Introduction: Sustainable Development

With the desire to live in an urban area rapidly increasing, it is expected that 68% of the world's population will be living in a city by 2050. (UN, 2018) With this increase, the need for sustainable development is more important than ever for urban planners and urban designers to use as a foundation for improving urban areas. "Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities." (World Commission on Environment and Development, 1987) Urban areas create plans to address how they will improve their economy, the well-being of their inhabitants, and combat climate change while striving to be a sustainable city in all aspects of development. Sustainable development is broken down into three dimensions or "pillars"; *Economic, Social*, and *Environmental*. The following report will include a discussion of the "three pillars" of sustainable development and their connection to urban planning as well as their key aspects. The key aspects are then put into a framework and the dimensions are used to evaluate based on their indications, elements, presence and scale. The city plan for Stockholm, Sweden will then be evaluated using the criteria from the framework that has been created in order to determine whether it is a sustainable city.

Three Pillars of Sustainable Development:

Economic Sustainability

In *The Essentials of Economic Sustainability*, John Ikerd states the question, "How can we meet the economic needs of the present without diminishing economic opportunities for the future?" Often times economic decisions are made by a group of people who are only considering only the present world that they live in, and do not care much about the future, especially if they will no longer be around when that future comes. An economy that does not consider the future is not sustainable, and therefore poses a threat to the members of that economy, in this case, inhabitants of a city. Economic sustainability serves as the main pillar and encompasses aspects of social and environmental sustainability as well, because the city is run by the economy. Economic sustainability is about making certain trade-offs in hopes that it will benefit future generations.

A city that is economically sustainable requires everyone to have access to adequate food, shelter, clothing, and other basic needs for further development and overall well-being. (Ikerd, 2012) A sustainable economy would be able to offer everyone their basic needs, without having to worry about the future. "A sustainable economy must provide permanent sustenance for the individuals, social, and ethical well-being of all, including those in the future. It must enhance the physical and mental health of individuals. It must promote the economic and social health of families, communities, and

societies. It must sustain the productivity and ecological health of nature. And it must provide each generation with the means of fulfilling its ethical responsibilities for the future of humanity." (Ikerd, 2012) In regard to planning, it is important to consider the economic potential of a development and ask if it will benefit the inhabitants in the future as well as in the present. A city that offers affordable and accessible housing, employment and economic opportunity for growth, offers local centres and support for smaller local business, and works at closing the income and opportunity gaps is economically sustainable. One way to increase economic sustainability in a city are implementing incentives. By offering incentives for those that don't use as much water or drive their cars around the city, you are given people more of a reason to cut back on using up resources that are unnecessary.

Social Sustainability

According to OISD, Social Sustainability is defined as "concerning how individuals, communities and societies live with each other and set out to achieve the objectives of development models which they have chosen for themselves, also taking into account the physical boundaries of their places and planet earth as a whole." (Design for Social Sustainability, 2015) Social sustainability is the most important pillar to the inhabitants of the city specifically. It focuses on their individual needs and overall well-being. A socially sustainable city is one that allows their inhabitants to develop and make decisions for themselves, and not have a great impact on the future generations. Social sustainability also focuses on bringing the generations together and forming communities. "To ensure that the benefits of urbanization are fully shared and inclusive, policies to manage urban growth need to ensure access to infrastructure and social services for all, focusing on the needs of the urban poor and other vulnerable groups for housing, education, health care, decent work and a safe environment." (UN, 2018) Having an environment where the inhabitants feel included, valued, and considered is very important in creative a viable community." By implementing inclusivity, safe and liveable spaces, accessible areas and transportation for people of all ages and abilities and providing adequate transportation options to get people across the city, a city can achieve social sustainability.

