The Hong Kong Polytechnic University I 2022

PolyU Design

SD 5173

About sustainability floral design in Hong Kong

Capstone Reflective Thesis

Name: Tsang Wai Man, Mandy

Student number: 21006131G

Supervisor: Dr William Liang

Introduction

Sustainability is one of the most concerned global issues in the past decade, it is an ever-changing theme. Sustainable floral design is considered the future of the industry. With very limited information, education and development in this aspect, this report aims to investigate Hong Kong floral designer's awareness of sustainable elements when designing product. And provides a summary of the research findings and recommendations about sustainable measures in the flower industry, as well as how these measures effect costs and spread to the end-user. At the conclusion of the study, the viability of sustainable floral design in Hong Kong will be measured, and the constraints faced by the industry as well as local sustainability improvement needs will be identified.

Acknowledgment

Everything about flowers and plants comes from nature. People can try to make them in a lab, but they will never just follow the instructions. A medium between controllable and unpredictable. I'm glad this master's course allowed me to study and learn more about this unique form of media. I would like to thank my supervisor, Dr. William Liang, from the bottom of my heart for his help with the research topic, his knowledge, and the inspiration he gave me throughout the whole process. As a way to show my appreciation, I hope to use the results of this work in my future projects.

Thank you very much to Sido Fokkema, the CEO of "SIDEAU," for spending the time answering my question about the new materials.
I also want to thank my parents, sister, and niece for being there for me and being patient during this journey.

Sincere thanks to my friends Siri, Justina, and Karen for their help, support, time, and insights and for how their lives have inspired me. Thanks for making me feel better and making me laugh.

Lastly, I would like to thank everyone who has used, will use, or plans to use sustainable elements in their business goals to create a better world. Thanks for the inspiration, and I hope this report can give you some thoughts, especially in Hong Kong, and provide more insight into your flower journey.

Table of Contents

Table of Contents

Section 1

Background

Section 1

Since the continues rise of world's population and resources have become increasing scarcer, a greater focus on sustainable practices has emerged. Sustainability can be defined as the way humans manage an economy to preserve its productiveness (Zarsky, 1990). The world's population growth rate is estimated at 1.05% (2022 World Population by Country, n.d.). The growing interest on sustainable practices is how to make the best use of the available resources, so that resources can continue to support a growing population.

In 2021, the Import of Live Trees, Plants, Bulbs, Roots, Cut flower" totalled is USD25.4B, increased 42% compare to 2016 (USD17.8B), and the export totalled is USD30.8B, increased 62% from 2016 (USD18.9B). This continuous rising of number shows the growth of flower industry globally. Especially in China, the import number increased 35% from 2016 to 2021, and export number dramatically increased 87% compare to 2016 - 2021. (Hong Kong, Imports and Exports, Live Trees and Other Plants; Bulbs, Roots and the like; Cut Flowers and Ornamental Foliage, 2020),

Geography	Import of Live Trees, Plants, Bulbs, Roots, Cut flower (USD, million)				Export of Live Trees, Plants, Bulbs, Roots, Cut flower (USD, million)			
	2013	2016	2018	2021	2013	2016	2018	2021
Global	19025.9	17777.1	20747.4	25429.9	21688	18887.9	23277.9	30793.1
China	173.3	226.6	292.6	306.8	275.6	336.1	380.8	629.6
Hong Kong	43.5	51.6	66	38.4	4.1	2.9	4.4	2.6
Netherland	2,097.3	2,028.7	2,686.8	3,753.2	11,199.5	8,909.9	11,699.1	15,851.4

Figure 1: Import and export of Live Trees, Plants Bulbs, Roots, Cut Flower (trendeconomy; 2021)

Hong Kong, a cosmopolitan city which has the 5th highest population city in the world (worldpopulationreview.com, 2022), with an iconic complex high-rise and high density living environment, most of the products are imported from the other countries. A study about sustainable in Hong Kong indicated that 87% of respondents were willing to pay an extra 5% or more on the sustainable products, on the other hand, only 18% of respondents reckoned themselves are "fully and quite understood" on sustainable concepts. It shows that Hong Kong consumers have begun insisting on more transparency within the production cycles of their products & services, there are improvement on the education & strengthen the transparency of information about sustainability of products & services.
Since sustainable practices remain the focus of many different industries, it is important to understand how these practices are implemented and embraced. This study will systematically analyse the use of sustainable practices in the field of selection, marketing and product development in the flower industry.

1.1 Review flower industry in Hong Kong

Floral design is the art of using flowers and foliage to create an eye-catching and balanced composition or display. The arrangements combine line, shape, form, space, texture, and color elements. The main principles are balance, proportion, rhythm, contrast, harmony, and unity. It is an artwork or a creation using flowers and foliage as the creative medium. It is part of the floriculture, a sub-discipline of horticultural sciences that involves growing, handling, maintaining, and marketing ornamentals, growing rapidly, reflecting the dynamics of this business globally.

Purpose of Study

In Hong Kong, there is a high percentage increasing in the flower industry. Flower is not the only luxury gift, also play an integral role in Asian societies in business interactions, holiday, luck, and gift-giving. It is not only for special events and seasonal as well as a lifestyle and a daily consuming habit. In the commercial, more companies and brands are willing to use flowers and foliage as the medium for their event and function as a branding promotion, to fit for the trend and integrate sustainability practices into brand's operations and values of sustainable. The increasing demand on the whole parties in the supply chain , from grower, wholesaler, retailer , floral designer, and to the end-user. The whole process of growing, sourcing materials, transportation, packaging, re-packaging and the disposal of flower waste will involve each parties' sustainable development practice.

1.2 Background

1.21 Significant problems in the flower industry : Impact on the eco-system

The global flower production industry (the floricultural industry) is worth approximately €64.5 billion and is generally limited to developed societies with disposable incomes (Nation, 2020) While this does employ thousands of people in developing countries, flower cultivation also has a substantial environmental cost. Most flowers purchased at the Hong Kong flower market and local floral designer / florists are imported. The largest exporter of cut flowers are China (46%), Netherland (27%), Malaysia (3.65%) and Japan (2.81%) , which provide popular flowers such as roses, orchids, and carnations. (2020)

Significant environmental impacts are related to the intensive cultivation of flowers and the delivery of cut flowers. Below is the supply chains in the flower industry, start from the life journey of cut flowers, growing up and to their distribution channels, stages, and finally to the end-user, to analysing their impact on the environment.

Figure 2: Flower industry supply chain

1.22 Type of pollution in different stage

Grower

Growers are the ones who plant the blooms from seed to flowers. Since to shorten the time of growing, control the quality, and maximize the supply and profits, planting in a greenhouse and plenty of water and pesticides will be adopted during the production process. the top 5 floricultural company (growers) in 2020 are Danziger Group (Israel), Dummen Orange (Netherland) ,Karen Roses (Kenya), The Kariki Group (Kenya) and Kurt Weiss Greenhouse Inc. (United State), and which the 2nd: Dummen Orang €354 million revenue in 2019. (Top Floriculture Companies in 2020 – Floriculture Industry Statistics and Leading Flower Exporters, n.d.)

Picture 1: Floriculture glasshouse

Picture 2: Floriculture glasshouse

Carbon dioxide: Flowers are grown in the commercial greenhouse to meet large consumer demand. They typically burn natural gas or non-renewable carbon sources to heat up and control the temperature, releasing large amounts of carbon dioxide. Netherland is the number one country in export the floriculture product. To keep a controllable and warm temperature, provide enough sunlight during the whole year, the greenhouse needs plenty of energy to facilitate the needs.

Water: Water is essential to the floral industry. Flowers are thirsty plants; they require a great deal of water for their growth. Therefore, the flower farm uses a lot of water. Numerous studies have established that the reduction in water quality is attributable to the growing use of pesticides and fertilizers in the flower industry. This indicates that Lake Naivasha is polluted; another cause is the falling water level. This is caused by irrigation. (Wageningen University, 2012, pg.33)

Grower Chemicals: The regulation for food crops are not involved flowers. Therefore, various combinations of pesticides and fertilizers are used to maintain fast and vigorous growth during flower production. However, excessive use of pesticides, herbicides and fertilizers can cause them to enter the local soil, and subsequent infiltration of the soil into groundwater can promote eutrophication. Beside, flowers for exported must be dipped in fungicides to comply with import regulations.

Packaging: As fragile and perishable products, flowers and plants need a certain amount of packaging for safety protection. Therefore, numerous paper, plastic, carton box, and plastic bucket are used for storage and transportation. Growers harvest the flowers by machine and separate them into different standards according to the size and quality of plastic bucket are used for storage and transportation. Growers harvest the flowers by machine and separate them into different standards according to the size and quality of the stems. Therefore, different kinds of packaging will be used according to the shape and species. For example, flowers such as tulips do not require much moisture; paper wrapping covered with plastic in a flower bucket is sufficient protection for auction afterward. On the other hand, cut anthurium is delicate and easy to get a bruise. It requires a plastic wrapping per petal with a water tube, placing it well, and storing it in a strong carton box (picture 5). All packaging aims to keep the flowers alive and in good condition. Moreover, there is standard flower packing sizes in the flower industry for easy logistic management. For example, Europe's plastic-made Dutch flower buckets (picture 3 & 4) are a standard transportation container for storing flowers and plants systemically.

Picture 3: Dutch bucket

Picture 4: Dutch bucket in bulk

Picture 5: Cut anthurium package

Auction

A flower auction is a place to gather cut flowers and plants in a cold storage room and gather buyers and sellers through a comprehensive system for bidding on goods. It is an ideal method for a perishable product to achieve the highest possible price within the shortest possible time. The auction house will collect all the products and their information from the grower. Flowers and plants will be scanned systematically with pictures and prices, with information such as origin, standard, quality, Etc. shown on an " auction clock". Wholesaler and distributor can bid within a few seconds. The world's largest flower auction is Royal Floral Holland (RFH), a non-profit organization in Netherland, Aalsmeer. RFH gathers the flowers and plants from various growers and exporters, repack and arrange in a flower bucket for scan, take a picture, and prepare for further auction and transportation. Every day RHS sold 43 million flowers and 5 million plants.

Carbon dioxide: The flower auction hub is a giant refrigerator that aims to slow down the growth of flowers and plant during the auction process. The cold warehouse at the flower auction in Aalsmeer covers a surface area of 51,800 sqm. . (Do You Know All about the World's Largest Flower Auction in Aalsmeer?, 2021) By comparison, the size is more than 7 of a standard Soccer field. Therefore, supporting this immense cooling system generate a massive amount of C02.

Water: Like growers, flowers need plenty of water to grow and maintain their life. Therefore, clean and fresh water is essential for watering and moisturizing flowers and plants.

Carbon footprint: Logistics and transportation are significantly critical parts for auction house. Transport logistics impact the life of these deliciated products; once the buyer bid and consumer the products, the auction company has to deliver as efficiently as possible. All packaged flowers and plants are in boxes or buckets, products are sent by plane, lorries, and boat by a series of refrigerated facilities, the resulting high carbon footprint emission.



