Making Spokane a Sustainable City through Waste Education

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Final Report

ABSTRACT: Sustainability is important to attain to reduce the impacts of resource scarcity, Climate Change, and increase human development. Cities are where sustainable measures can have the greatest effect, especially in waste diversion and material conservation. The United States can look to the Netherlands in their management of waste as their Municipal Waste per capita is smaller (4.9 versus 3.07 lbs) and percentage of recycled waste is greater (32.1% versus 80%). Strategies to increase the efficiency of recycling and reduce overall waste is found in outreach to the public through increased labeling of waste bins and support sustainable entrepreneurial practices.

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Chapter 1: Sustainability

As human development advances and resources becoming more scarce, more complex solutions are needed to efficiently use resources to meet society's demand. The solutions need to account for the use of resources sustainable manner to reduce unintended impacts and increase renewability. Sustainability encompasses the design of projects to account for their impacts on people, the planet, and profit of a project (Delta Programme, 2014). This system is connection of circles as shown in Figure 1 below, but is replaced with Environment, Society, and Economy. The environment feeds into society, which feeds into the economy. Sustainable projects attempt to reduce the draw between each pillar and create benefits for each pillar so there is a constant balance. Being mindful of the effects the systems that promote human well-being have on each part of the cycle is important in becoming sustainable as a society.

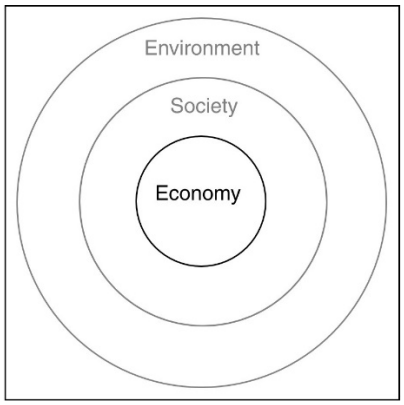


Figure 1: Sustainability (Giddings, Hopwood, and O'Brien, 2002)

Climate Change, resource scarcity, and improved human development are the some of the most challenging problems in the process of becoming a sustainable society. Climate Change has been put into effect by the emission of greenhouse gases. These gases such as CO_2 and methane capture heat in the atmosphere, heating the Earth. This greenhouse effect alters weather and creates an imbalance in the earth's overall climate. The same resources that create greenhouse gases are becoming scarcer. Fossil Fuels such as coal, oil, and natural gas that are used to power our society are in limited supply with coal depleting in 2112, oil in 2040, and gas in 2042 (Shafiee & Topal, 2009). The solution to reducing the effect on the environment and retaining our living standards is through sustainable in use of the Earth's resources. When more sustainable practices are implemented, human development is improved overall through

resiliency to Climate Change. By finding ways to decrease environmental, societal, and economic impacts a project has on the world the consequences are decreased for other people. Sustainability allows for better equity in society, and protection from the consequences of our unsustainable past, which allows for human development to increase in the future (Bloeman, 2014).

Sustainable Cities

Cities are where sustainable practices can be easily implemented and used to the greatest effect, as they are the most immediate system connected to people, profits, and the planet. A city in this analysis is defined as a metropolitan area and the surrounding resources that is draw from, such as farms. Sustainable practices can be implemented in cities through cultivating public support and using Circular Economy principles. Public support is built through solidarity. Solidarity means that citizens put the values and interests of the public above their own interests (Bloeman, 2014). With everyone working together and advocating for more sustainable measures, the implementation of these projects will come quicker and easier. The Circular Economy is a concept that resources and money recirculate back into the economy, similar to how nature reuses dead plants and animals to continue life. In reusing and recycling waste and money, this allows for cities to reduce demand for resources and stimulate a stable economy (Odegard, 2022).