Environmental Sustainability

While Economic and Social Sustainability focus on the inhabitants of the city, Environmental Sustainability focuses on the ecosystem as a whole, including climate, water, waste management, and utilising natural resources. According to the European Commission's *Indicators for Sustainable Cities*, "achieving environmental sustainability urban consumption must match or be below what the natural environment — such as forests, soil and water bodies— can provide, and the resulting pollutants must not overwhelm the environment's ability to provide resources to humans and other members of the ecosystem." In the sense of planning, environmental sustainability is the pillar that requires the most adaptation of infrastructure. While it is important to focus on the natural resources and natural environment, one of the most important focuses of environmental sustainability is climate change, which affects the most vulnerable of a

population. "New residents and the urban poor living in peri-urban areas and informal settlements are particularly vulnerable to natural hazards due to their tendency of residing in high-risk areas and faulty shelters, having limited access to basic and emergency services, and a general lack of economic resilience." (World Bank, 2011) Climate change can lead to natural disasters that are unpreventable and cause a city to endure an extreme obstacle. With an increase of urban populations and natural disasters, protecting the environment is extremely important when it comes to sustainable development. "Urbanization acts as a major factor of socio-economic development, it also has all-too visible negative effects on ecosystems, biodiversity and resource use, with pollution a threat to public health." (UN Habitat, 2016) When it comes to planning for environmental sustainability, all dimensions of the population must be recognized and contribute information pertaining to resources when it comes time for decision making. The important criteria that make a city environmentally sustainable are proper waste management, water, combating climate change, and establishing green infrastructure.

Framework:

	Economic Sustainability				
	Indicator	Elements	Presence	Scale	
1.1	Accessible + Affordable Housing	Social/affordable housing for low-income			
		citizens/families; availability of various property			
		types, opportunity for development			
1.2	Employment + Economic growth	Job opportunities available; affordable and			
		accessible available office space			
1.3	Local Centres	Support for small, local businesses; allows			
		community members to support the community			
1.4	Closing the gaps	Decreasing the income gap; decreasing the			
		opportunity gap			
		Social Sustainability			
	Indicator	Elements	Presence	Scale	
2.1	Social Equality	Equal access to education, social, health, and			
		leisure			
2.2	Liveable Spaces	Decreasing crime rates; providing a safe			
		community for all; offering community events for			
		the public; create a community dynamic			

2.3	Accessibility	Universal design making the city generally		
		accessible to everyone; adaptable public spaces		
		and public buildings		
2.4	Transportation + Movement	Accessible and efficient transportation system		
		throughout the city (buses/trains); providing		
		pedestrian and cycle paths (alternatives to limit		
		vehicle use)		
	En	vironmental Sustainability		
	Indicator	Elements	Presence	Scale
3.1	Climate Change	Implementation of climate change policies and		
		planning strategies; Consumption of natural		
		resources; reducing vehicular emissions		
3.2	Water	Reducing the consumption of water; reducing		
		water pollution; and clean water accessibility		
3.3	Waste Management	Solid waste regeneration; recycling and reusing		
3.4	Establishment Green Infrastructure	Give access to nature; improve connection with		
		nature		

Key:

Symbol	Meaning
	Present - Response
	Present – No Action
	Not Present
1	Improving
	No Change
•	Deteriorating

Stockholm's Urban Plan: Critical Evaluation + Assessment of Framework

Stockholm is the capitol of Sweden, and also the largest city in the country. The city is made up of 14 islands connected to one another by over 50 bridges. As of 2017, the county's population was estimated at 2.269 million, and by 2050, the Stockholm-Mälaren region of Sweden is supposed to reach a population of 3.4 million inhabitants. Stockholm serves as a main corporate hub for all of Scandinavia. Stockholm launched a city plan titled "The Walkable City" in 2010, in hopes

to makes Stockholm a pedestrian-friendly city. "In Vision 2040 - A Stockholm for everyone, Stockholm is described as a climate-smart city that prioritises cycling, walking and public transportation. An efficient, climate-smart transportation system is combined with greater consumption of renewable energy. Children are guaranteed a non-toxic environment and more organic food is served at city facilities." (City of Stockholm, 2014) With many individual plans developed over the years to address housing, green space, budgets, mobility, and other developments, the "Stockholm City Plan" (2018) hopes to address the increasing population, lay out urban development opportunities for the next 25 years, and serve as a guideline for making Stockholm economically, environmentally and socially sustainable. The main city planning goals are to make Stockholm a growing city, a cohesive city, a climate-smart and resilient city, and offer good public spaces.