Picture 6: Flower Auction in Aalsmeer, Netherland

Wholesaler / Distributor

Wholesaler / Distributor is to supply retail florist with their needed flower and plants on a regular basis. From propagating, growing, caring, cutting, arranging, and selling, wide and deep knowledge in floristry are needed. They also need to provide update product information and trend to the retailer and florist. They are the connection between grower to the retailer and florist.

Grower Chemicals: In this phase, the cut flowers have been removed from the soil and out of their roots. In order to sustain and extend the life, additions of pesticides and fertilizers are required to provide for necessary components.

Carbon footprint: To export or import flowers and plants to different countries, the distributor must not only arrange logistic issues but also ensure the product's delivery method is the best option. Due to the short lead time, most flowers are sent by flight, resulting in high carbon footprint emissions due to a series of cooling systems and facilities.

Retailer

Retailers received the flowers and plants from different wholesaler and distributors. After the lengthy and comprehensive transportation by flight , lorries or boat, retailers must immediately unbox, handle, manage and water the flowers and plants. A signature flower retails in Hong Kong located in Mong Kwok flower market, it offers a range of different types of cut flowers, potted plants, seeds, and bulbs seasonally. All flowers and plants have imported globally, 99% from China, Netherlands, Kenya, United States, Japan, Taiwan, Etc . (Hong Kong, Imports and Exports, Live Trees and Other Plants; Bulbs, Roots and the like; Cut Flowers and Ornamental Foliage, 2020)

Carbon dioxide: All retails needs a cold rooms or flower refrigerator to store the cut flower. Especially Hong Kong lies at the northern fringe of tropical zone, with long summer from June to September, is hot, humid and rainy, cut flower cannot survive long. To keep the cut flowers in a good condition, certain amount of C02 emission.

Water: A large number of water is not only used for watering the flowers and plants, as well as cleaning flower, tools and container.

Grower Chemicals: After the long distance of transportation, cut flowers and plants lack hydration and nutrition. A certain amount of grower chemicals, such as pesticides , flower food, fertilizers will be used to upgrade them into the best condition and attract consumers immediately. “Chysal flower food “is widely used in the flower industry. This affordable and effective nutrient made by various chemicals, which helps flowers increase vase life by up to 60% compared to water alone. It stimulates the optimal development of buds and blooms, and extends the flower’s life and appreciation period. Unfortunately, water with those chemicals will also pour back into our regular drainage system, directly returning to the sea.

Picture 7: Flower Food

Packaging: All cut flowers and plants are being packed in a carton boxes with safe packaging, Once retailer received the products, they will remove the current package(picture 8) , sperate this bulk order into small quantity to fit for their customer’s needs. Plastic bag, elastic band, price tag will be used in this repackaging process. Furthermore, certain number of wrapping paper are used for consumer during shopping (picture 8).

Picture 8: Existing packaging waiting for remove for sale after

Picture 9: Casier with wrapping corner in Hong Kong flower shop

Picture 10: EPE net bag for roses packaging

Flower waste: Due to the long transportation distance, some flowers and plants are damaged and cannot be resold. Therefore, before resale to customers, retailers remove burnt or broken blooms, remove excess leaves and petals, trim into appropriate lengths, and nicely manage them before resale. Flower waste is piled up with ordinary waste and then landfilled.

Picture 11: Packaging used during flower shopping

Floral designer

Floral designer, as well as florist, who arranges flowers, foliage, herbs, or other plant elements into a pleasing design. They used flowers and plants as a medium, arrange in vases, bowls, baskets, or any container, to become bouquets, centrepieces, corsages, wreaths, or events setup. Many nations have their style of floral arranging; this is dependent on what flower varieties are readily available and the culture of the nations. Style can be categorized into Ikebana, English garden Style, Modern, European style, and Cotemporary, Dutch style. Each style involves different floral theories, logic, and flower arrangement tools. Numerous schools, associations, and education centres offer florist training in both formal and informal. The well-known industry associations that promote floral design worldwide include the American Institute of Floral Designers (AIFD), the Society of American Florists (SAF), and the National Association of Flower Arranging Societies (NAFAS), through workshops, conferences, flower shows, and seminars. (Wikipedia contributors, n.d.)

Carbon dioxide: Heat can shorten the life of cut plants by causing premature aging and increasing plant rot. Furthermore, higher temperatures accelerate plant respiration, resulting in the production of ethylene gas and the development of additional heat. Overall, these processes hasten the aging of stored flowers. To avoid storing flowers in a hot and dangerous atmosphere, cooling solutions for flower storage can assist in maintaining the ambient temperature stable. According to data (Cold Shot Chillers, 2021), recommended storage temperatures for most flower kinds are between 33°F and 37°F, while cold-sensitive blossoms and tropical flowers should be kept at temperatures over 50°F. Appropriate temperature can help to ensure flowers stay fresh for longer, lowering the expense of damage before delivery to the consumer. The emission of C02 from the cooling systems will cause.

Flower food: To keep the flowers and plants healthier and encourage them to bloom more beautiful and last longer. Most florists will use Flower food as nutrition before the arrangement. In addition, water with flower food will be poured back into our regular drainage system and returned to the sea.

Packaging: Packaging in floral design includes a shopping bag, wrapping paper, and ribbon. It is not only for transportation and flower protection but also part of the decoration and creative element of the entire flower presentation. Several types of wrapping paper are commonly used depending on the design, purpose and function. For example, cellophane and OPP, these types of waterproof wrapping paper, are used to hold water for flowers. Flower decoration and visual enhancement will consider wrapping paper in different materials, colours, and styles, such as crepe paper, non-woven fabric, mesh cloth, facial tissue, kraft paper, tissue paper, etc. A signature packaging and wrapping flower approach are also crucial branding and selling points for floral designers to showcase their uniqueness, stand out in the market, and differentiate floral designer positions to attract their target customers. A standard Europe style flower bouquet of 30cms width for the graduation ceremony will consume one cellophane, three waterproof wrapping paper, 60cm long ribbon, 50cm of rope, and some transparency tape to feature one beautiful and pleasant bouquet. Some floral designers or flower shops will also provide customers with message cards.

Picture 12: Packaging for flower bouquet

Floral foam: Floral foam is a green block of sponge-like foam known as Oasis, which was designed 60 years ago by product designer V.L. Smithers (creator of OASIS). Floral foam are in different form and shape (picture 13, top), which has been an indispensable tool for floral design since it makes flower arrangements easier, quicker, and more imaginative. Additionally, it supplies enough water for flowers and plants and can hold up to fifty times its weight in water (Bricks and Blocks, n.d.). Furthermore, it is lightweight, resilient, and simple to cut and shape. The benefit of floral foam is that it saves time, money, and water along the route. Unfortunately, it includes as much plastic as ten plastic grocery bags, is non-biodegradable, non-recyclable, and harmful to humans and wildlife (picture 14). In addition, absorbing water into floral foam will release microplastics into the water, and not dissolve in water (picture 13, bottom). Referring to the study (Floral Foam Adds to Microplastic Pollution Problem: Study, n.d.), 72% of floral designer will discharge foam waste down the sink, bathroom, or drain. In addition to leaching chemicals into the surrounding water, floral foam microplastics are more harmful to aquatic animals than leachates from other plastic families.

Picture 13: (top) Floral foam in different shape and form
(bottom) Floral foam microplastics suspended in vase water

Picture 14: Used floral foam

Flower waste: : To present a perfect and remarkable flower product to the customer, a floral designer requires much preparation before getting creative and cleaning constantly throughout the day. Flower designer must take out the damaged, broken flowers and remove extra leaves from the base stem before arranging the flower.(picture 15) Flower waste usually is collected according to the countries' waste policy. In Hong Kong, flower waste will arrange with everyday waste and then landfilled.

Picture 15: Procedure on remove extra leaves from roses to a flower bouquet.

Picture 16: Flower waste

Carbon footprint: From a single flower stem to a floral design or work of art, floral designers have limited time for preparation and creativity. However, efficient and secure transport is essential in the floral industry once the flower arrangement is completed and ready to be sent. Large flower companies have their logistic team and delivery van and truck, such as McQueen Flower Shop in London, which they use daily to deliver flowers to customers. In Hong Kong, a small company will organize flower delivery using a logistic company, such as "Lalamove" or "GoGoVan."

Consumer / End-user

Consumer or End-user buy flowers and plants categorized for two purposes: For personal use or as a gift. For personal, mainly will consume at the retail shop such as supermarkets, flower markets, or florists. The selection of the flowers depends on the cost, size, species, and promotion; retail service will also influence the decision-making during the process. If as a present, there are two channels to order: Online or Offline. A beautiful flower bouquet for friends and family is a method in tradition but a precious blessing. Every year mother's day, valentine's day is the peak season for every florist. The total expenditure on mother's day in the United States is US$2.62B in 2018, increased to US$2.9B in 2022 (figure 3) The figure shows a continuous growth in demand (Statista, 2022).

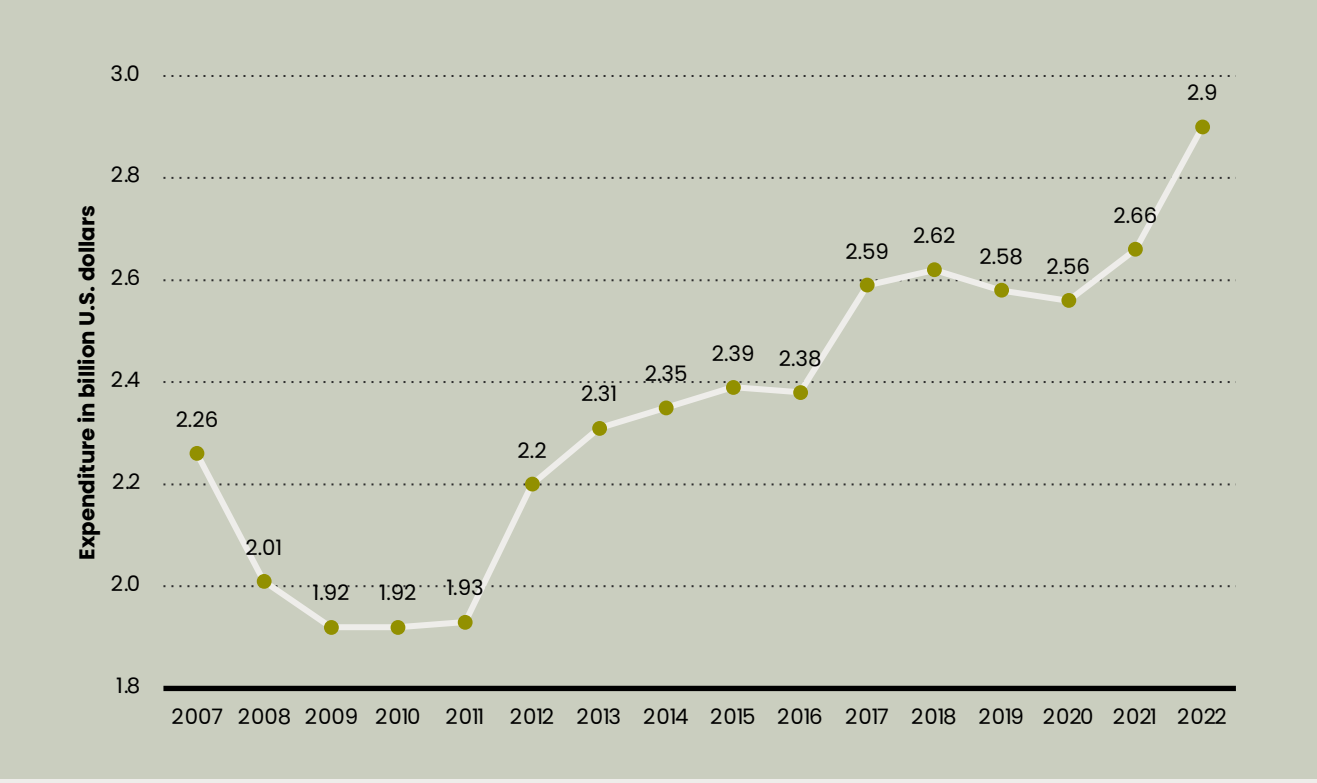


Figure 3: Planned total flower expenditure on Mother's Day in the United States from 2007 to 2022

Packaging: Retailer and Florist are normally wrapped the flower by water-proof paper for protection and decoration. Most of the consumer or receiver received the flower will immediate unwrap and put into a vase, those wrapping paper will directly go to the landfill.

