MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
UKRAINIAN-AMERICAN CONCORDIA UNIVERSITY

School of Management and Business
Department of International Economic Relations, Business & Management

Bachelor's Qualification Work

The waste management as a competitive advantage in international business

(based on Royal Engineering LLC case)

Bachelor's student of
Field of Study 29 – International Relations
Specialty 292 – International Economic Relations
Educational program – International Business

Alina Sitnikova

Research supervisor

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(*First Name, Last Name)*
Ph.D. in Economics

Kyiv – 2023

Abstract

The work is devoted to consideration the concept of waste management as a competitive advantage in international business and examines how companies can harness sustainable waste management practices to enhance their brand image, minimize costs, comply with regulations, and foster innovation. The work summarizes the study how waste management has become a framework for international business development and its efffects on it as well as establishing ways of busy development and enhancement. The disposal system in international business was analyzed. Autor provided the basic concepts of food sharing and food waste processing technology. The analysis of the competitiveness of composting. The main differences between zero waste and legislative influence are clarified and a study of product waste management as a competitive advantage on the case of Royal Engineering is carried out.

The work covers the main bases in waste management with overview of basic concepts of recycling, its main pros and cons, as the aspects of utilization of the industry waste (defined thereby as by-product) and the treatments necessary to discard waste to environmental acceptors. In addition, analysis of the competitiveness of zero waste, composting, carbon footprint, etc.

Keywords: brand image, cost minimization, regulatory compliance, innovation, framework

Анотація

Робота присвячена розгляду концепції поводження з відходами як конкурентної переваги в міжнародному бізнесі та досліджує, як компанії можуть використовувати практики сталого поводження з відходами для покращення іміджу свого бренду, мінімізації витрат, відповідність нормативним вимогам та сприяння інноваціям. Робота підсумовує дослідження того, як управління відходами створює основу для розвитку міжнародного бізнесу та його вплив на нього, а також визначає шляхи активного розвитку та вдосконалення. Було проаналізовано систему утилізації в міжнародному бізнесі. Було наведено основні поняття фудшерингу та технології переробки харчових відходів. Проаналізовано конкурентоспроможності компостування. Роз'яснено основні відмінності між нульовими відходами та законодавчим впливом, а також проведено дослідження управління відходами продукції як конкурентної переваги на прикладі Royal Engineering.

Робота охоплює основи управління відходами з оглядом головних концепцій переробки, її основних плюсів і мінусів, а також аспекти утилізації відходів промисловості та обробки, необхідної для вилучення відходів у навколишнє середовище. Крім того, аналіз конкурентоспроможності нульових відходів, компостування, вуглецевий слід, тощо.

Ключові слова: імідж бренду, мінімізація витрат, відповідність нормативним вимогам, інновації , розвиток бізнесу

PHEE-institute «Ukrainian-American Concordia University»

School of Management and Business
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Educational level: **bachelor degree**
Specialty: **292 "International Economic Relations"**
Educational Program "International Business"

APPROVED
Head of Department Prof. Liubov Zharova

"25" April 2023

TASK
FOR BACHELOR'S QUALIFICATION WORK

Alina Sitnikova
(Name, Surname)

1. Topic of the work: The utilization of locality as a competitive advantage in global business (on the basis of Royal Engineering)

Supervisor of the work Liubov Zharova, Dr of Sci in Economics.
(surname, name, degree, academic rank)
Which approved by Order of University from "22" September 2022 № 22-09/2022-2c

2. Deadline for bachelor's qualification work submission "23" April 2023
3. Data-out to the bachelor's qualification work_
Materials from internship received during the consultation with representatives of the company. Information from open resources in the Internet, official reporting of financial and economic activities of the enterprise.

4. Contents of the explanatory note (list of issues to be developed).

There are main topics a student should develop in this work:

- Theoretical bases in waste management
- Ways of enhancement of ecosystem in ukraine through zero waste
- The utilization of locality of products as a competitive advantage
- The main characteristics of capital construction and food business comparison through locality of products
- Basic concepts of locality of products in different businesses

5. List of graphic material (with an exact indication of any mandatory drawings)

Graphs and figures for analysis of economical and statistical information on the company and its development, visualization of mechanism of action, etc.

6. Consultants for parts of the work

Part of the project	Surname, name, position	Signature	
		Given	Accepted
1	Liubov Zharova, Dr. of Sci. in Economics		
2	Liubov Zharova, Dr. of Sci. in Economics		
3	Liubov Zharova, Dr. of Sci. in Economics		

7. Date of issue of the assignment

Time Schedule

№	The title of the parts of the bachelor's qualification work	Deadlines	Notes
1.	I chapter	31.12.2022	In time
2.	II chapter	20.02.2023	In time
3.	III chapter	11.04.2023	In time
4.	Introduction, conclusions, summary	23.04.2023	In time
5.	Pre-defense	26.04.2023	In time

(signature)

(signature)

Conclusions:

The work was performed in accordance with the calendar plan and the approved content. At the same time, the student proposed a non-traditional distribution of material in the study in order to better show the logic of the research devoted to the analysis of how waste management became the basis for the development of international business and its impact on it, as well as to determine ways of business development and improvement.

The work analyzed the main concepts of waste processing, systematized information on the disposal system in the food business, summarized the main concepts of food sharing and food waste processing technology, and analyzed the competitiveness of composting. In the practical-analytical part of the work, information on the "Fundamentals of Zero waste Ukraine" is systematized and a study of product waste management as a competitive advantage in the case of Royal Engineering is carried out. As a result, the main decisions regarding capital investment in enterprises are proposed. The work was performed at a sufficient level and deserves a high positive evaluation.

Supervisor _____L. Zharova

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INTRODUCTION

One of the most important goals of various food structure scientists is the safety of food products that reach consumers. In the latest trends in world production, it can be found that in the distribution and preparation of food products, there is an excessive emphasis on hygiene methods at all levels and an increase in the safety of these products, the goal of which is the safe supply of food products.