Evaluating Economic Sustainability

1.1 Accessible and Affordable Housing:

	Indicator	Elements	Presence	Scale
1.1	Accessible + Affordable Housing	Social/affordable housing for low-income		•
		citizens/families; availability of various property		T
		types, opportunity for development		

Shelter is a basic human need, and Stockholm currently faces a housing shortage. The goal is to develop 140,000 new homes by 2030, 40,000 by 2020, and 80,000 homes by 2025. (p.17) The city plan addresses how it is going to meet the goal in developing housing but does not address how it is going to work to make housing more affordable for young people and socioeconomically weak groups. "The shortage of housing disproportionately affects socioeconomically weak groups and young people. For these groups, a growing housing shortage often leads to insecure and unstable living conditions or overcrowding... One serious problem is the major discrepancies between different areas and households in terms of overcrowding and housing quality." (p.45) The implementation for the housing provision states that it will be adding new housing throughout all suitable locations in the whole of Stockholm, focusing on varying sizes, types, and forms, both ownership and rental. (p.45) The options for housing available must be inclusive and work to help young people, elderly people, disabled people, and others who may come from vulnerable groups.

1.2 Employment and Economic Growth:

	Indicator	Elements	Presence	Scale
1.2	Employment + Economic growth	Job opportunities available; affordable and		
		accessible available office space		

In Stockholm, there are more jobs than people to do them. There is an uneven distribution across the city due to the roads and public transportation lacking in some areas. "Vision 2040 sets out a clear ambition for the city and the region to be more cohesive, and for every part of the city to offer good conditions for housing, jobs and services." (p.59) The city aims to promote a balanced distribution of jobs and population growth in the southern parts of the city, expanding the metro and investing in infrastructure over SEK 100 billion, which will enable newer office buildings to be developed in the less central areas. The city's main goal in planning is to create mixed-use development in most industrial areas. "The city's planning should be based on the existing business structure as it works to transform pure industrial areas into mixed- use parts of the city. Bearing in mind the city's need for provision of goods, business-specific considerations should always be taken into account when developing spaces near or in Stockholm's industrial areas." (p.60) The only goals listed for implementation that takes into consideration employment and economic growth is that the business community's need for premises, workers, communications and other infrastructure is to be incorporated into all planning and Advantage is to be taken of any opportunities for more even distribution of jobs in the city by prioritising the establishment of offices where the appropriate market conditions exist in the southern suburbs. (p.61)

1.3 Local Centres:

		Indicator	Elements	Presence	Scale
1.	3	Local Centres	Support for small, local businesses; allows		
			community members to support their community		

With tourism increasing (over 40% in the past ten years), Stockholm has become one of Europe's most visited destination. The plan seems to focus less on supporting the smaller business and more on how to support the tourists, as they spend about a third of their budget on shopping in Stockholm. There is a need for high-quality hotels, shops and restaurants, placing a demand on inner-city space, as well as other areas surrounding the inner-city Stockholm. The infrastructure development is clearly more focused on the growing tourism industry rather than the smaller, local businesses themselves, which could really benefit from tourism is approached correctly. According to the Stockholm City Plan, tourism and shopping promote growth and integration, but it is important to make sure that infrastructure supports the needs of the inhabitants of the city and is not just to support tourism growth.