Flower waste: After the appreciation period of flowers and plants, people generally throw them into the garbage according to the city waste management regulation. Japan has a sophisticated waste management system as well as education, and the garbage is generally separated into burnable, non-burnable, and recyclable items. Flower and plants are categorized as biodegradable waste: burnable garbage. For those countries that do not have household waste management systems yet, flowers and plants will go to general garbage and landfills.

Floral foam: Floral foam is typically used for flower baskets or wreath arrangements. It allows floral designers to attach the stems to their designated spot and ensure the arrangement is accurate. Generally, the consumer who received the flower with floral foam does not know how to treat the floral foam after it has been used. They will classify it as plastic and throw it away.

The previous research identified the substantial environmental implications from the grower to the consumer. Different steps taken by the participants have varying degrees of environmental impact. They may not evaluate the impact for various reasons, including cost or efficiency, or they simply do not consider this issue. To enhance the sustainable concept and implementation within the flower industry, we first comprehend the meaning of sustainability and what defines sustainability in the flower industry.

Section 2

Definition of sustainability

Section 2

Definition of sustainability

Sustainability is challenging to define. In this study, it is recommended to examine sustainability definitions that will aid in the analysis of the problem statement. An overview of the literature on sustainability is given in this part, along with some of the important ideas.

History

IUNC created the notion of "sustainable development" At the World Conservation Strategy in 1980. The concept of "sustainable development" preserves biodiversity and environmental services. After the 1987 study, the concept of sustainable development was revised to “That development meets the needs of the present without compromising the ability of future generations to meet their own needs”. Was the meaning at the time in question. This notion was employed at the 1992 UN Conference on Environment and Development held in Rio (UNCED). As a result of this discussion, the social, environmental, and economic aspects of sustainability were separated into three categories (Sutton; 2004).

The Kyoto protocol began in 2005. This protocol is part of the United Nations Framework Convention on Climate Change (UNFCCC), in which the reduction of greenhouse gases, particularly carbon dioxide, is described (Nations; 1998). Globally, this protocol facilitated a sustainable development. The goal of the Kyoto treaty is to reduce greenhouse gas emissions by an average of 5 percent from 1990 levels. This pact was drafted in 1997 and signed by the majority of ratifying nations, including the Netherlands. Only Canada and the United States have not signed the treaty (UNFCCC; 2012). This implies that countries are cognizant of the fact that the greenhouse effect has negative implications, which is why carbon dioxide-related measures are being taken.

Definition

Sustainability can be considered in terms of the three Ps: social, environmental, and economic (Hindle; 2008). At the World Summit on Social Development, these three key dimension that advance social science and the concept of sustainable development were highlighted. Therefore, when choosing the present, individuals must consider the future.

Social: This dimension covers poverty reduction and the protection of labour rights. In addition, organizational behaviour, health and safety considerations, community well-being, employment opportunities, charity, cultural sensitivity, and standards are addressed.

Environmental: The climate change, global warming, air, land and water pollution (or preservation) and ozone layer depletion are all aspects of the environmental component. (Hindle; 2008). According to Study (Bedada; 2011), this refers to the prudent use of natural resources without impairing the standard of living for future generations. Carbon dioxide and water footprint fall into this category. Environmental issues like soil erosion, water scarcity, deforestation , and air and water pollution have a negative impact on the ecosystem (Bedada; 2011).

Economic: According to the study (Hindle; 2008), the economic dimension refers to the value an organization generates economically after deducting the cost of all inputs, including the cost of capital.

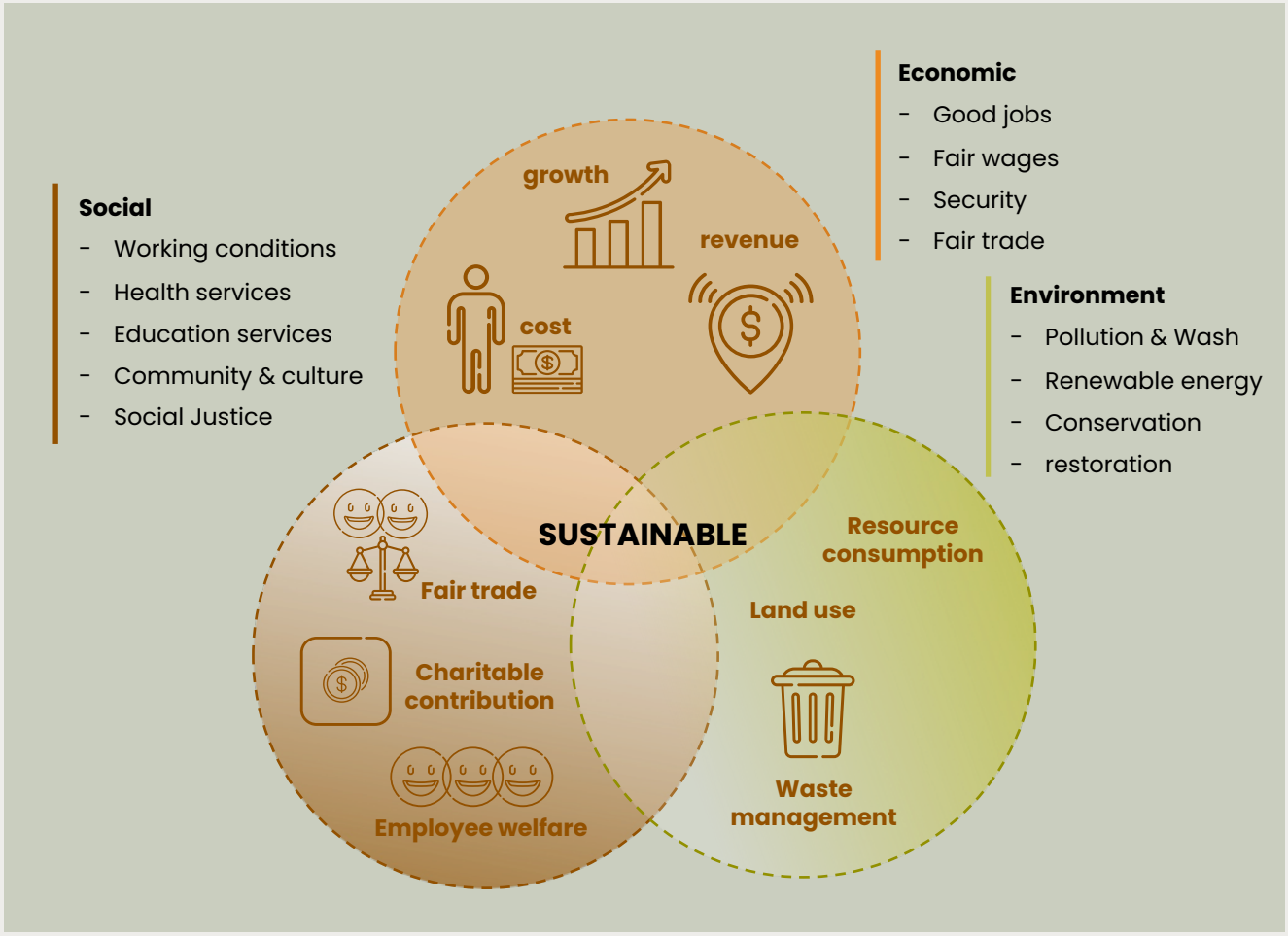


Figure 4: Graphic descripting of the triple bottom line (Wikipedia; 2021, Willard; 2012)

2.1 What is sustainable floral design

Sustainable floral design is a commitment by a floral designer or florist to undertake the 3 P's dimension practices (Social, environment, Economic) to protect the health of the earth, the environment, and the people touched in all aspects of the short life of a cut flower. This is a important decision making for a floral designer archive the sustainable practise of bringing flowers from the origin to the consumer; From the selection of flowers and plants themselves to the usage of flower tools. Study from Washington university in 2022, shows recommendation for floral designer to move to be more sustainable: Labour, energy, chemicals and materials are the four aspects have to be concern and aware.

Labour: Latin American nations is second of the export country sold commercially worldwide. The commercial flower business relies on low-wage labour both locally and abroad. To increase consistency and output, chemical fertilizers, herbicides, and insecticides are sprayed on flowers, exposing these employees to high amounts of exposure. In addition, particularly susceptible groups, like as youngsters and pregnant women, frequently work in the commercial flower business in countries with less restrictive labour regulations than in Europe and suffer from higher exposure to these poisons.

Energy: Since most cut flowers in the country are imported, they must be sent across great distances while being kept fresh. Before they reach the florists, flowers sometimes travel hundreds of miles by truck, airplane, and container ship; this shipping procedure leaves a significant carbon impact. In addition, flowers are stored in deep-cold storage at 34° F, close to freezing conditions, to keep them fresh for shipment. This rigorous refrigeration operation increases the commercial floral supply chain's overall carbon footprint.

Chemicals: Flowers are treated with chemical fertilizers, pesticides, herbicides, and herbicides both during the growing process and when imported to prevent the spread of pests and illnesses. Further, workers often use preservatives to guarantee that the flowers stay fresh throughout their lengthy journeys**.**

Materials: Flower positioning and securing into artistic displays often involves using single-use plastic supports, tapes, and foundation materials like floral foam. Unfortunately, floral foam is not biodegradable and is known to contain carcinogens. Additionally, recyclable items like glass vases and biodegradable ones like flowers are frequently thrown into landfills due to ease of disposal or a lack of waste separation skills. As a result, the current flower supply chain produces excessive quantities of dangerous waste and landfill garbage.
As a sustainable floral designer, it is crucial to ensure that the flowers and foliage they choose are grown with respect to the land and workers, choose the proper supporting elements during design and execution, and manage the waste disposal.