Without the ability to recycle, we would all survive in landfills and landfills, and everything on the planet would be the heart of all pollution and disease, to the extent that eventually there would be no safe place to live and exist. At present, when industrialization brings disorder to the environment, it also provides control over the pollution it itself causes.

The fact that some substances, which are undesirable ingredients, are removed from production makes them, according to European laws, waste. The term ‘‘by-product,’’ which is common in industry, points up that these are mostly ulterior usable substances, often with a market value.

One of the most important problems faced by food enterprises is disposal. As an example, the traditional method of waste disposal is agriculture - this is a consequence, since most of the raw materials, by origin, are agricultural, and are currently no longer available due to changes in legislation and various types of technologies. Also, new types of these technologies, new products and markets make recycling and disposal much more interesting.

Previously, this topic has been researched by various economists L. Baum, L. Andrady, A. Neal, L. Shaxson as well as many others, since the subject of waste management is so extensive.

The aim of the work intends to focus on the rationale behind the recycling system on the background of locality in global food business and finally about a consensus as to what can be done in order to maximize waste disposal without inflicting negative results to the environment.

The work covers the main bases in waste management with overview of basis concepts of recycling, its main pros and cons, as the aspects of utilization of the food

industry waste (defined thereby as by-product) and the treatments necessary to discard waste to environmental acceptors. In addition, analysis of the competitiveness of zero waste, composting, carbon footprint, etc.

Also, the aim of the report is to examine the reasons why some people are in favor of recycling while others are not. Ultimately, the goal is to reach a consensus on how to dispose of waste in the most effective manner without harming the environment, which is essential for supporting life. It is widely acknowledged that an unlivable environment can lead to the death and extinction of all living beings, including humans, so it is our responsibility to ensure that the environment is conducive to our survival.

In total, the following work will discuss waste management as a whole and economic waste, its advantages and disadvantages, its impact on international business development and address the issue of how it has affected a specific international business, analyze company competitiveness and suggest ways of improving and enhancing business development in the framework of waste management.

The master thesis consists of an introduction, three chapters, conclusion, list of references and annexes. The thesis has been outlined in the chapters in the following order: theoretical bases in waste management, ways of enhancement of the ecosystem in Ukraine through zero waste, and the waste management of products as a competitive advantage (Royal Engineering case) .

The first section provides the necessary overview of basic concepts of recycling and basic concepts of food sharing and technologies on food waste recycling.

The second section provides analysis of disposal system in the food business, core issues in waste management problems, and the foundation of zero waste Ukraine.

The third section gathers all the previous data and analysis in order to show the basic concepts of locality of products in different businesses, the main decisions in capital investment in business, and the main characteristics of capital construction and food business comparison through locality of products.

The **relevance** of this work is defined by the extensive and rapid progress of waste management that is taking place in the world right now as well as the effects that it has had on various areas of life, among which lies business development.

The **aim of the master thesis** is to study and analyze how waste management has become a framework for international business development and its effects on it as well as establish ways of business development and enhancement.

In order to achieve this aim, the following **tasks** were set**:**

- study basic concepts of recycling
- analyze disposal system in the food business
-provide basic concepts of food sharing and technologies on food waste recycling
- analyze of the competitiveness of composting
- find out main differences between zero waste and law impact
- systemize information concerning “The foundation of Zero waste Ukraine”
- conduct research of the waste management of products as a competitive advantage on Royal Engineering case
- identify the main decisions in capital investment in businesses
- formulate the main characteristics of capital construction and food business comparison through locality of products

The **methodological basis** for this work is comprised of peer-review journal articles, acclaimed internet publications, and personal data analysis and calculations.

The **research objects** are cyclical economics and waste management as bases for building the competitive strategy for the unit on local and global markets.

The **research subject** is a set of theoretical, methodological and practical approaches to establish the ways of business development improvement and define company competitiveness for LLC “Royal Engineering”.

Master thesis consists of an introduction, 3 chapters, conclusio and list of references. Work is carried out on 71 sheets, containing 13 tables, 6 formulas and 4 figures. References include 78 literature sources.

CHAPTER 1
THEORETICAL BASES IN WASTE MANAGEMENT

1.1 Overview of basic concepts of recycling

Let's imagine the situation: you have finished your drink, throw your plastic bottle in the trash marked "recycling", and have no idea what awaits it next. But, you realize that something is happening to her, and it's good for the environment. That's when we feel good because we're saving the planet in small steps by tossing the bottle in the designated place. But still, how does recycling work? What's next for a plastic bottle, a corn can, or a piece of paper from a notebook?

California Environmental Protection Agency Integrated Waste Management Board reports that recycling is a long-term practice. For example, since the time when in California, dinosaurs were being processed for the production of oil and gas.

This will be possible due to the formation of sedimentary rocks from the lulls, which were transformed into gas and oil under the influence of pressure and heat. Also, from a nomadic life to a more settled one, there was a change in waste management, i.e., improved disposal, which is the reason for various aspects of recycling.

The emergence of organizations such as churches and government bodies with a goal of promoting a healthy society has led to an increase in recycling activities aimed at improving the environment. Recycling was traditionally done to avoid waste and prevent diseases, but the importance of conserving the environment and natural resources was not considered. This was due to the abundance of resources in a less populated world. However, with the increasing population and growing needs, conserving resources has become a major reason for recycling, along with creating job opportunities and improving the economy. Nowadays, there are numerous recycling programs and strategies in place to conserve the environment and scarce resources for the present and future generations, achieving environmental sustainability.

Recycling involves gathering waste materials that would otherwise be disposed of as trash and processing them into new products. The process varies depending on the material being recycled. Paper, for example, is broken down into wood fibers, while glass is crushed into tiny pieces.

Scientists and engineers have been developing ways to separate and process recyclable materials at Material Recovery Facilities since 1973. However, some materials such as computers, batteries, and light bulbs are too complex or contain too many toxins to be properly recycled at these facilities.