1.4 Closing the gaps:

	Indicator	Elements	Presence	Scale
1.4	Closing the gaps	Decreasing the income gap; decreasing the		
		opportunity gap		

The city plan does not address the income and opportunity gaps within the economy. With lack of statistical information about the average incomes of Stockholm's inhabitants, it is difficult to gauge the overall economy of the city aside from

its increase in tourism which has helped businesses in the area. In regard to education and opportunity, "The Stockholm region's universities and colleges are to be given the physical conditions to develop. Access to upper secondary places that meet residents' needs is to be secured, along with sufficient access to compulsory schools and preschools in every local area." (p.61) Access to education is an essential step in creating opportunity, and a sufficient plan to develop and give access to education is a good implementation for developing opportunities in local area. The implementation of a circular economy will help aide in the decrease of the opportunity gap. "The circular economy as a basic concept should also be incorporated into city planning. What it means is a smarter economy where materials, products and services are part of an eco-cycle system. A circular economy creates opportunities for growth and for new types of services and businesses. It may also involve establishing the means for people and organisations to rent, lend, share, sell on and repair." (p.61) A circular economy focuses on an inclusive environment rather than bringing in products and services from the outside, which would be extremely beneficial to the community.

Evaluating Social Sustainability

2.1 Social Equality:

	Indicator	Elements	Presence	Scale
2.1	Social Equality	Equal access to education, social, health, and		1
		leisure		

The city plan addresses the need to focus on children, young people, and elderly people at the very beginning of the planning process. The directions that the City of Stockholm plans to take are: All urban development should add social value. A social sustainability perspective should be integrated into the different stages of the city planning and development process in order to clarify how the planning adds new social value; City planning should promote equal access to basic urban assets such as public transport, public services, shopping, jobs, culture and recreation; The involvement of the city's administrations and companies, businesses, civil society and the research community in locally coordinated site development is to be strengthened, with a view to developing the social assets of the urban environment. People should be given greater opportunities for participation and co-creation in urban development; and City planning must have the best interests of children as one of its starting points, and child rights impact assessments are to be employed. (p.53) Meeting places should be welcoming to people of all ages in order to facilitate interactions between multiple generations, and schools should be located so that they can merge people from different backgrounds, areas, and neighbourhoods (p.53) in order to decrease segregation and create diverse relationships.

2.2 Liveable Spaces:

	Indicator	Elements	Presence	Scale
2.2	Liveable Spaces	Decreasing crime rates; providing a safe		•
		community for all; offering community events for		T
		the public; create a community dynamic		

An inclusive city if one of the main goals of the plan, meaning everyone should feel that the urban environment is safe. (p. 52) While the majority of Stockholm's inhabitants feel safe, there is still more that can be done to promote safety and security and it begins with design. "Well-designed and lit squares, streets, corridors, parks and playgrounds are important factors in improving feelings of safety and security. Amenities on ground floors and well-arranged urban spaces also have a positive effect." (p. 52) Safety and security is important when it comes to liveable spaces, but the opportunity to offer community spaces and create a dynamic helps to build the community. "The City of Stockholm's outdoor environments and public buildings must be safe and inclusive, whatever a person's age and physical capabilities. They should facilitate independent living with good quality of life, where everyone can get out and fully participate in city life without being dependent on other people. The city's provision of recreation, sports, meeting places, culture and entertainment should be distributed evenly across the city, so that distances shrink and participation increases." (p.52)

2.3 Accessibility:

	Indicator	Elements	Presence	Scale
2.3	Accessibility	Universal design making the city generally		_
		accessible to everyone; adaptable public spaces		
		and public buildings		

The City of Stockholm implies that it should make all urban development inclusive, and that "Knowledge of different groups' need for security, physical activity, meeting places and quality outdoor environments should provide an important starting point for urban development and lay the foundation for physical interventions in the urban environment. The needs of children, young people and older people should be given particular consideration, along with perspectives on gender equality and disability." (p.53) This goal is clearly outlined in the plan, but there isn't much implementation or ideas of how they are going to make the city accessible and adaptable for everyone. City of Stockholm's Disability Ombudsman states, "Everyone has a right to self-determination and full participation in every part of society. The UN Convention on the Rights of Persons with Disabilities sets out what is required in order for disabled people to enjoy their rights on the same terms as everyone else, for example in school, working life, recreation and democratic decision-making processes." (p.53) It is clear that the city plans to address access for all, but there is no immediate or specific indication of it improving.