The following section will systematically sort through three design stages, and explain definitions, information, criteria, and metrics for sustainable flowers in different countries.

- Sourcing materials (source and details of flowers and leaves)
- Design & arrangement (choice of flower tools, packaging, & transportation)
- Waste disposal

Figure 5: Floral designer's design and arrangement stages

2.2 Sustainable flower measurement and standard

There are guidelines for identifying sustainable products, including in floriculture. The social and environmental criteria are discussed in this study. They are also known as process standards. The production of flowers and plants must meet the process standards. Those factors probably have an impact on the final item's quality. Product standards are requirements and standards for the quality of the items themselves (Riisgaard, 2009; Rikken, 2010). The process standards are the main subject of this study.
Since the 1990s, several sustainable standards and brands have appeared in the flower industry. However, the origins, substance, implementation methods, and monitoring practices of social and environmental standards vary greatly. Early producer groups or buyers mainly determined the standards and labelling. Later, standards for flowers were established with the support of NGOs and labour unions, which was more successful because the initial standards were relatively loose and heavily depended on internal monitoring. As a result, a significant need for monitoring and certification emerged (Riisgaard, 2009; Rikken; 2010,).

Labels are part of a global increase in non-governmental regulation. However, not all the labels are materially identical. A study (Rianne van der Hulst, 2012) shows that apart from 18 labels/standards in the European flower and plant market, only the MPS- Florimark standard covers both aspects: Social, Environmental, and Quality. On the other hand, Certification programs are used as a management tool to perform business specialization; Others decide on involvement as a method of self-regulation. Growers also want to profile their business as professional and sustainable, for example, on the auction clock when the company name list as a quality brand (Rikken, 2010). The certificate adds value to their products and uplifts their branding, which helps to get higher returns in Europe. A study (Rianne van der Hulst; 2012) listed out the primary certificates/standards in Europe for the fundamental elements of standards seeking to improve social and environmental conditions in cut flower production, such as GLOBALGAP, MPS-A,B , Kenya Flower Council, Fairtrade (FLO), Flower Label Program (FLP), Fair Flower Fair Plants (FFP), International Code of Conduct for Cut Flower (ICC), The Horticultural Ethical Business initiative (HEBI) (Figure 6).

On the other hand, in the United States, organizations such as Bloom Check, Veriflora, and Rainforest Alliance are widely recognized organizations as sustainable flower standards. Due to the majority of the exported and imported flowers and plants being in Western countries compared to Asia nations, there is no comprehensive or well-recognized standard for the sustainable floral industry. In 2011, Japan's Ministry of Agriculture, Forestry, and Fisheries announced and launched a new program to calculate and indicate the carbon footprint (CFP) on marketed agricultural and marine product labels. These items cover the flowers and plants. Since different standards and certificates are in the market, growers applying for a certificate or buyers understanding the information of the standard are challenged. The Floriculture Sustainability Initiative (FSI) was established in Belgium in 2013 by a group of 25 players in the floriculture industry, the majority of whom were located in Europe. The "FSI basket" standard is made up of sixteen different voluntary sustainable standards and schemes. These standards and schemes are fully transparent and comparable and adhere to independent benchmarking standards. Additionally, they comply with Good Agricultural Practices (GAP) and basic environmental and social requirements. (Figure 7)

Figure 6: different type of sustainable certificate

Certificate	Origin	Founded	NGO	NPO	Sustainable standard			Included in FSI basket
					Social	Economic	Environmental	
Rainforest Alliance	United State	1987	YES	YES	✓	✓	✓	YES
Flor Ecuador	Ecuador	2005	No	NO	✓	x	✓	YES
Huella de Carbono	Colombia	2015	NO	NO	x	x	✓	NO
MPS – GAP MPS – ABC MPS - SQ	Netherland	1995	NO	NO	✓	x	✓	YES
Fairtrade	Germany	1997	YES	YES	✓	✓	✓	YES
Veriflora® Sustainably Grown	United State	2004	NO	NO	✓	x	✓	NO
Florverde® Sustainable Flowers	Colombia	1996	YES	YES	✓	x	✓	YES
Ornamental Horticulture Assurance Scheme (OHAS)	United Kingdom	2020	NO	NO	✓	x	✓	YES
Global GAP	United Kingdom	1997	NO	NO	✓	✓	✓	YES
Ethiopian Horticulture Producer Exporters Association (EHPE)	Ethiopian	2002	YES	YES	✓	✓	✓	YES
Kenya Flower Council	Kenya	1996	YES	YES	✓	✓	✓	YES
Bloomcheck	United State	--	NO	NO	✓	x	✓	NO

Figure 7: Different countries and criteria of sustainable flower standard

2.3 Waste Management

Solid waste disposal is a significant problem in the world. The number increased massively around the world in recent decades. Annually, the globe produces 2.01 billion tonnes of municipal solid garbage, of which at least 33% are not treated in an environmentally sustainable (Figure 8). By 2050, worldwide garbage is anticipated to reach 3.40 billion tonnes, more than doubling the population increase over the same period. (Statista; 2022) The top three composition of global waste in 2016 are: 1) Food and green, 44%, 2) Paper and cardboard, 17% 3) Plastic, 12%. (Figure 6, Trends in Solid Waste Management, n.d.-a)

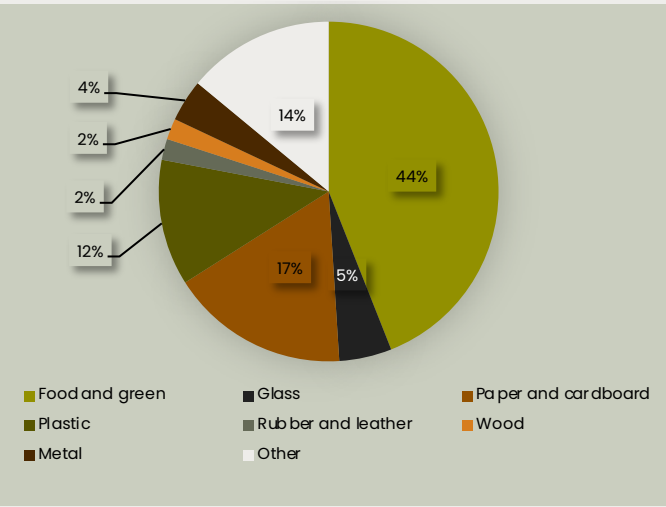


Figure 8: Composition of global waste in 2016

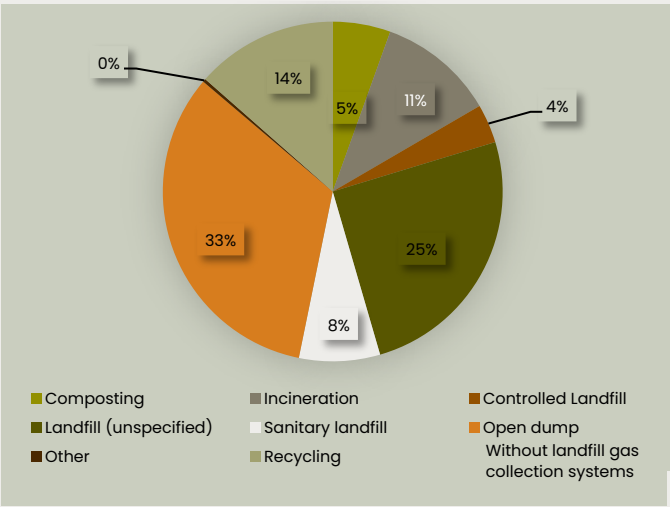


Figure 9 : Global treatment and disposal of waste in 2016

Based on the amount of waste generated, its composition, and how it is managed, solid waste treatment and disposal were estimated to account for 5 % of world emissions in 2016, and 1.6 billion tonnes of carbon dioxide (CO2), equivalent to greenhouse gas emissions. The result of garbage disposal in open dumps and without landfill gas collection systems (Figure 9). Almost half of all emissions are caused by food waste. If no changes are made to the sector, solid waste-related emissions are projected to reach 2.38 billion tonnes of CO2 equivalent per year by 2050.

In most countries, solid waste management is a municipal responsibility. Almost 70% of countries have established agencies in charge of the waste industry's policy development and regulatory oversight. Approximately two-thirds of countries have passed solid waste legislation and regulations. However, enforcement is quite variable. Other than regulatory oversight or financial transfers, direct involvement of the national government in the

of waste services. Public bodies supply at least half of the services, from primary rubbish collection to treatment and disposal, with roughly one-third delivered through public-private partnerships. Furthermore, collaboration tends to succeed only under specific conditions with the private sector for finance and operations, with appropriate incentive structures and enforcement mechanisms. Hence, they are not always the best alternative.
Floral designers will not only lay out flowers and plants but employ their creativity and imagination to use other supplementary elements to support their flower presentation. Such things as wrapping paper, tape, ribbons, and shopping bags will be involved in the process. Buckets, flower foam, chicken wire, or vases will also be used for larger flower installations. Floral designers basically generate two types of wastes: Green waste (flowers and foliage) and secondary flower waste (flower foam, wrapping paper, packaging, vases, flower buckets, barbed wire, etc.). Due to the diversity of nations, waste management is not identical, and garbage disposal will be organized differently in each nation. Japan has one of the most intricate recycling systems in the world. Separating trash, burnable, plastics, and other things are second nature to most individuals. They are expected to follow local councils' sorting requirements, and rubbish is generally classified into burnable, non-burnable, and recyclable materials. Flower and plants are categorized as biodegradable waste: burnable," which is the same as food waste. As in Germany, waste separation is mandatory for everyone. The incorrect waste separation will increase the waste disposal bill or make you have to pay a fine. Garbage in Germany divides into five types: Yellow (plastic), Brown (organic waste), Blue (paper, newspaper, and cartons), Black (non-recyclable, residual waste), and Orange (glass bottles). Flowers and plants are categorized in brown as organic waste. Compared to the United Kingdom, the United States, and Hong Kong, waste separation is not mandatory by the government. It relies on the person's self-motivation and the incentive programme or attraction by the recycling company or NGO. Most people or flower companies will leave the garbage together and in landfills. On the other hand, Shanghai in China established a waste sorting program in 2019, which makes it compulsory to separate the garbage into four types: residual waste, household food waste, recyclable waste, and hazardous waste. Flowers and plants are sorts of household food waste.