For cities to become sustainable, integrating the economy and solidarity in creating sustainable practices must be done. Working on improving sustainability in cities can yield greater progress in overall sustainability in the world since each city can do its part easier. By focusing on creating solidarity among citizens in a city, a culture of sustainability and action can be fostered. Feeding into this solidarity is the Circular Economy that ensures sustainable use of resources and economic benefits for all sectors of the city's economy. By supporting solidarity and Circular Economy in a city, a change from the bottom-up, or societal change from the public, can occur to push for change in business and government practices. A bottom-up change is desirable as it changes the societal views more naturally than an incentivized change, or a top-down change, that is forced on people by governmental edicts. While a bottom-up change is desired, some top-down action from the city government is important in helping facilitate greater awareness of

Points of focus

The focus of sustainability can be divided into 7 sectors in a city: buildings and energy, transportation and land use, waste diversion and material conservation, water resources, economic prosperity, natural environment, and health and wellbeing. This analysis focuses on the waste diversion and material conservation. Waste is produced by society as people use resources and dispose of the byproducts. In a linear economy, this waste will pile up in landfills or burn into the atmosphere. This inefficient use of waste continues the use of the environment's resources and

The topic is explored in the context of a city and the societal, economic, and environmental impacts of waste diversion and material conservation. Areas of action for different types of waste require more advanced solutions to reduce, reuse, or recycle this waste. Comparing the philosophies and data on how waste is treated between the United States and Netherlands is explored. Using this comparison and examples from waste systems in both countries, an analysis and recommendation will be made on how Spokane can improve in this sector of sustainability. Specifically, waste diversion and material conservation is highlighted, compared, and analyzed.

Chapter 2 - Waste Diversion and Material Conservation Comparison

Cities consume a multitude of resources, and once used, waste is created. This waste can be human waste, food packaging, replaced goods, or anything that is sent to a landfill or incinerator on the personal level. Industrial waste is often byproducts to production. The amount of waste is determined by the demand for products, product packaging, and the variety of products (SAS, 2021). Much of the waste produced by cities is either incinerated or put in a landfill. These methods produce CO_2 and pollute land. While waste will always be a part of cities, solutions to reduce waste can be utilized to increase the sustainability in cities.

Due to how detached the city is from the production and of packaged products, a city ordinance cannot reduce packaging amounts. This makes waste diversion more dependent on how society perceives waste. Some waste can be recycled, which creates new revenue streams for the city, but this is difficult process for some materials such as glass (Odegard, 2022).

Tertiary methods that influence consumer decisions and force producers to use less packaging can help reduce waste, but it comes down to how aware consumers are about how much waste they are producing.

United States Waste Management

Waste management in the United States differs throughout the country, but Spokane's methods are focused on in this analysis. The goals of Spokane's waste diversion and material conservation education policies are to divert waste towards the best use, prioritize reuse and conservation, consider environmental equity, and minimize economic costs for low-income residents (SAP, 2021). Education affects many of these goals. Informing people of trash separation, impacts of trash, and methods reduction can be achieved are a couple of the priority actions. These actions are important as reducing personal waste and creating awareness of composting and recycling can reduce the flow of waste upstream and have higher efficiencies of recycling and reuse.

To improve waste diversion and material conservation in the U.S., observing trends in U.S. is beneficial. Trends in Municipal Solid Waste (MSW), Recycling and Composting per capita, Recycling and Composting percentages, and management of MSW is shown in Figures 1-4 respectively. In the United States there is growth in attempts to recycle, but waste has been increasing steadily since 1960. Between 1960 and 2018 the amount of waste generated before any recycling or composting went from 88.120 to 292.360 million tons per Figure 2 below. At the same time the Municipal Solid Waste (MSW) per capita generation of waste went from 2.68 to 4.9 pounds per person per day. A recent jump in waste occurred between 2017 and 2018, when overall waste went from 268.7 to 292.4 million tons and MSW per capita went from 4.53 to 4.9 pounds per person per day. While this seems alarming, the recycling and composting rate has dramatically increased from 6.4 to 32.1 % between 1960 and 2018 per Figure 3. Even with this increase in recycling 50 percent of waste is landfilled and 11.8 percent is incinerated per Figure 4 below. Other food management pathways make up the final 6 %, but most of the waste in America is either landfilled or burned (USEPA, 2020).