2.4 Transportation + Movement:

	Indicator	Elements	Presence	Scale
2.4	Transportation + Movement	Accessible and efficient transportation system		
		throughout the city (buses/trains); providing		1
		pedestrian and cycle paths (alternatives to limit		
		vehicle use)		

Stockholm's transport goals are to improve travel and transport without imposing negative impacts on road safety, health, the climate, or the environment and give priority to public transport, walking, and cycling. Their public transport requires that vehicles rely on fossil free fuels and have a high occupancy so that they are more cost-effective. A few of the planning directions for transport or as follows; "Public transport needs to be planned alongside city planning and given high priority where there are substantial flows of travellers. Stops and interchanges should be placed in locations that have good conditions for city life; Pedestrian and cycle paths must be of high quality, i.e. safe, secure, free-flowing and easy to find; Functioning logistics are to be ensured in strategic locations via sufficient space, approach roads, waterways, lorry parks and centres for trans- and co-loading; and Future port operations and ferry quays for public transport are to be incorporated into planning by reserving areas of land and adjacent water areas for the needs of the port operation. (p.82) Stockholm is clearly making the improvement of transportation one of their main goals in this city plan in hopes that it will allow its inhabitants to become more reliant on getting around by foot, by water, by bus, train, or cycling, and less reliant on their cars.

Evaluating Environmental Sustainability

3.1 Climate Change:

	Indicator	Elements	Presence	Scale
3.1	Climate Change	Implementation of climate change policies and		
		planning strategies; Consumption of natural		
		resources; reducing vehicular emissions		

As climate change becomes one of the biggest issues facing the world, the environment is becoming one of the most important consideration to be taken into account when it comes to city planning. The City of Stockholm addresses climate change as a major threat to their environments as well as the rest of the world, and they tie it into various aspects of the plan such as reducing CO2 emissions given off by vehicles, and the threat that climate change may have on resources such as water, but there is no direct or clear implementation of policies or a plan of how the city is going to combat climate change and protect its ecosystem from any possible damage within the next 25 years.

3.2 Water:

	Indicator	Elements	Presence	Scale
3.2	Water	Reducing the consumption of water; reducing		
		water pollution; and clean water accessibility		

Every day almost 1.3 million residents and businesses in the county get their drinking water via Lake Malaren's drinking water network. (p.106) Stockholm is working to secure quality and quantity of water for the long term, as it is one of the more valuable and important necessities to human life. "Reliable and eco-aware systems for drinking water provision and wastewater management are to be expanded as the city grows." (p.108) An expansion and upgrade to Stockholm's future wastewater treatment is necessary in order to keep up with the growing population. The city plan states that it is reviewing the demand for water usage up to the year 2040, taking into consideration the threat of climate change, sea levels rising in the Baltic Sea, storm pollution, leaks in wastewater networks, and other pollutant activities that could occur.

3.3 Waste Management:

	Indicator	Elements	Presence	Scale
3.3	Waste Management	Solid waste regeneration; recycling and reusing		1

Stockholm has based their waste management plan off of that of the EU's, "which entails prevention of waste, preparing for reuse, recycling, energy recovery and as a last resort disposal in landfill." (p.107) Stockholm's plan for waste management begins with new developments and focuses on integrating a program for limiting landfill wastes as well as instilling into the community the importance of recycling and reducing their wastes. They have also implemented a food waste specific recycling plan in Högdalen, sorting food waste at a much larger scale. (p.107) Planning directions for the future state that public recycling facilities are to be integrated into the urban environment and designed to be easy to use. (p.108)