Single Stream Recycling focuses on five types of waste: paper, steel, glass, aluminum, and plastic. The ability to recycle certain types of plastic depends on the MRF's capabilities and market demands. For instance, while expanded polystyrene (commonly known as Styrofoam) can technically be recycled, it's not practical because it doesn't melt down a lot of polystyrene. In contrast, PET plastic soda bottles are recycled at almost all MRFs.

The author Grabianowski explains that recycling is a simple concept that involves taking something that is considered to be of no value and transforming it into a brand new product instead of discarding it as waste. [20]

Recycling can be as straightforward as repurposing an old item for a different use or as intricate as collecting various items, processing them into fresh raw materials, and creating new products for consumers.

Furthermore, the key stages of the recycling process include collecting waste materials, processing them into new products, and purchasing those products, which can be recycled again. Common materials that are recycled include paper, wood, plastics, glass bottles, aluminum cans, and iron and steel scrap. Recycling these materials helps to substitute raw materials that are sourced from scarce natural resources like coal, mineral ores, trees, natural gas, and petroleum. This reduces the amount of solid waste that is deposited in landfills, which can be costly, and also lowers pollution levels in the air, water, and land resulting from waste disposal. The processes used to create finished products from raw materials typically serve to form the material into the desired shape and enhance its properties.

Let’s move on to the details of recycling process.

Here are some steps to Recycling Materials:

Collection: Collecting materials that can be recycled, which may involve separating them from non-recyclable waste.

Sorting: Sorting the collected materials into different categories based on their type, such as paper, plastics, glass, or metals.

Processing: Processing the materials to prepare them for recycling, which could involve shredding, crushing, or grinding them into smaller pieces.

Conversion: Converting the processed materials into new products using various methods like melting, extrusion, or chemical processing.

Manufacturing: Using the recycled materials as raw materials in the manufacturing process or incorporating them into existing products to make new products.

While recycling is generally considered a positive decision, it also comes with some negative impacts that are often overlooked by many people.

Advantages of Recycling

Recycling minimizes pollution

Modern pollution, in all its forms, stems from industrial waste. This waste includes plastics, cans, and chemicals. Recycling these industrial wastes can significantly reduce pollution levels because these waste products can be reused instead of being thrown away carelessly. Recycling is a revolutionary concept that opens the gateway to ecological activism, helping to preserve the planet's resources for future generations. When people become familiar with the concept of recycling, they become more eco-conscious and might participate in other eco-friendly activities.

Recycling is not just about separating waste into different bins or taking old products to recycling centers. It's about adopting an environmentally conscious lifestyle and incorporating it into daily life. Simple things like composting food scraps, using solar energy, and reducing the use of single-use plastics can encourage people to adopt a green lifestyle and halt the environmental impacts caused by pollution.

Closed-loop systems are another aspect of recycling that can help reduce pollution levels. These systems take used products and create something that is exactly the same as a reusable item. For example, if you turn in a bag of aluminum cans with a closed-loop recycling program, you would get to use them again as cans for other products.

Recycling is not just about reducing pollution levels; it also has a positive impact on the economy. The recycling industry employs millions of people globally, and the demand for recycled materials creates new job opportunities. Recycling also reduces the amount of waste sent to landfills, which are expensive to maintain and require significant amounts of space.

In conclusion, recycling is a simple yet powerful tool for reducing pollution levels and preserving the planet's resources for future generations. By adopting a green lifestyle and supporting closed-loop recycling programs, individuals can contribute to a cleaner and healthier environment. [21]

It can work with open-loop and closed-loop systems

The concept of open-loop and closed-loop systems also applies to recycling programs when usable products are available.

An open-loop recycling system refers to the process of converting a waste product into a new product that is different from the original. For example, plastic bottles may be recycled and turned into polyester fibers for clothing. In this process, the original material is transformed into a new material, and the end product may not be recyclable again.

On the other hand, closed-loop recycling, also known as circular recycling, involves the process of turning a waste product into the same product again. For instance, aluminum cans can be recycled and made into new aluminum cans, which can then be recycled into new cans again, creating a closed loop. Closed-loop systems are considered more efficient than open-loop systems since they eliminate the need for additional resources to create new products and help reduce waste. However, closed-loop systems require more investment and infrastructure to ensure the collected materials are of the same quality and purity to maintain the integrity of the closed loop.

Saves energy and CO2

Some people may oppose recycling, especially when they focus on products that yield low returns, such as plastic or green glass. However, recycling products like aluminum cans can have a significant impact, as approximately 95% of the energy required to create new aluminum can be saved through recycling. In the US, around 69%

of the crude steel used in 2019 was made from recycled material, according to The Balance Small Business. Additionally, the Environmental Protection Agency (EPA) estimates that around 68% of all paper and cardboard is recycled. These statistics demonstrate that recycling helps to reduce the consumption of raw materials and saves energy. To summarize:

Energy conservation: recycling saves energy because it generally requires less energy to produce products from recycled materials than from raw materials. For instance, recycling aluminum cans consumes about 95% less energy compared to producing new cans from bauxite ore. This not only reduces energy consumption but also minimizes CO2 emissions that result from energy production.

Reduced greenhouse gas emissions: when waste is sent to landfills, it can decompose and produce methane, which is a potent greenhouse gas contributing to climate change. By recycling waste instead of sending it to landfills, we can decrease the amount of methane produced and therefore lower the CO2-equivalent emissions associated with waste disposal.

Lower emissions from transportation: recycling also reduces the need to transport raw materials and products, which in turn decreases emissions linked with transportation. For example, if paper is recycled locally rather than being transported long distances to a paper mill, transportation emissions can be reduced.

Reduced emissions from resource extraction: recycling also decreases the need for mining and extraction of raw materials, which can be energy-intensive and generate greenhouse gas emissions. By utilizing recycled materials instead of virgin materials, we can reduce the environmental impact related to resource extraction.