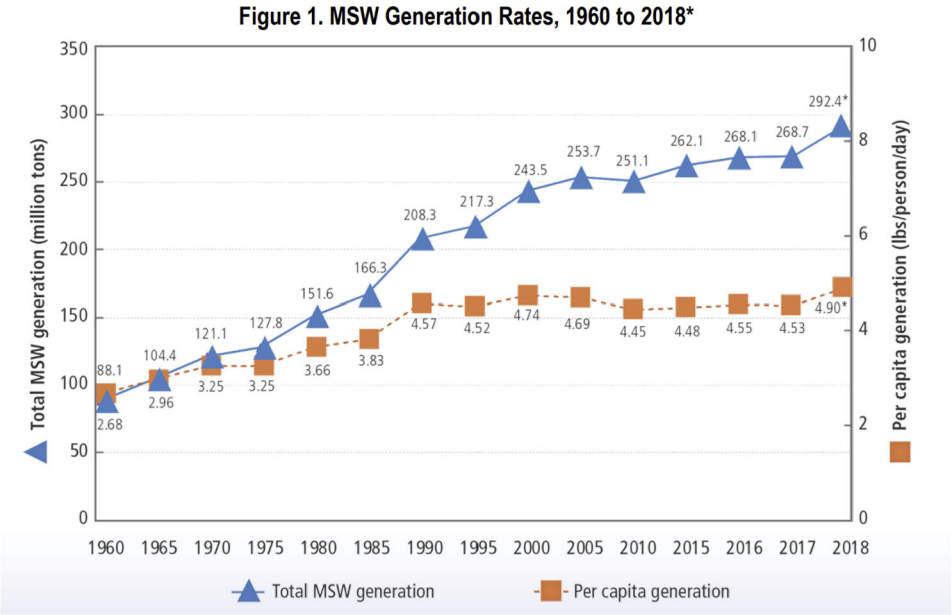


Figure 2: MSW Generation Rates, (USEPA 2020)

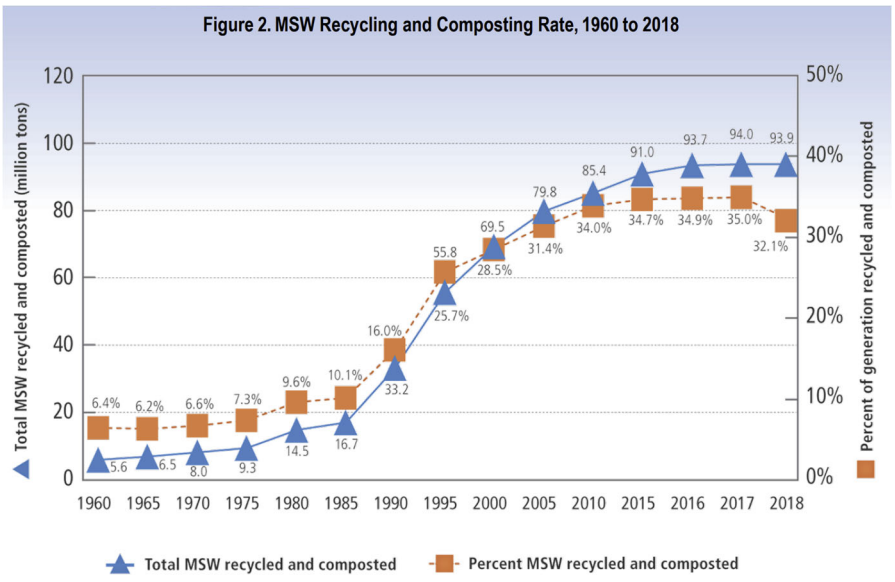


Figure 3: MSW Recycling and Compost Rates (USEPA 2020)

