 2023)

As shown in figure 5, intensive awareness courses can be conducted to educate people on how to use modern technologies implemented in homes, for example, and tests can be conducted for the residents of the home to ensure their ability to use modern technology implemented at home. Awareness and education can also be increased through television advertisements to ensure that this important awareness information will be seen by every home in the city, thus increasing the level of awareness among people so that their behavior changes to sustainable behavior and thus they are able to make the correct use of the technology implemented.

## 9 CONCLUSION

It was concluded that applying the new technology alone is not sufficient for the success of sustainability projects. Examples have proven that implementing sustainable projects alone without looking at the needs of the population and their behavior results in the failure of these projects. For example, implementing a public transportation system does not mean that people will use it and dispense with their cars. In particular, the application of energy-saving home systems does not mean that people will use them in the correct way that saves energy. On the contrary, their incorrect use can cause greater energy consumption than expected. Therefore, the solution to the success of sustainable projects is to change people’s behavior towards sustainable behavior. It is necessary to know people’s needs and requirements by analyzing the seven theories of people’s needs and knowing how to apply this when transforming urban projects into sustainable projects to ensure their success. The five elements also contribute significantly to changing people’s behavior towards sustainable behavior and encourage people to choose the sustainable option even if they have an unsustainable option in front of them, and this is what has been proven from the examples that were presented. Therefore, changing people’s behavior towards sustainable behavior is the solution to ensuring sustainability projects, and not just applying modern technology without looking at the needs of the population.

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