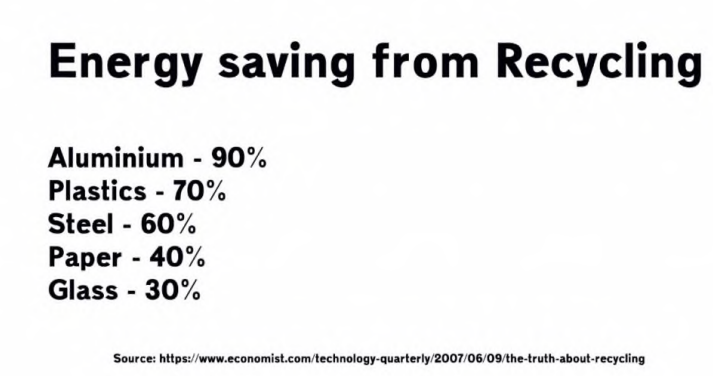

Fig 1.1 Energy saving from recycling [23]

Recycling minimizes global warming

During waste disposal, huge amounts of waste have combusted that lead to the emission of vast greenhouse gases such as carbon dioxide, sulfur, and nitrogen, which contribute to climate change and global warming.

Best solutions to reduce global warming

** Gigatons CO2 Equivalent Reduced / Sequestered (2020–2050)*

SOLUTION	SECTOR(S)	SCENARIO 1 *	SCENARIO 2 *
Reduced Food Waste	Food, Agriculture, and Land Use / Land Sinks	88.50	102.20
Plant-Rich Diets	Food, Agriculture, and Land Use / Land Sinks	78.33	103.11
Family Planning and Education	Health and Education	68.90	68.90
Refrigerant Management	Industry / Buildings	57.15	57.15
Tropical Forest Restoration	Land Sinks	54.45	85.14
Onshore Wind Turbines	Electricity	46.95	143.56
Alternative Refrigerants	Industry / Buildings	42.73	48.75
Utility-Scale Solar Photovoltaics	Electricity	40.83	111.59
Clean Cooking	Buildings	31.38	76.34
Distributed Solar Photovoltaics	Electricity	26.65	64.86
Silvopasture	Land Sinks	26.58	42.31

Table 1.2 Best solutions to reduce global warming [23]

When industries and manufacturing companies recycle non-biodegradable waste, they can significantly reduce the amount of greenhouse gases generated by their factories and plants. This is because recycling reduces the need for energy-intensive processes used in the extraction and production of new raw materials, which can lead to lower emissions of carbon and other harmful gases. Additionally, using renewable energy sources such as solar power or wind energy can further minimize the use of fossil fuels and reduce emissions. Since fossil fuels are a major contributor to greenhouse gas

emissions, reducing their use can have a significant impact on reducing carbon emissions and mitigating climate change. [23]

Conservation of natural resources: Recycling helps to conserve natural resources that would otherwise be extracted from the earth through mining and extraction to produce new products.

Creation of jobs: Recycling contributes to job creation as more recycling plants will be established, leading to a chain of collection and delivery.

Financial benefits: Recycling can save and make money. Selling recycled items like electronics, water bottles, and other trash can earn you cash while buying recycled materials can save you money. Reusing household trash can also lead to more financial benefits.

Disadvantages of Recycling

Recycling takes time and effort itself

Recycling aims to reduce waste and promote sustainability, but it requires the use of resources in the process. According to a report by NPR, recycling plastic can be expensive, and sorting it is difficult. In the United States, only 5% of plastic consumption is currently being recycled. Despite this, Jan Dell, the founder of the Last Beach Cleanup, argues that recycling is still important and necessary. “We don’t have factories to do it. It’s also very water intensive, so we’re not going to build more plastic recycling facilities in the US.” [24]

Recycling green glass may not be economically viable as it has a low return value. When green glass is recycled, it results in a black substance known as 'cullet', which is not very useful. Making new glass bottles from recycled cullet can be more expensive than producing them from raw materials like sand. On the other hand, glass that ends up in landfills decomposes over time, ultimately turning into sand. Therefore, putting glass in landfills may not be as harmful as it does not pose a significant environmental threat.

“In effect, citizens are paying the city extra to throw away the glass, so that they can pretend it’s being recycled.” (Cato Unbound) [24]

High upfront capital costs: Establishing a waste recycling unit requires a lot of capital, which may not always be cost-effective.

Unhygienic, unsafe, and unsightly recycling sites: Recycling sites hold piles of unhealthy and unhygienic waste that are a source of infectious diseases and bacteria hazardous to humans. The entire recycling process also poses significant health risks to those responsible for recycling these products.

Quality and durability of recycled products: Recycled products may not guarantee quality and durability compared to new products. The materials used for recycling are often worn out and fragile and are most likely to get worse over time.

Recycling may not be inexpensive: Establishing a recycling protocol requires a significant investment that includes renting space, waste materials collection, recycling units, heavy machinery, and utility vehicles. Critics argue that the cost of recycling outweighs its benefits, and landfill waste disposal is much cheaper than recycling.

Increased processing cost and low-quality jobs: Recycling costs can be three times as much as the cost of dumping garbage in landfills, and the process is labor-intensive, leading to low-quality jobs.

Over-supply

Recycling has faced a range of challenges over the years, with one major issue being over-supply. Several years ago, the increased supply of recyclable plastic flakes led to a drop in prices, rendering the recycling process uneconomical. As a result, councils that had been encouraging people to recycle found themselves unable to process the high volume of so-called 'recyclable' materials and had to resort to sending them to landfills. The oversupply of recyclable materials was simply too much to be effectively utilized.