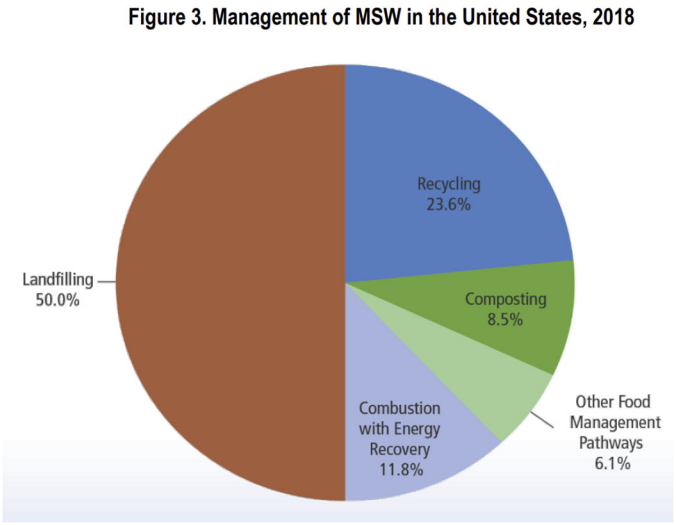


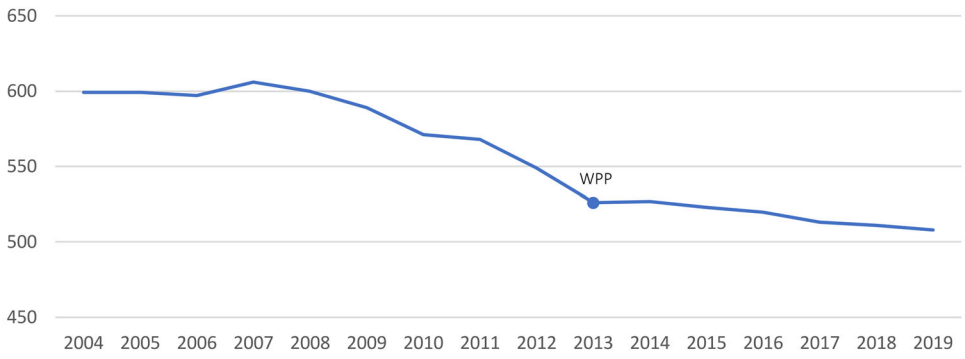
Figure 4: Management of MSW in the US (USEPA 2020)

Upon further review of the materials that make up the recycled percentage, this is 67 % paper and paperboard. Steel has the second highest percentage recycled at 33.1 % recycled (USEPA, 2020). Other materials such as metals, plastics, rubber, textiles, and wood majority of the time are landfilled in the US. Waste in the US has increased considerably per capita since 1960 and while recycling has improved, it has mainly been effective in only paper and paperboard, not in other materials (USEPA, 2020). Waste in the US is trending towards greater waste generation at the same recycling rate, which will continue to fill landfills and lose valuable resources that could be economically beneficial.

The Netherlands Waste

The Netherlands value balance in the effects their projects have on people, profits, and the planet. Being sustainable in their designs has been characteristic of the Dutch for many years, as they have had to adapt to a reduction in resources and living below sea level. Due to the imminent threat of flooding over the past 800 years in the Netherlands, their people have greater solidarity to address imminent and future dangers to society. From their integrated transportation system to the Delta Programme, the Dutch work together as a society to create systems that work the best for everyone and mitigate impacts on the environment. This solidarity affects how the whole country operates on waste management, which is in stark contrast to the US's methods (Bloeman, 2014).