2.4 Floral design supporting tools

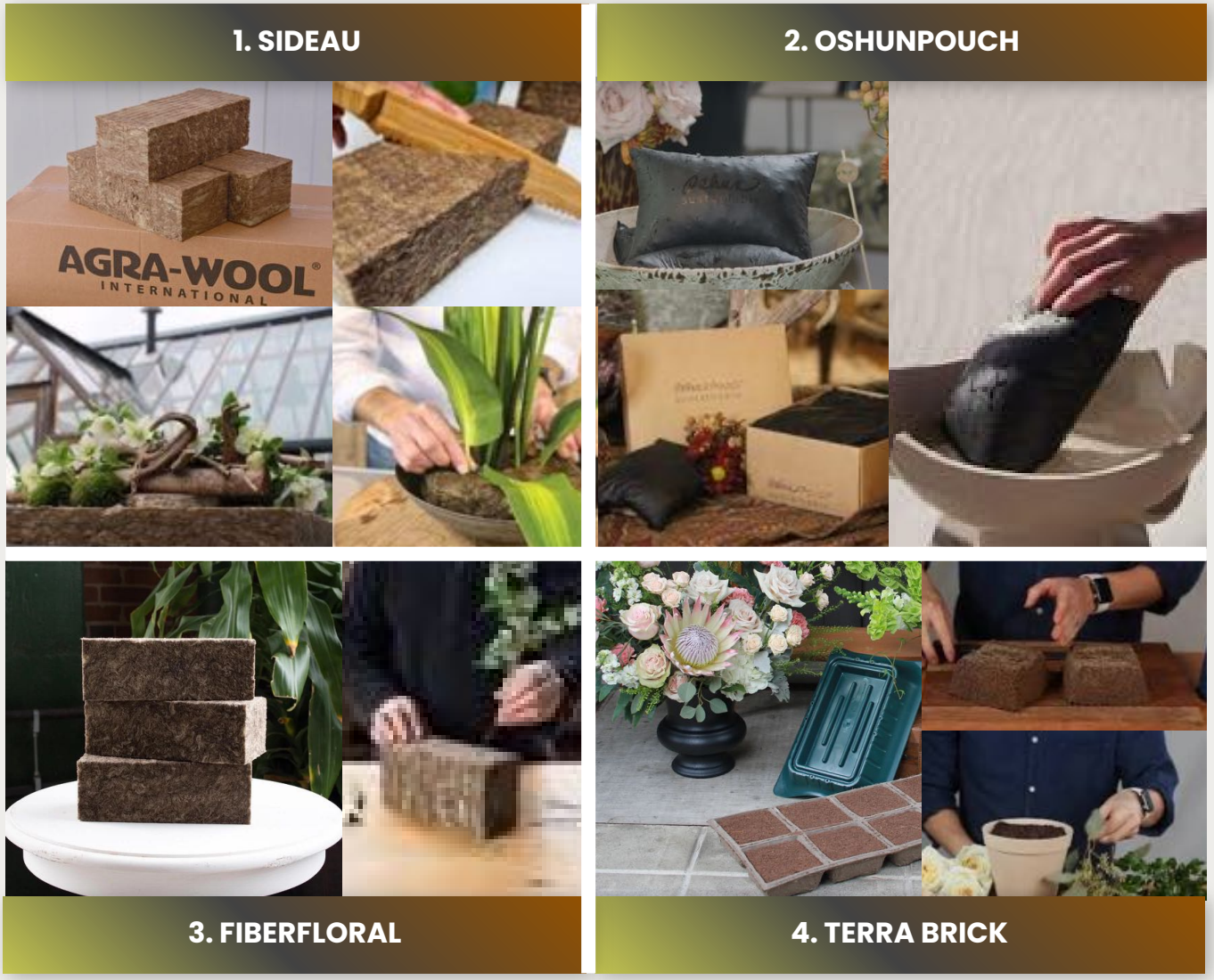
Creates stunning arrangements using flowers, leaves, herbs, or other plant components in addition to being a florist and floral designer. For larger flower installations, buckets, flower foam, chicken wire, or vases will also be used. The 3R's rule—Reduce, Reuse, and Recycle—is always an excellent strategy for reducing waste and protecting the environment. A floral designer can reuse flower vases, containers, plastic, and paper, reduce waste from flower packaging, and avoid single-use materials when executing a design. However, there is one essential component of the floral industry that has been difficult to substitute over the past 60 years: Flower foam, sometimes known as "Oasis." A unique product that is a crucial component of contemporary floral design. As mentioned in the first section, flower foam uses micro-plastics and is currently not recyclable or biodegradable; a study revealed that the substance was consumed by aquatic species with a variety of eating habits and leached more harmful compounds into the water than conventional foam. Additionally, the micro-plastic components from the flower foam will readily arrive throughout the soaking process. Due to the negative impact on flower foam, numerous floral designers moved to the flower frog, a tool to assist with floral arrangements, which was originally inspired by Japanese flower tools called “Kenzan” (picture 17). It is a reusable metal tool with numerous needles for fastening the stems. It can be made of different materials but with the same logic for fixing the flower (picture 18). Flower frog still not a very widespread and frequently used flower tools in the market since it requires more floral arrangement expertise and technique, and costs of flower frog is higher than flower foam.

Picture 17: Kenzan

Picture 18 : Different type of floral flower fog

In addition, more environmentally friendly technologies and materials are being found and developed as alternatives to flower foam. Such as "Sideau," a product introduced in the Netherlands by Agra-Wool International. A product created from basalt, a volcanic

igneous rock, is a material that is entirely natural. One block can absorb 1.5 liters of water for flowers' hydration, and it is simple to cut and shape for various forms. The "OSHUNPOUCH" is also an alternative option for floral foam available in the United States. The "OSHUNPOUCH" contains a blend of 100% natural and organic coir-based ingredients. The membrane is generated from plants, mainly maize or sugar beet starches, and has passed TUV Austria's "Home" composability tests. However, it is not allowed to trim the form.



Picture 19 : Floral foam alternative : 1) SIDEAU, 2) OSHUNPOUCH, 3) FIBERFLORAL 4) Terra Brick

Nowadays, many floral designers recognize the disadvantages of flower foam, but both cost are much higher than the regular flower foam due to its portability, lightweight, and cost. "Sideau" is 70% more expensive than flower foam, and "OSHUNPOUCH" cost is three times the price of flower foam (Figure 10) These major factor reduce the floral designer's interest in choosing the alternative, which has a reduced frequency of use in the floral industry.

Brand (size)	Details				Price	Price (each)	channel
	Materials	Bio-Degradable	Natural material	Reusable			
SIDEAU (23x10x7.5cm)	basalt wool with plant based, starch binder	✓	✓	X	USD54.95 (20pcs)	USD2.74	www.newageflorl.com
Oshunpouch (dry: 15x23x3cm)	*(outside)* plant based, from starches derived from corn or sugar beet *(Inside)* 100% natural and organic coir based	✓	✓	X	USD150 (30pcs)	USD5	
FIBREFLORAL (23x11x8cm)	volcanic basalt rock with a bio-based binder from rapidly renewable materials	✓	✓	X	USD66.2 (20pcs)	USD3.31	https://www.oasisfloralproducts.com
Terra brick (11x5x8.5cm)	plant-based, renewable, natural coir, and a compostable binder	✓	✓	X	USD55 (8pcs)	USD6.875	
Floral foam (22x10x7.5cm)	phenolic resins, or phenol formaldehydes	X	X	X	USD38.2 (24pcs)	USD1.59	

Figure 10: Floral foam and the alternative comparison table

Furthermore, the Royal Horticultural Society (RHS) announced a significant announcement for the 2022 Chelsea Flower Show. The RHS is in charge of the world-class Chelsea Flower Show and Hampton Court Garden Festival, as well as regional and season-long shows. Since 1912, it has been held in the United Kingdom. The notification bans the use of floral foam at RHS Shows beginning in 2021 and requests that floral designers at RHS Show in 2021 experiment with alternative products whenever possible. This wonderful initiative encourages enterprises and florists to find alternatives to flower foam, and "SIDEAU" is one of RHS's suggested alternative materials, which offers a better incentive for new eco-materials companies to innovate, invest, and expand their business. Besides ,Australia considers “biodegradable plastic” the most problematic, so it will be banned in 2022. Floral foam, as “mentioned as biodegradable plastic," will also be affected by this new policy. (‘Biodegradable’ Plastic Will Soon Be Banned in Australia, 2021)

2.5 Constraints and Restriction of being sustainable in flower industry

The environmental consciousness of consumers is becoming an increasing issue in the flower industry. The purchasing choices of consumers influence the company's commitment to sustainability. Such as the government or academic researchers, stakeholders have a bearing on sustainability. Government is a crucial stakeholder since it must authorize sustainable working methods, environmental organizations, financial institutions, and supply chain participants (Wognum, et. al.; 2011). However, according to Willard (2012), consumers and employees have the most influence on how to manage sustainable expectations, as consumers may choose not to purchase the product and employees may go on strike. The flower industry supply chain is the series of firms, as mention in section one, there are 6 parties: Grower, auction centre, wholesale or distributor, retailer, flower designer, who collaborate to deliver goods and services to the Consumer and End-user. To identify the restrictions, we may divide them into the following categories.

Cost

According to a 2018 study by M.A. Wani et al., the following factors influence growers' propensity to adopt sustainable floriculture: environmental restrictions, customer value, attitudes toward sustainability, age, and operation size. 65.2% of respondents said that sustainability was crucial to the environment, and 63% of respondents have implemented sustainable practices in their operations. Additionally, adoption behaviours may differ. Concerns about implementation and the perceived risk by growers were the two primary factors that hindered the adoption of sustainable practices. Growers were particularly concerned about the rising cost of sustainability. From a commercial perspective, they expect this practice will strengthen their competitive advantage and set them apart from other growers, thus improving their brand value.

Translucency in sustainable information and standard

Although numerous sustainable standards, measurements, and certificates have been introduced, the measurements vary. Referring to section two, the majority of sustainable certified products are introduced in Europe and Latin America, while Asia-Pacific launches are uncommon. Additionally, the implementation of sustainability in various countries varies. Study "Bio-degradable" phrases are technically considered one of the sustainable

standards. However, after conducting a few studies, we discovered that some of them are still damaging and that few people, even floral designers, are aware of the standard's information.