However, in recent years, the situation has changed dramatically, with a surge in raw material prices and an upsurge in demand from companies seeking to use recycled plastic in the manufacture of plastic bottles. This has brought a new challenge to recycling – the cost of using recycled plastic is now significantly higher than the cost of newly made plastic, which is very cheap. This has led some to question the economic feasibility of recycling, despite its environmental benefits. [25]

Recycling is a worthwhile activity despite the challenge of recycling certain products. Its benefits include reducing carbon and methane emissions, as well as limiting the release of harmful toxins from landfills into the environment. However, it goes beyond just weighing the costs and benefits. Recycling encourages a mindset of sustainability, prompting individuals to work with nature for the long-term, and to move away from a consumerist, disposable way of thinking.

1.2 Basic concepts of food sharing and technologies on food waste recycling

Food sharing is a relatively new and somewhat small topic that warrants a thorough review of existing literature to establish a solid understanding. When it comes to reducing food waste, previous studies on food sharing have mainly focused on macro-level factors like socio-ecological, geographic, economic, and cultural influences.

Food sharing involves collecting surplus food that would otherwise be thrown away and distributing it to those who can use it. This surplus food can be sourced from private households and small or medium-sized businesses.

Let’s move to some basic concepts of food sharing:

The first step is **food recovery**, which involves collecting surplus food from various sources and distributing it to people in need. This includes food from farms, restaurants, grocery stores, and other sources that would otherwise go to waste.

Food donations are another way to help reduce food waste. This involves individuals or organizations donating food to food banks, food pantries, and other charitable organizations that distribute food to people in need.

Community fridges are a public option for those who are in need of food. These refrigerators are stocked with food donations from individuals and businesses, and are accessible to anyone in the community who may be in need.

Gleaning is another practice that helps reduce food waste. It involves collecting leftover crops from farms after the harvest, and distributing them to people in need.

Finally, **meal sharing** is a way to share meals with others. This can be done informally or through organized events, such as community dinners or potlucks. Sharing

meals not only helps reduce food waste but also promotes a sense of community and social connection.

Food sharing is a significant approach to tackling food insecurity and minimizing food waste. It involves the redistribution of excess food to those in need, which not only provides access to healthy and nutritious meals but also diminishes the environmental consequences of food waste. In addition, food sharing encourages social connections and solidarity among members of a community, strengthening its cohesion.

Sustainability potential

To promote sustainable practices, the ecological benefits of resource efficiency in production and consumption, as well as the promotion of regional, closed nutrient cycles should be considered.

In terms of economic benefits, indirect benefits such as increasing food security and promoting a circular economy should also be noted.

Social benefits, including access to healthy nutrition, participation, and social justice, also play an important role. Additionally, education and awareness for sustainable nutrition are key.

Various technologies that can serve as alternatives to landfilling food waste are emerging, ranging from small commercial businesses to large organizations, providing a complete spectrum of food waste management opportunities that are economically and environmentally viable.

Food processing technologies can be classified into three main categories: biological digestion, non-biological reduction of volume/weight, and thermal processing.

Composting: The natural breakdown of food waste by microorganisms into nutrient-rich soil amendment. Can be done in a small or large scale.

In-vessel composting: Controlled decomposition of food waste in a closed container, producing high-quality compost that is free of pathogens and pests.

Vermicomposting: Using worms to break down food waste into nutrient-rich compost to fertilize plants and gardens.

Food waste-to-energy: Technologies that convert food waste into energy through processes such as combustion, gasification, and pyrolysis.

Anaerobic Digestion: Breaking down organic matter (e.g. animal or food waste) to produce biogas and biofertilizer without oxygen in a sealed tank called an anaerobic digester.

Thermal Hydrolysis: is a two-step procedure that includes subjecting waste to high-pressure boiling, followed by rapid decompression. Subsequently, bacteria digest the waste sludge anaerobically, resulting in the generation of substantial biogas yields.

Aerobic Digestion: involves the decomposition of food waste in the presence of oxygen through the action of naturally occurring organic bacteria.

Mechanical Processing: involves the utilization of mechanical blades to grind or shred food waste while water is present, resulting in the formation of a pulp. This pulp is subsequently pressed to eliminate a significant portion of its water content.

Thermal processing

Waste to energy incineration: This method involves combining municipal solid waste (MSW) and capturing residual heat to generate electricity and heat.

Pyrolysis: Pyrolysis is the process of breaking down organic material at high temperatures without oxygen. This results in the production of char, oil, and gas that can be used for energy or other purposes.

Gasification is a technology that transforms carbon-based substances, including organic waste and products derived from fossil fuels, into carbon monoxide (CO), hydrogen (H2), and carbon dioxide (CO2). These resulting gases can then be used to generate electricity and heat.

These technologies have several benefits, including the reduction of greenhouse gas emissions, diverting food waste from landfills, and producing valuable resources like compost and energy. However, the feasibility and effectiveness of each method may

vary depending on factors such as the amount and type of food waste produced, available infrastructure, and local regulations and policies.

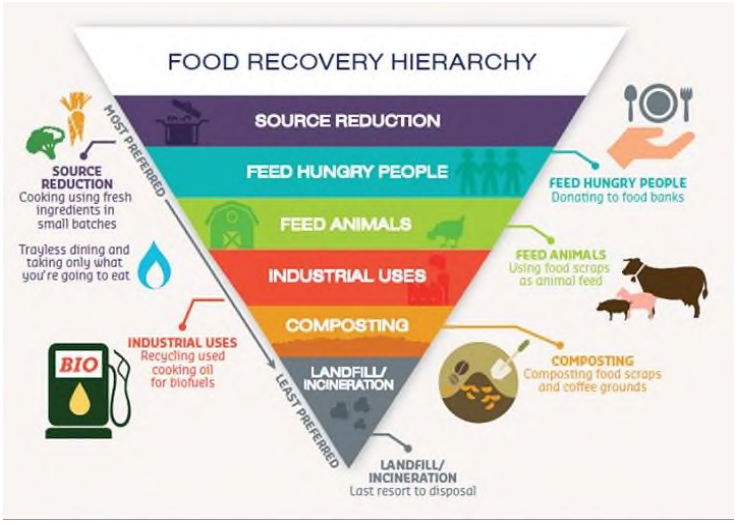

Fig. 1.1 Food Recovery Hierarchy [78]

Additionally, an extensive investigation by MIT scholars has revealed fresh insights into the attributes of regions that have adopted food waste recycling programs. Among these findings is that food waste recycling initiatives are being implemented across the nation and not just in affluent coastal regions with active environmental movements.