By comparison to the US, The Netherlands has been decreasing waste per capita over the past 20 years and increasing their recycling. As seen in Figure 5 below, the MSW has decreased from 599 kg to 508 kg per capita. This is the equivalent of decreasing from 3.6 to 3.07 pounds per capita between 2004 and 2019, a substantial decrease. Between 2010 and 2018, the population of The Netherlands has increased by 3 % and the GDP has increased by 18 % while the total waste has slightly increased by 3 % as shown in Figure 6 below. Assisting in the reduction in waste, food waste has decreased by 25 % between 2010 and 2019 (EEA, 2021). The Netherlands also reuses many of their resources. Up to 96 % of water, and wastewater, 38 % of construction materials, 29 % of timber and paper, and 19 % of plastics are reused. This on top of an 80 % recycling rate, shows that The Netherlands is one of the world leaders in reuse and recycling (CBS, 2021). This personal responsibility in individual waste has allowed the Dutch to keep their total waste at a near constant rate over the past 10 years and their high recycling rate brings money back into the economy.



Source: Eurostat Circular Economy Monitoring Framework.

Figure 5: Municipal Waste in the Netherlands in kg per capita (EEA, 2021)

Figure 2: Development of waste intensity, Netherlands, 2010-2018 (2010 = 100)

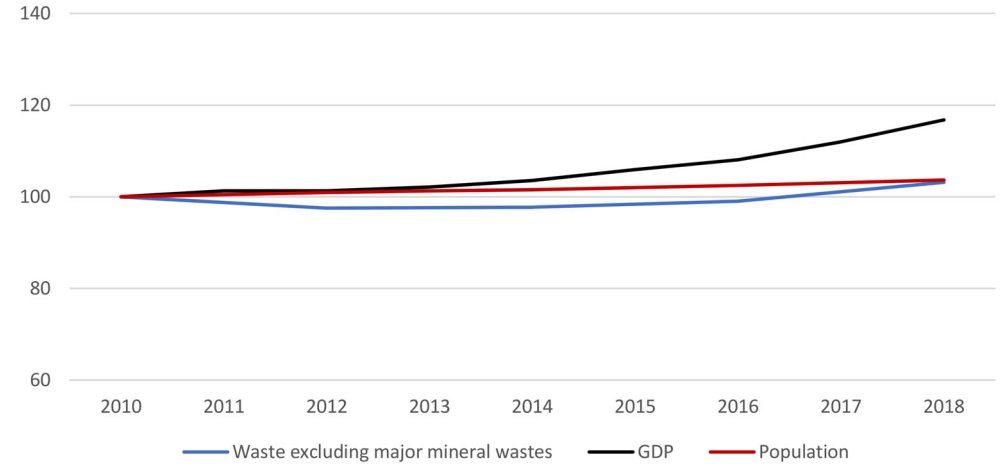


Figure 6: Development of Netherlands waste intensity 2010-2018

The Netherlands have been able to increase their GDP while keeping produced waste constant. Their efficiency in producing greater economic gains with less produced waste and more overall recycling shows that waste does not need to be proportional to economic growth. Their policies and organization of the waste system aids and subliminally guides citizens to use of less waste and recycling at a high rate. Even though it is a small part of how the Netherlands keeps MSW low and economic gains increasing, the cultivation of solidarity among people and businesses to be aware of the waste they are producing is an integral piece of how the Dutch produce less waste and bring greater economic gains to their country.

Chapter 3:

Ways that the Dutch have reduced their waste and increased recycling is through a couple different programs over the years that have used greater technology and public outreach to achieve their goals. A particular program is the Netherlands Waste Prevention Programme, which promotes the circular economy through community outreach and providing resources for innovative solutions to reduce or reuse waste (EEA, 2021). The main goal of this strategy is to have outreach to the public and businesses to support the circular economy and create waste awareness. Methods used are more efficient trash sorting, cultivating support for sustainable entrepreneurial endeavors, and generating awareness of the circular economy through education

and exposure to the idea. For pressing issues such as food waste, greater outreach and support concerning composting and efficiently using food must be done. Figures 7 and 8 below show waste bin labelling and the Blue City, an entrepreneurial resource for sustainable entrepreneurs the class visited on the trip. These resources and visual aids streamline the waste system and allow for new solutions for the waste issue to be ideated by the decisions of the public and businesses (EEA, 2021).