Education

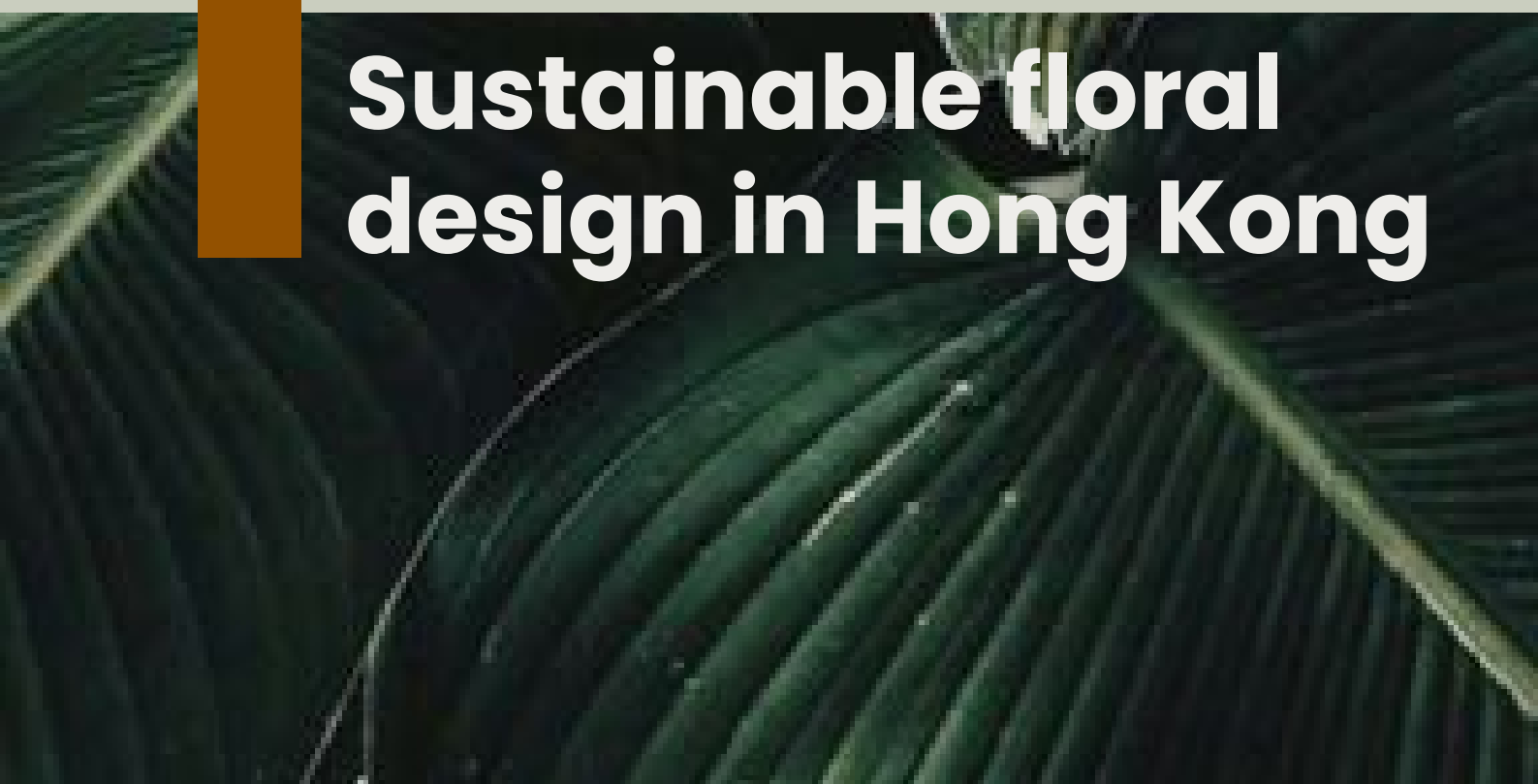
Education is vital for the transfer of any kinds of knowledge. Sustainable education can help present and future generations live a better life. Reducing air, water, and soil pollution contributes to the preservation of long-term economic expansion. To encourage individuals to adopt a sustainable lifestyle, we educate them about the benefits, disadvantages, and implementation. In the flower industry, growers, auction centres, and even wholesalers practice sustainability, but there are discrepancies between merchants, florists, and end consumers.

Each florist has its own "definition of sustainable floristry." For example, European florists have the necessary procedures to archive, such as buying local flowers, reducing floral foam, reusing vases, and even adopting reusable and more environmentally friendly materials for flower wrapping. (THE BEST SUSTAINABLE FLORISTS AROUND THE WORLD, n.d.) On the other hand, Hong Kong florists labelled their products as sustainable by packing them in biodegradable cellophane (Flowers, 2021). However, cellophane from production to disposal, which involves poisonous carbon disulfide, could release methane, a potent global-warming gas, if deposited in a landfill without a methane recovery mechanism. To compare, Europe's floral designers have better trained on this subject.

The concept and implementation of sustainable flower standards are not widely disseminated and promoted to the general public, particularly by stores and florists; consequently, not everyone has access to the necessary knowledge. Therefore, the issue of information dissemination will reduce their appeal and cannot help enhance the worth of the items and brands, resulting in lower motivation for retailers and florists.

Section 3

Sustainable floral design in Hong Kong



Section 3

3.1 Sustainable floral design in Hong Kong

Problems of Hong Kong

Hong Kong is Asia's second most sustainable city in 2018, per the data from design consultant Arcadis (The Sustainable Cities Index, 2018). Then fall to 63rd, out of the top five in 2022 ((The Sustainable Cities Index, 20122). The ranking evaluates a city's sustainability based on three sub-indices: people, plant, and profit. This indicates that cities must consider factors other than economic development, such as the health of their natural environment and the quality of life of their residents. Hong Kong's total rating plummeted from 9th in 2018 to 63rd in 2022, as three pillars declined drastically. People Pillar's dropped to 65th (rank dropped 44) and Profit's reduced to 45th (rank dropped 42) , variables that significantly impact Hong Kong's situation in 2022, indicating that the city will be confronted with significant issues or changes. Among the three pillars, the Plant pillar declined from 50th in 2018 to 56th in 2022, reflecting that Hong Kong has not performed well since 2018 and is far behind Tokyo, Seoul, and Macao. Plant Pillar is about the relationship between the city and the planet. The data comprised measurements of greenhouse gas emissions, sustainable transportation, the utilization of renewable energy, and efficiency. The data shows that Hong Kong needs to make more of an effort to improve and advance in this sector.

Geography	2018				2022			
	overall	people	plant	profit	overall	people	plant	profit
Hong Kong	9	21	50	3	63	65	56	45
Macao	41	16	73	35	50	52	41	22
Seoul	13	7	30	10	26	4	43	44
Shanghai	76	67	76	75	66	49	75	63
Singapore	4	31	41	1	35	5	69	28
Taipei	24	4	72	13	46	20	71	29
Tokyo	33	11	63	28	3	7	7	20

Figure 5: The Sustainable Cities Index ranking in 2018 and 2022

3.11 Government Support

A few programs were initiated by the Environmental Protection Department (EPD) of Hong Kong in relation to sustainable flower and plant arranging. From 2016 and continuing through 2022, the Natural Christmas tree recycling programme allows tree-owners to deliver unwanted Christmas trees and Peach blossom to various collection places in Hong Kong for recycling. EPD hired a contractor to provide the recycling services following the Christmas holiday and Chinese new year . The collected natural Christmas trees and Peach blossom will be processed into mulches, composting materials, etc. During the specified collection time, individuals and organizations can bring unwanted Christmas trees to the following collection place. In addition, EPD engage with their recycling program "GREEN$ community" to encourage more individuals to recycle their used natural Christmas trees and Peach blossom rather than dispose of them in a landfill.

In addition, in 2018, the Hong Kong Environmental Protection Department collaborated with the Business Environment Council (BEC) to assist the Hong Kong Flower Show in reducing trash. The programming and measurements focused on proper waste collection and handling. The program encouraged commercial stall operators, exhibitors, and contractors to reduce waste jointly, separated reusable and recyclable materials, divided re-plantable flowers from wilted flowers at the showground, and facilitated on-site plant distribution to Hong Kong citizens. (2021-22 Natural Christmas Trees Recycling Programme | Waste Reduction Website, n.d.)

After completing the Christmas tree and peach blossom recycling operations, no reports or documents were made available to the public regarding the follow-up, progress, or achievement rate. In an investigation in 2017 by a legislative councillor Mr. Hui (鄺曉斌, 2017) the total retrieved materials was 57 tones. 70% (42 tones) were used to create compost, compost filler, wood coal, and other useful recycled products. 16 tones were sent to various educational, social welfare, charitable organizations, etc. The remaining materials were not recycled due to improper storage and mildew. Therefore, the achievement rate is not satisfactory. . And there was no data after 2017 for people to analyse the effectiveness of the recycling program. Additionally, the program only runs for a limited time and does not continue throughout the year. Therefore, it is impossible to recycle after the Christmas and Chinese New Year's holidays; consequently, this waste can only be sent to landfills during the regular season.

3.12 Education

The concept and implementation of sustainable floral standards are not extensively distributed and promoted to the general public, notably by stores and flower designer; hence, not everyone has access to the required expertise. In Hong Kong, the majority of flower designers would learn their flower techniques through different channels and get a variety of flower certificates for their careers. The most common are Dutch Floral Art Designs (DFA), American Floral Art School (AFA), and Fachverband Deutscher Floristen (FDF), which are arranged and organized by different countries' organisation with various types of flower styling techniques. From the course outline they are focused on the flower arrangement technic and design theory on colour, line, shape, and form. There is no official lesson on the sustainable flower for the student to get this type of expertise; student must conduct their own research and acquire the materials if they are interested in the sustainable flower. Therefore, the concept becomes a personal interest item, the concept cannot be widely passed and spread the knowledge and awareness to the mass and end-consumer.

Picture 20 : Dutch Floral Art Designs (DFA) certificate sample

Picture 21 : American Floral Art School (AFA) certificate sample

3.13 Translucency in sustainable information and Cost

Similar to the global challenges with transparency information, sustainable standards, measurements, and certificates have been implemented; nevertheless, measurements differ, and certifications are not universal. In addition, the majority of Hong Kong's imported flowers come from China. According to the data, Hong Kong imported $36.7 million of live trees, plants, bulbs, roots, and cut flowers in 2021, while China shared $16.9 million (27%), Netherlands shared $10 million (27%). However, China does not measure and standardize sustainable flowers. Therefore, half of the imported flowers and