"You don't have to be Seattle to have excellent waste management," says Lily Baum Pollans Ph.D. '17, a recent doctoral graduate of MIT's Department of Urban Studies and Planning and the corresponding author of the new paper outlining the study's results.

Paying for garbage collection policies, commonly known as "pay as you throw" (PAYT), are often implemented in cities that have food-scrap recycling programs. This policy charges residents for exceeding a certain amount of garbage, making them more involved in waste collection by encouraging them to limit and sort their trash. As a result, the adoption of PAYT policies can facilitate the implementation of food scrap recycling programs.

"Having a 'pay as you throw' policy seems to make everything else easier," says Jonathan S. Krones PhD '16, a visiting scholar in the MIT Department of Materials

Science and Engineering and a graduate of MIT's Institute for Data, Systems, and Society. [28]

CHAPTER 2
WAYS OF ENHANCEMENT OF ECOSYSTEM IN UKRAINE THROUGH ZERO WASTE

2.1 Analysis of disposal system in food business

The food processing industry is taking significant steps to minimize waste by-products, recycle processing and packaging materials, save energy and water. Manufacturers can minimize the amount of waste sent to landfills and promote waste reuse by adopting the principles of waste management known as the three R's: Reduce, Reuse, and Recycle.

Additionally, a pyramid model has been created to provide a multisensory experience for individuals when interacting with food. The model starts with the preliminary level of interacting with food and progresses to biting, chewing, and swallowing. Its goal is to introduce different tastes, textures, and temperatures of food to enhance the experience.

EPA's Food Recovery Hierarchy

For food processors and beverage producers, the Food Recovery Hierarchy from the EPA is a valuable tool to establish a program that will have the greatest positive impact on the environment, society, and the company itself.

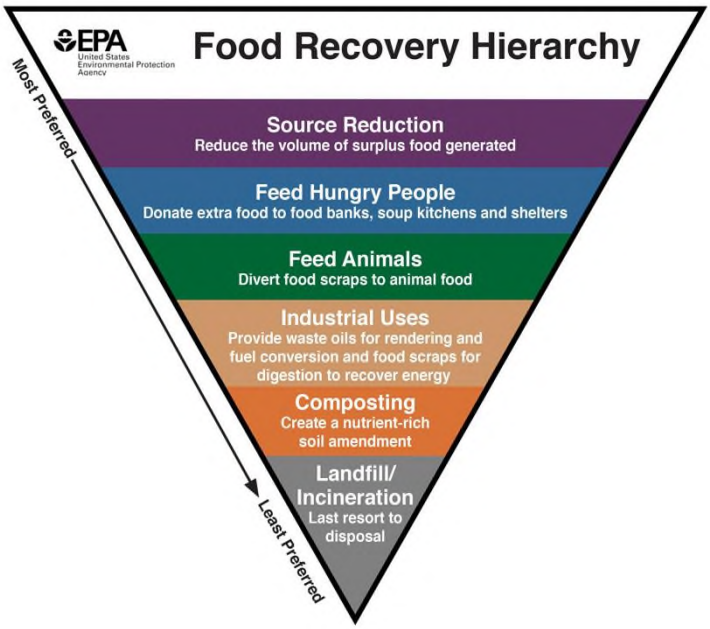

Fig. 2.1. EPA's Food Recovery Hierarchy [26]

It's important to note that food and beverage producers worldwide are actively seeking sustainable and profitable waste management options instead of landfill, such as making animal feed, composting to create fertilizers, anaerobic digestion for biogas production, recycling/reusing waste for other industries, and feeding surplus food to people in need.

According to a report by PMMI Business Intelligence, nearly two-thirds of food manufacturing companies are searching for recyclable packaging solutions, and most brand owners have made significant changes to increase the ease of recycling packaging substrate materials.

The majority of materials being pursued are recyclable (64%), followed by compostable and variety/multi-packs (both 30%), plant-based packaging (24%), multi-container formats (14%), and material reduction (4%).

One Director of Process Engineering at a frozen and fresh meat, poultry, and seafood manufacturer said, "Our goal is zero landfill, so we're looking for plant-based packaging materials to be more recyclable or compostable."

An Engineering Sr. Manager at a cereal and grains manufacturer said, "By 2025, our sustainability goal is to reduce the impact of our carbon footprint with 100% recyclable, compostable, or degradable packaging."

According to the report "2019 Trends and Advances in Food Packaging and Processing," three out of five participants are also making processing and packaging changes to extend shelf-life, prevent contamination, and present a more sustainable consumer package. 36% percent of participants are testing sustainable materials, and 30% are introducing flexible formats. 13% are exploring bag-in-a-box, and seven percent are incorporating barrier films as well as single-serve convenience packaging.

All in all, what is food waste?

Food waste encompasses any food that is not consumed, whether it is thrown away, spoiled, or left uneaten on plates, at any point in the food supply chain, including production, processing, distribution, and consumption. The Food and Agriculture Organization of the United Nations estimates that around one-third of the world's food production is lost or wasted annually, creating significant environmental, economic, and

social problems. It depletes natural resources, increases greenhouse gas emissions, and causes food insecurity for many individuals.

The three primary categories of food waste are as follows:

Pre-consumer waste: This category encompasses food that is thrown away during production, processing, or distribution. This includes fruits and vegetables that are rejected due to imperfections or damage or food that spoils during transportation.

Post-consumer waste: This category includes food that is discarded by consumers, such as leftover food or uneaten food on plates.

Food loss: This category refers to food that is lost before it can reach the market due to spoilage, pests, or other factors.