Figure 7: Labeling on Waste Bins in Delft, Netherlands

Figure 8: Blue City Entrepreneurial Resource in Rotterdam, Netherlands

SAP Goals

This strategy meets multiple SAP goals. Through better labeling of waste bins and educating citizens on where waste belongs would streamline trash sorting and allow for greater amounts of recycling and composting as stated in goal WD 1 which covers the maximization of composting (SAP, 2021). If sustainable entrepreneurs are supported to help solve waste problems, this cultivates support for the circular economy, which matches goal WD 3 that covers advocating and supporting the circular economy in the SAP. Sustainable entrepreneurship can solve many other goals such as reducing food waste, goal WD 2, if the incentives are there and the support is prevalent.

Implementation in Spokane

The outcomes of this strategy in Spokane can work to great effect due to the existing plans and infrastructure for these strategies to be implemented. The incorporation of green waste bins on every block is a great start for educating the public (SAP, 2021). By promoting the uses of the green bin, more food waste will be composted rather than thrown in the garbage. Beyond the household waste, public trash bins can add more options than the trash bin in Figure 9 shows. By adding the options of paper, plastics, food items, and other desired bins, the public is shown what us recyclable or compostable and places most of the sorting at the beginning of the waste stream. While this may be more intensive in gathering waste, sorting time later will be saved. In Spokane this would save money on labor and make money on more viable materials for recycled and composted goods.

Figure 9: Waste and Recycling Bin in Riverside Park

Promotion of the circular economy through outreach and support for entrepreneurial endeavors is suited for Spokane too. The city library already has a partnership with StartUp Spokane, a resource for small businesses to learn and grow from (StartUp, 2022). The community of entrepreneurs and small businesses can be encouraged and incentivized to create more sustainable business practices. The economic benefits from outreach to businesses and entrepreneurs can pay for itself as better solutions benefit Spokane's economy, which in turn can pay the city back for its efforts.

How these strategies are implemented in Spokane versus the Netherlands can be similar but have far different contexts. The Netherlands already has greater solidarity amongst their people due to their history as a nation. This history has also allowed for greater investment and cooperation by the people into their public works. How this compares to Spokane is there is a greater challenge in building solidarity around the amount of waste produced and how it is managed. Creating the buy-in from the citizens and businesses will take time. The efforts put in place in Spokane will take longer to work as well as the Netherlands does today, but any action towards a more efficient and innovative waste system can do good for the city's overall goals.

Chapter 4: Conclusions and Recommendations

To combat changes in the climate, the environment, and scarcity, our cities must become sustainable. Only through a careful mix of solidarity and innovation can this be achieved. Helping cultivate solidarity and implementing new solutions to sustainability problems is the responsibility of the city. A sector that needs changes to become more sustainable is waste and material conservation. With many wasted scarce resources and money lost to landfills and incinerators, solutions that reduce, recycle, and repurpose waste are needed.

A major obstacle in reducing waste and making our waste management more efficient is solidarity. Through education and clear expectations, solidarity can be cultivated. Following similar measures implemented in the Netherlands, strategies to inform the public and encourage businesses can work in Spokane. For better interactions with the public and their waste, better labeling and greater options in bins to place waste will create increased efficiency in recycling and create greater awareness in the public. To assist in sustainable solutions, entrepreneurial support and incentives will create sustainable solutions that can reuse waste and create economic gains for the city. Using the existing foundations that Spokane already has to offer these strategies can be implemented simply. These solutions are simple yet effective, and I recommend the City of Spokane to implement these changes in the city.

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