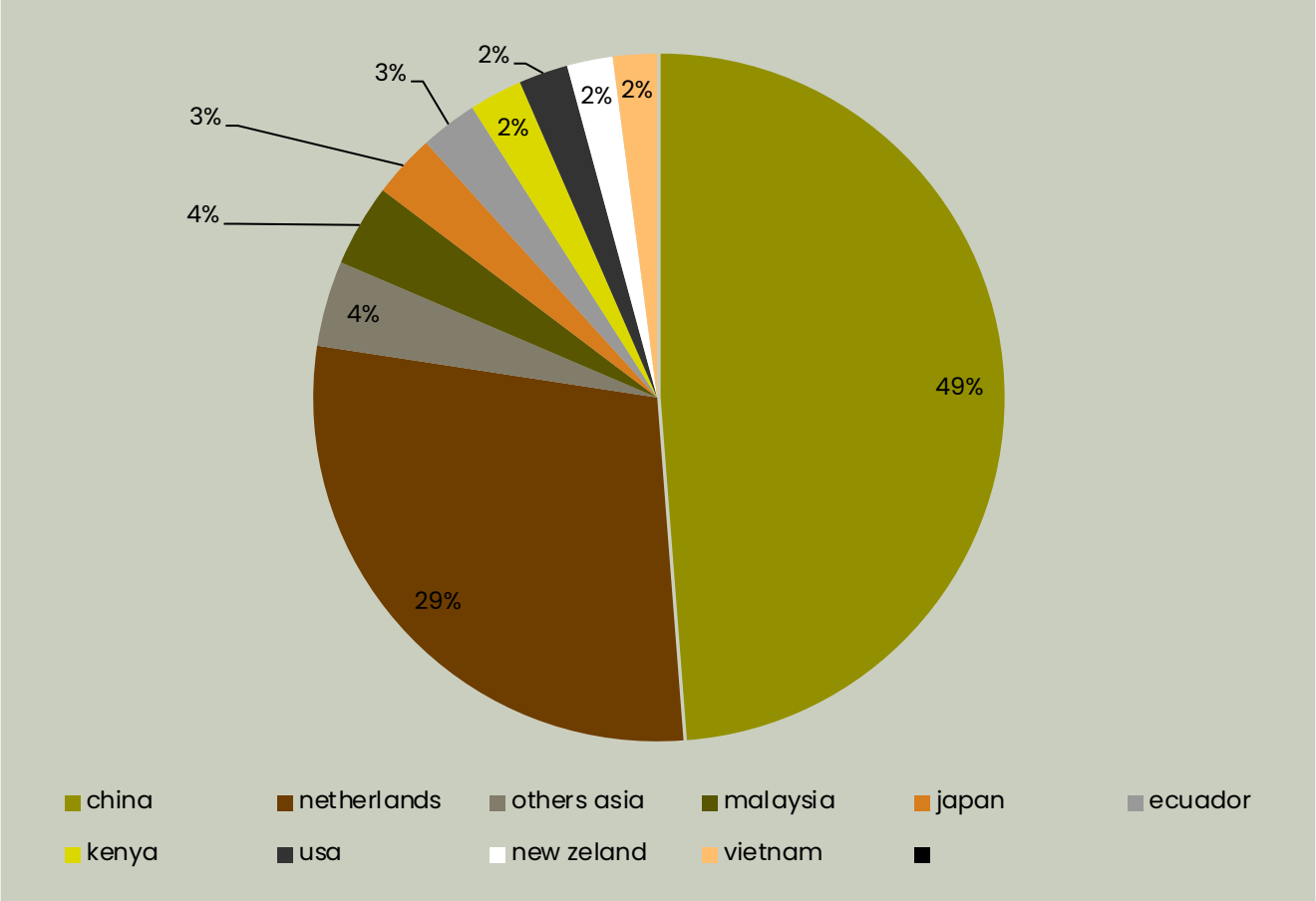


Figure 6: 2020 imported bulbs and flower (HK total US38.4m)

plants, retailers, flower designers, and end-users do not have a way to distinguish them. Cost, quality and origin become the only measurable variable.

Moreover, the cost of sustainability is expensive, and the Hong Kong flower industry is particularly competitive in the market. For example, if a flower designer wants to use an alternative medium to replace flower foam during the creative process, the cost of the flower foam is 70 % more than the most cost-effective alternative: SIDEAU (Figure 4), and even most of the alternatives are not selling in Hong Kong, international orders for the alternative materials will also increase the cost of the product.

3.14 Consumer perception

Although 87% of Hong Kong consumers are increasing their usage of sustainable products (Consumer p.), they are willing to pay 5% more for sustainable items. Compared to the alternative of flower foam, the cost of archiving and being sustainable is higher than 5 %; the cost is 70% more than non-eco-friendly materials, but consumers are expected to consume a sustainable product of high quality at an affordable level, which is challenging for flower designers and retailers to achieve from a business perspective.

3.2 Aims and objectives of the study

Sustainability is one of the most critical global issues of the past decade, and it is a subject that is constantly evolving. Sustainable floral design is regarded as the industry's future. However, to become a sustainable city, we must consider eco-friendliness and the following three pillars: Plant, People, and Profit. The sustainable flower industry in Hong Kong is extremely out of date. Since there is relatively limited information, education, and development in this area, we must open up the information to the public, and the mass; adopting sustainable living must involve everyone in their everyday lives; it must become their daily habit. From this study, we can learn how other countries implement sustainability in the flower industry and investigate the knowledge of sustainable components during design among Hong Kong flower designers. And provides an overview of the research findings and recommendations about sustainable measures in the flower industry and how these measures affect costs and spread to the end-user. After the study, the viability of sustainable floral design in Hong Kong will be assessed, and the industry's limitations and local sustainability improvement requirements will be highlighted.

3.3 Recommendation for floral designer

The majority of Hong Kong's flowers are imported from China (46%), Netherland (27%), Malaysia (3.65%) and Japan (2.81%) (Figure 6) . Floral designer can input an intention on adapt local flowers and plants around Hong Kong while in the design stage, or by choosing less packaging flowers, to cut down the environmental costs related with the importation and packaging of flowers can be reduced.

1. Local sourcing

Hong Kong still have limited flower farm are providing seasonal flower source such as and "Chiba" (picture 22), specialised orchid and "Shun Sun Yuen",(picture 23) famous on gladiolus, sunflower, etc. (Hung, 2022)

Picture 22: Orchid in "Chiba" glasshouse

Picture 23: Gladiolus farm in "Shun Sun Yuen"

2. Sustainable certificate

When purchasing locally is not an option, look for flowers that participate in third-party sustainability certification programs (such as FSI, GLOBALGAP, Fair Trade, Fair Flower Fair Plants (FFP), and Rainforest Alliance.

3. Packaging

Packaging is part of the important element for floral designer. Can help to show their uniqueness This is a one of the branding tools and differentiate to among the market. Flower bouquet required serval materials, translucent paper for wrapping water, various colorful wrapping paper and ribbon for packaging. Minimal as much as possible, and use the materials can be recycled or composted.

4. Materials

Eco-friendly and reusable or compostable materials are suggested to use. Avoid flower foam which is non-biodegradable and plastic tape, try to replace by more eco- friendly alternative, like flower frog, Eco-friendly flower block: SIDEAU etc.

5. Vases

Using repurposed and reclaimed vases, having a short delivery distance, and incorporating weeds and invasives into floral arrangements is a cost-effective and environmentally responsible practice.

6. Chemical

Avoid using fungicides, pesticides, and fertilizers while designing flower arrangements. Black pepper and garlic components have a comparable impact as biofertilizers and corn gluten, which can be substituted. You may also make your own flower food by combining lemon juice and sugar. This can also nourish your flowers and plants. However, the cleanliness of your flower water is more important than any chemical nutrients.

7. Waste : Avoid single-use plastics in floral arrangements, packaging, and landfill operations. Separate your garbage while creating and designing flower arrangements. Reuse the wholesaler's flower packing, and separate flower waste during the flower arrangement according to the Hong Kong government's waste management scheme. After dismantling the flowers and designing for larger-scale flower installations, consider donating any unused or extra flowers to charity. Referring to "Floral Angel" (floralangels.com), an NGO in London, United Kingdom, they recycle and reuse flowers from events, weddings, and retail, and deliver them to the community who normally would not receive flowers, such as hospices, elderly care homes, and shelters. Extending the flowers and plants' appreciation period can aid the flower industry in reducing waste.

8. Education: Educate your clients and stakeholder, support the flower industry's sustainability. Instruct the populace in sustainable information and raise their sustainable consciousness.

SUSTAINABLE

Recommendation for floral designer In Hong Kong

01 SOURCE LOCAL

- try local
- plant your own

02 SUSTAINABLE CERT.

- Support fair trade
- Support product with sustainable cert.

03 PACKAGE

- use less
- eco-friendly materials

04 MATERIALS

- no- floral foam
- reuse & recycle

05 VASES

- reuse vases

06 CHEMICAL

- made own your flower food
- Less pesticides

07 WASTE

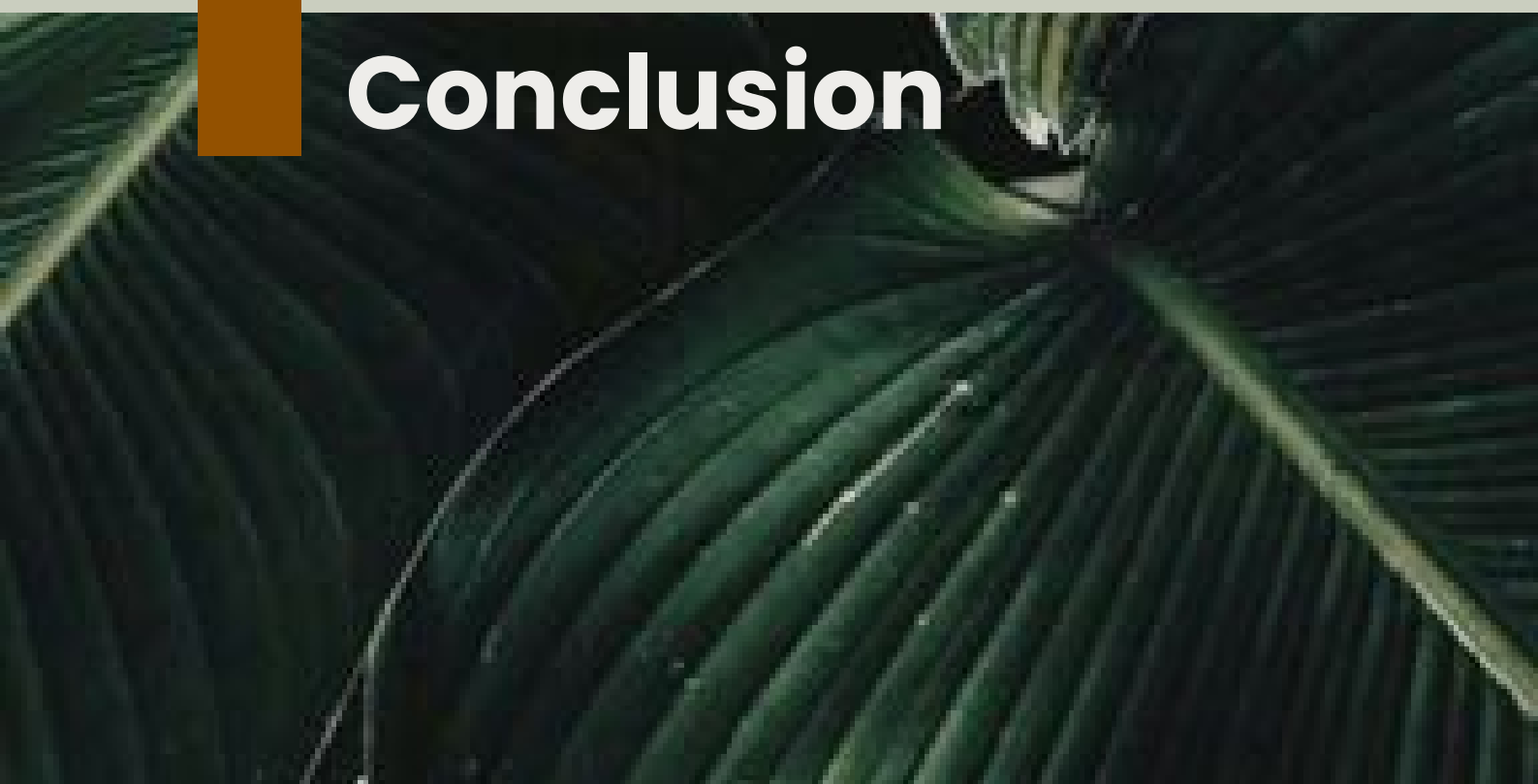
- separate waste
- Upcycle your flower waste
- spare flower can donate to charity

08 EDUCATE

- Spread out sustainable concept to client and stakeholder

Section 4

Conclusion



Section 4

4.1 Overview research

The necessity for sustainable flower design is undoubtedly pressing in the business. However, although there is an increase in concern in society, the lack of clear and thorough planning in the sector remains a significant barrier to overcome.
The above report demonstrates various levels of environmental awareness in the floral design process. Also, depict the various types of pollution in different stages and stakeholders. Considering various measurement tools and standards that are sustainable in different countries' flower industries,

Different levels of awareness result in multiple countries, corporate tactics, and target clients. The educational background of the floral designer and the customer also shows a difference in the level of awareness. These findings show that education plays an important role in raising awareness of sustainable concerns, with people with western education being more concerned about sustainability issues in the flower design process and consumption. The flower industry's most recent and long-term development is undoubtedly the sustainable design strategy. However, comprehensive preparation is required, including consumer and industry education, government assistance, and planning.