Reducing food waste is an essential aspect of promoting sustainable food systems. This can be accomplished by implementing measures such as improving supply chain management, reducing portion sizes, donating surplus food to food banks, and composting food scraps. By minimizing food waste, we can protect natural resources, reduce greenhouse gas emissions, and enhance food security for everyone.

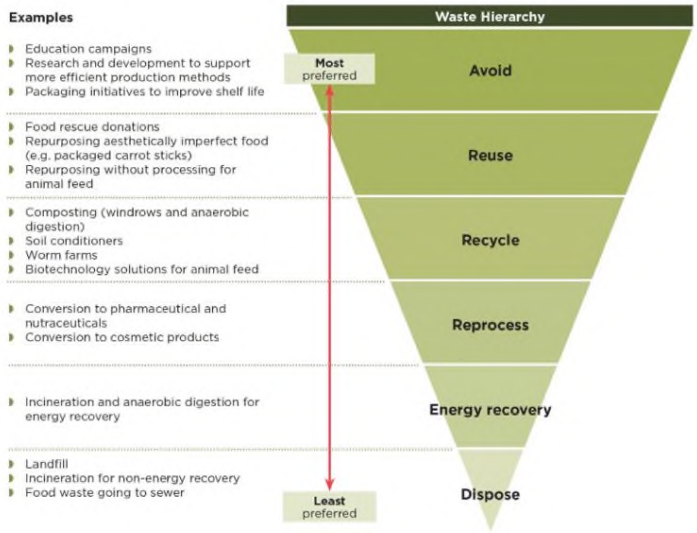

Fig. 2.2. Examples of Waste Hierarchy [76]

Food waste management

To begin with, food waste is the main issue, and it is only getting worse. The Daily Mail states that by 2050, the world will have to produce double the amount of food it

currently does to feed a growing population. With so many people in need of food, the issue of food waste has become an important one.

Here are the steps to manage food waste:

Source reduction: Reduce the amount of food waste generated at the source by reducing overproduction, portion sizes, and spoilage.

Food recovery: Collect and distribute food that would otherwise go to waste to people in need, such as through food banks and donation programs.

Composting: Break down food waste into nutrient-rich soil, which can be used to fertilize gardens and farms.

Anaerobic digestion: Break down food waste in an oxygen-free environment to produce biogas, which can be used to generate electricity or heat.

Recycling: Turn food waste into new products, such as animal feed, biofuels, and even new food products.Food waste management is the activities and actions required to manage food waste.

This includes collecting, transporting, treating, and managing food waste and monitoring and regulating the food waste management process.

Collection of food waste: Collection systems that ensure clean food waste is brought to treatment.

Treatment of food waste: Food waste treatment alternatives, from windrow composting to anaerobic digestion.

Food waste disposal: Food waste can be composted to produce soil and fertilizer, fed to animals, or used to produce energy or fuel.

To manage organic waste from food processing plants, one option is to use modern in-vessel composting technology. Through this process, organic waste can be turned into high-quality fertilizer that can be used for landscaping or sold as organic fertilizer.

This approach has multiple benefits, including reducing greenhouse gas emissions from landfills, improving soil quality, and reducing the need for landfill space.

Additionally, using commercial food recycling machines in manufacturing and hospitality can help reduce food waste and promote sustainability. Ready-made compost can also be purchased for household or agricultural use.

Utility companies operate large-scale bio-digestion facilities that use a sealed biodigester where the amount of oxygen is minimized, a process referred to as anaerobic digestion. Biodigesters can process not only food waste and organic matter such as tree cuttings but also municipal and industrial waste.

One effective solution for managing organic waste in food manufacturing plants is to use anaerobic digestion to biologically break down the waste. This process takes place in a sealed biodigester where the oxygen level is minimized. During this process, the organic waste is broken down into biogas and digestate. Biogas is a source of energy that can be used as a heating fuel in the plant or converted into electricity using a combined heat and power (CHP) unit. The digestate, on the other hand, is a nutrient-rich material that can be used as a soil conditioner.

Biogas can also be converted into biomethane or bio-CNG for use as a vehicle fuel. This process is called biomethanation and is becoming increasingly popular due to the rising demand for cleaner fuels. By using biomethane or bio-CNG as a vehicle fuel, food manufacturers can reduce their carbon footprint and contribute to a more sustainable future.

In addition to managing organic waste through anaerobic digestion, food manufacturers can also recycle other materials like cardboard, clean plastic, metal, and paper. These materials are all commodities that can be sold to recyclers, reducing waste and generating revenue for the company.

Cardboard boxes are particularly useful for food manufacturers, as they are commonly used for supplies and packaging. These boxes can be broken down into flat pieces and sold to recyclers. Alternatively, they can be reused to temporarily store chip packages before being placed into retail distribution boxes.

Food manufacturers can also use "jet shredder" waste technologies to separate and recover packaging materials in-house. This technology separates film, cardboard, and foodstuffs, all of which can be recycled separately. By implementing these waste management strategies, food manufacturers can reduce their environmental impact, save money, and contribute to a more sustainable future.Effective food waste management is important for several reasons. It helps to reduce greenhouse gas emissions, conserve

resources, and feed people in need. It also helps to reduce the amount of waste that ends up in landfills, where it can contribute to environmental pollution and other problems.

Reprocess food waste: making functional materials

According to the Food and Agriculture Organization of the United Nations, fruits and vegetables are the most wasted food products globally, with wastage rates estimated at 45% along the supply chain. However, with advances in chemistry, biology, and engineering, it is now possible to repurpose these by-products into functional and valuable products. This not only reduces waste but also creates new revenue streams for food manufacturers and processors.

Here are the ways to reprocess food waste into functional materials:

Extracting natural fibers: Food waste such as citrus peel, coconut husks, and banana stems can be processed to extract natural fibers that can be used to make textiles, paper, and other products.

Creating bio-based polymers: Food waste such as shrimp shells and eggshells can be processed to create chitosan, a biopolymer that can be used to make films, coatings, and other products.