3.4 Establishment of Green Infrastructure:

	Indicator	Elements	Presence	Scale
3.4	Establishment Green Infrastructure	Give access to nature; improve connection with		•
		nature		•

Greener Stockholm is the city's plan to implement, manage, and improve green spaces. The planning direction states that "the park guidelines in Greener Stockholm inform decisions on how to meet Stockholmers' need for recreation in a

growing city. The features of the landscape, Stockholm's park tradition and the city's green cultural assets must all be taken into account. Stockholm corridors and other forms of new green environments, assets and functions are being developed in order to ensure good park access and standards, as well as a cohesive function. Robust green infrastructure and blue structure rich in biodiversity is to be maintained and strengthened. Specific attention should be paid to functions that are of regional importance for biodiversity." (p.89)

Conclusion

Stockholm's City Plan touches on various sectors of economic, social, and environmental sustainability and focuses in on how to make their community inclusive, safe, and sustainable. Certain sections lack an actual plan to implement or develop, specifically in the economic sustainability sector focusing on closing income and opportunity gaps as well as developing local centres and supporting small business. The main focus seems to be growing the working population to fill jobs that are needed in the city and continue to develop infrastructure to support the growth of tourism. The City of Stockholm truly cares about its inhabitants and how they feel when it comes to being part of a community. There are many plans in place to develop public spaces, housing, and other community offerings for people of all ages and generations. Stockholm prides itself on inclusivity and is working towards bridging any gaps between generations, cultures, areas, and neighbourhoods. It is important for the city to provide the inhabitants with access to public transportation and safe public spaces for them to grow as a community. The city has a plan "Greener Stockholm" to further develop public parks and green spaces in order to increase access to nature and better the way of life for people. The waste management plan is improving, incorporating a food waste plant into the program as well as installing reduce, reuse, and recycle methods into all new housing developments in order to limit landfill wastes. Climate change is very important to the people of Stockholm, and it is addressed multiple times in the city plan but there are no exact plans or policies being implemented outlining steps and strategies that inhabitants can take to help the city combat climate change. Overall, Stockholm is working towards a sustainable future, and has great plans ready for environmentally and social sustainability but could use some more implementation when it comes to economic sustainability. When a city takes into consideration the elements of economic sustainability, social sustainability, and environmental sustainability, and produces a plan to guide their planning and development teams as well as their citizens, that city will become sustainable.

Completed Framework:

Economic Sustainability					
	Indicator	Elements	Presence	Scale	
1.1	Accessible + Affordable Housing	Social/affordable housing for low-income			
		citizens/families; availability of various property		1	
		types, opportunity for development			
1.2	Employment + Economic growth	Job opportunities available; affordable and			
		accessible available office space			
1.3	Local Centres	Support for small, local businesses; allows			
		community members to support the community			
1.4	Closing the gaps	Decreasing the income gap; decreasing the			
		opportunity gap			
	Social Sustainability				
	Indicator	Elements	Presence	Scale	
2.1	Social Equality	Equal access to education, social, health, and		•	
		leisure		•	
2.2	Liveable Spaces	Decreasing crime rates; providing a safe			
		community for all; offering community events for		T	
		the public; create a community dynamic			
2.3	Accessibility	Universal design making the city generally			
		accessible to everyone; adaptable public spaces			
		and public buildings			
2.4	Transportation + Movement	Accessible and efficient transportation system			
		throughout the city (buses/trains); providing		•	
		pedestrian and cycle paths (alternatives to limit		•	
		vehicle use)			
Environmental Sustainability					
	Indicator	Elements	Presence	Scale	
3.1	Climate Change	Implementation of climate change policies and			
		planning strategies; Consumption of natural			
		resources; reducing vehicular emissions			

3.2	Water	Reducing the consumption of water; reducing	
		water pollution; and clean water accessibility	
3.3	Waste Management	Solid waste regeneration; recycling and reusing	1
3.4	Establishment Green Infrastructure	Give access to nature; improve connection with nature	1

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