The paper contributes to the emergence of the Hong Kong sustainable flower business by suggesting that flower designers conform to the sustainable goal, as well as an international standard and trend that can empower the flower industry to be more international. On the other hand, as a cross-border trade hub for China, this prompted China to enhance its flower business to compete more.

4.2 Limitation of study and possible future study

As stated in section 3, the report's purpose has been attained. However, limitations in the study technique and result justification can be identified.
While insights into sustainability in the Hong Kong flower industry are generated through secondary research and online material, Asia's flower industry data (particularly in Hong Kong) are relatively limited. In addition, the flower industry community in Hong Kong and China is only for members, making it difficult to evaluate. To discover the actual opinions and attitudes regarding their sustainable practice, first-hand research such as interviews with those communities should be conducted.

Interviews with local floral designers and wholesalers might be conducted to better understand the constraints and limitations of current sustainable implementation in Hong Kong. This would allow for a more comprehensive evaluation of misinformation and knowledge.

Furthermore, while the section's suggested advice for floral designers is applied in practice, such forward-thinking solutions are only addressed on paper. Finally, to understand their comments and recommendations for future development, a simple flower installation demonstration might be held with floral designers and stakeholders to experience the actual sustainable practices and recycling system limitations,

Bibliography

500: We've Run Into An Issue | Mailchimp. (n.d.). Copyright (c) Mailchimp. All Rights Reserved. https://mailchi.mp/ecd173e8c6e9/fsi-newsletter-winter-5602177

2021-22 Natural Christmas Trees Recycling Programme | Waste Reduction Website. (n.d.). Wastereduction.Gov.Hk. https://www.wastereduction.gov.hk/en/natural-christmas-trees-recycling-programme-2021.html

2022 World Population by Country. (n.d.). Worldpopulationreview. https://worldpopulationreview.com/

The Arcadis Sustainable Cities Index 2022. (n.d.). Arcadis. https://www.arcadis.com/en/knowledge-hub/perspectives/global/sustainable-cities-index

Assembly Guide. (n.d.). FloraGUPPY. https://www.floraguppy.com/pages/assembly-of-your-guppy

THE BEST SUSTAINABLE FLORISTS AROUND THE WORLD. (n.d.). Net-a-Porter. https://www.net-a-porter.com/en-us/porter/article-bdafc27a60205b72/lifestyle/interiors/sustainable-florists

'Biodegradable' plastic will soon be banned in Australia. (2021, March 9). University of Technology Sydney. https://www.uts.edu.au/news/social-justice-sustainability/biodegradable-plastic-will-soon-be-banned-australia

Bricks and Blocks. (n.d.). Oasis Floral Products NA. Retrieved 2021, from https://www.oasisfloralproducts.com/collections/bricks-and-blocks

Business Environment Council Assists Hong Kong Flower Show 2018 in Successful Waste Reduction | Business Environment Council. (n.d.-a). Bec.Org.Hk. https://bec.org.hk/en/node/282

Business Environment Council Assists Hong Kong Flower Show 2018 in Successful Waste Reduction | Business Environment Council. (n.d.-b). Business Environment Council. https://bec.org.hk/en/node/282

Citizen Centric Cities. (n.d.). Arcadis. https://www.arcadis.com/campaigns/citizencentriccities/index.html

Davidson, R. (n.d.). The environmental impact of cut flowers? Not so rosy. Ideas.Ted.Com. https://ideas.ted.com/the-environmental-impact-of-cut-flowers-not-so-rosy/

Do you know all about the world's largest flower auction in Aalsmeer? (2021, July 8). Visit Aalsmeer. https://www.visitaalsmeer.nl/en/facts-flower-auction-aalsmeer/

The Elusive Green Consumer. (n.d.). Harvard Business Review. https://hbr.org/2019/07/the-elusive-green-consumer

Feldmann, R. (2021, July 29). About floral foam. Sustainable Floristry Network. https://www.sustainablefloristry.org/blog-index/aboutfloralfoam

Floral Angels | Recycling and Restyling Flowers | Charity | London. (n.d.). Floral Angels. https://www.floralangels.com/home

Floral foam adds to microplastic pollution problem: study. (n.d.). RMIT University. https://www.rmit.edu.au/news/all-news/2019/dec/floral-foam-microplastic

Flowers, G. (2021, June 10). Cellophane? Is It Biodegradable? Gift Flowers Hong Kong. https://giftflowers.com.hk/blog/en_florist/whats-cellophane-is-it-biodegradable/

Hong Kong, Imports and Exports, Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage. (2020). Trendeconomy.Com. https://trendeconomy.com/data/h2/Hongkong/06

Hong Kong's Lunar New Year flower markets: don't leave waste to the NGOs. (n.d.). South China Morning Post. https://www.scmp.com/comment/letters/article/3123200/hong-kongs-lunar-new-year-flower-markets-dont-leave-waste-ngos

How Strict Waste Management in Japan Alleviated Its Environmental Impact. (n.d.). Earth.Org - Past | Present | Future. https://earth.org/japan-waste-management/
Hung C. (2022, January 24). 【年花2022】年宵花市以外推介香港五大花場買年花. Time Out 香港. https://www.timeout.com.hk/hong-kong/hk/%E5%A5%BD%E5%8E%BB%E8%99%95/2022%E5%B9%B4%E8%8A%B1%E8%8A%B1%E5%A0%B4%E6%8C%87%E5%8D%97
Management of Floral Waste by Conversion to Value-Added Products and Their Other Applications. (n.d.). Research Gate. https://www.researchgate.net/publication/309744472_Management_of_Floral_Waste_by_Conversion_to_Value-Added_Products_and_Their_Other_Applications
Marginal Improvement in Hong Kong's Sustainable Consumption Behaviour 5 Years Apart Tripartite Effort from Government, Businesses and Consumers Crucial for Translating Beliefs into Embracing Sustainable Consumption for a Happy Life | Consumer Council. (n.d.). Consumer.Org.Hk. https://www.consumer.org.hk/en/press-release/20210616-6
Nation, T. (2020, August 27). Environmental Impacts of the Cut-flower Industry. Tasmanian Times. https://tasmaniantimes.com/2020/08/environmental-impacts-cut-flower-industry/
Resources – FSI 2025. (n.d.). FSI2025. https://www.fsi2025.com/resources/
Statista. (n.d.). Annual municipal waste generated per capita by OECD countries. https://www.statista.com/statistics/478928/leading-countries-by-per-capita-generated-municipal-waste/
Statista. (2022, June 3). U.S. Mother's Day flower expenditure 2007–2022. https://www.statista.com/statistics/619313/us-mother-s-day-flower-expenditure/
Sustainable Business is Good Business: A view from the Cut-Flower Industry. (2017, May 18). CURB. https://blogs.coventry.ac.uk//researchblog/sustainable-business-is-good-business-a-view-from-the-cut-flower-industry/
The Sustainable Cities Index 2018. (2018). arcadis. https://www.arcadis.com/campaigns/citizencentriccities/images/%7b1d5ae7e2-a348-4b6e-b1d7-6d94fa7d7567%7dsustainable_cities_index_2018_arcadis.pdf
Team, T. H. B. (2021, September 18). Chelsea Flower Show: the RHS has banned floral foam at this year's show. House Beautiful. https://www.housebeautiful.com/uk/garden/a30594959/floral-foam-ban-rhs-flower-show/
Top Floriculture Companies in 2020 – Floriculture Industry Statistics and Leading Flower Exporters. (n.d.). Bizvibe Blog. https://blog.bizvibe.com/blog/top-floriculture-companies
Towards more stringent sustainability standards? Trends in the cut flower industry. (n.d.). Jstor.Org. https://www.jstor.org/stable/23055365?saml_data=eyJzYW1sVG9rZW4iOiI4MzlhNDZjMy1hNGM1LTRkZjUtYTQ4YS1mZWZjNmRiYWI0NmEiLCJpbnN0aXR1dGlvbklkcyI6WyIxMDk5ZmVmMS1jNTljLTQ3NTctYTNiYi03MjA1ZjMzYzJhMDUiXX0&seq=3
Trends in Solid Waste Management. (n.d.). Datatopics. https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html
van der Ploeg, R. (n.d.). Signs of thaw for South Korea's flower industry. AIPH. https://aiph.org/floraculture/news/signs-of-thaw-for-south-koreas-flower-industry/
Wageningen University. (2012, December). Sustainability in floriculture. Rianne van der Hulst. https://edepot.wur.nl/245180

Waste disposal. (n.d.). Japan-Guide. https://www.japan-guide.com/e/e2222.html
What is the environmental impact of the cut-flower industry?- Tree-Nation. (n.d.). Tree Nation. https://tree-nation.com/projects/inside-tree-nation/article/5956-what-is-the-environmental-impact-of-the-cut-flower-industry
What Sustainability Certifications Mean and the Quest for More Responsibly Grown Flowers - Inspire - Flower.Style Magazine. (n.d.). Sustainability Certifications. https://www.flower.style/inspiration/what-sustainability-certifications-mean-and-the-quest-for-more-responsibly-grown
Wikipedia contributors. (n.d.). Floral design. Wikipedia. https://en.wikipedia.org/wiki?curid=2033002
鄺曉斌鄺.曉.斌. (2017, December 27). Christmas tree retrieve rate. 香港01. https://www.hk01.com/%E7%A4%BE%E6%9C%83%E6%96%B0%E8%81%9E/144724/%E8%81%96%E8%AA%95%E6%A8%B9%E5%9B%9E%E6%94%B6%E5%95%86%E5%83%85%E5%86%8D%E9%80%A0%E4%B8%83%E6%88%90%E5%9B%9E%E6%94%B6%E6%A8%B9%E6%9C%A8-%E7%92%B0%E4%BF%9D%E7%BD%B2%E7%A8%B1%E5%B7%B2%E5%AE%8C%E6%88%90%E5%90%88%E7%B4%84%E8%A6%81%E6%B1%82

Name: Tsang Wai Man, Mandy

Student number: 21006131G

Supervisor: Dr William Liang