Producing bioactive compounds: Food waste such as coffee grounds, fruit pomace, and grape seeds can be processed to extract bioactive compounds such as antioxidants, which can be used in dietary supplements, cosmetics, and other products.

Making animal feed: Food waste such as bread, vegetables, and fruit can be processed to create animal feed, reducing the amount of food waste that goes to landfills. Current research focuses on exploring the potential applications of root vegetable fibers in creating incredibly strong concrete, as well as investigating the use of mango seeds in producing surfboard wax. Rice husks, known for their silica content, offer a wide range of possibilities in various fields, including cement production, insulation, adsorbents, and construction materials. They can even be combined with glass to form lightweight, fire-resistant bricks that are resistant to termite damage.

Reprocessing food waste opens up opportunities beyond traditional waste management. For instance, fruits and vegetables contain valuable nutrients not only in their edible parts but also in the often-discarded portions like peels, pulp, and leaves.

These parts are rich in bioactive phytochemicals, plant-derived chemical compounds. Extracts from food waste can be used in dietary supplements, pharmaceuticals, and food preservatives, reducing further food waste. Additionally, extracts and oils derived from food waste can be valuable ingredients in high-quality cosmetics. [76]

Reduce food waste

Food waste is a growing problem in today's world due to changes in consumption patterns and food distribution systems that present increasing challenges for food waste management. Globally, one-third of the food produced for human consumption is lost or wasted every year, which is more than enough to feed the nearly 1 billion hungry people worldwide. To reduce food waste, people should be encouraged to eat all shapes and sizes of fruits and vegetables, and companies can use "ugly" produce in their products. Additionally, food waste can be repurposed to make other resources, such as compost for soil enrichment or renewable energy through anaerobic digestion facilities.

Waste management costs have become a serious issue in many countries due to the increasing costs of urban waste collection, transportation, and processing. Municipalities have assessed their waste management programs in recent years, and waste management has increasingly important political implications, particularly in the European Union. The EU has established clear targets for waste reduction and recycling as part of its action plan for a Circular Economy. The plan includes targets to recycle 65 and 75% of all waste by 2025 and 2030, respectively, as well as recycling 60 and 70% of urban waste by these dates. The EU also aims to reduce the share of waste going to landfill to 25% in 2025 and 5% in 2030.

The cost of disposal and processing refers to the expenses associated with managing and disposing of waste materials.

The main provisions in the cost of disposal and processing are:

Collection: The cost of collection involves the expenses associated with collecting waste materials from homes, businesses, and other sources. This includes the cost of vehicles, fuel, labor, and equipment needed to collect and transport the waste.

Processing: The cost of processing involves the expenses associated with converting waste materials into a form that can be safely disposed of or recycled. This could involve sorting, shredding, compacting, or incinerating the waste.

Landfilling: The cost of landfilling involves the expenses associated with disposing of waste materials in a landfill. This includes the cost of land, equipment, labor, and maintenance needed to operate and maintain the landfill.

Recycling: The cost of recycling involves the expenses associated with processing waste materials into new products. This includes the cost of equipment, labor, and energy needed to recycle the materials.

Environmental compliance: The cost of environmental compliance involves the expenses associated with complying with environmental regulations and standards. This includes the cost of permits, monitoring, reporting, and remediation activities needed to ensure that waste materials are managed safely and responsibly.

Cleaner Production

To produce in a sustainable manner, the United Nations Environment Program (UNEP) introduced the concept of cleaner production (CP) in 1989. The main objective of CP is to prevent environmental problems rather than relying on end-of-pipe solutions or clean- up operations.

The key principles of cleaner production include conserving natural resources such as water, energy, and raw materials, as well as avoiding end-of-pipe treatments. To achieve sustainable development, cleaner production involves rethinking products, processes, and services.

For the example, here is overview of Italian Waste Production and Costs.

In this section, I provide a short overview of the separately collected waste in Italy in 2017, illustrate the percentage of recycling waste and provide costs in Euro for a kg of recycling waste in the period 2011–2017. As displayed in Figure 1, the European target of 50% of collected waste was not reached during this period by all Italian regions.

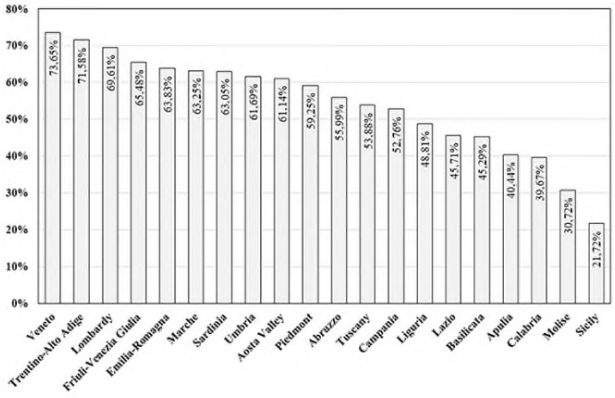

Table 2.1. Percentage of separate waste by regions, 2017

During the period under review, there were noticeable differences between regions. In 2017, the country failed to achieve the national goal of 50% separate waste collection in seven out of 20 regions, meaning Italy as a whole did not meet the target. The highest and lowest rates of separate collection were found in Veneto (73.65%) and Sicily (21.72%), respectively. The regions that fell short of the target were all located in southern Italy, except for the northern region of Liguria.

As shown in Table 1.2., the urban waste collection and recycling percentages increased over time between 2011 and 2017. Still, differences remained across the three macro-areas, and rates were consistently higher in the north than in the central and southern areas. On average, the overall national waste recycling rate was around 50%. These results reflect changes in the waste collection rate, a key step for any waste recycling activities.

Geographic area	2011	2012	2013	2014	2015	2016	2017
North	51.07	52.73	54.41	56.66	58.63	64.24	66.19
Center	30.24	33.07	36.43	40.84	43.76	48.60	51.87
South	23.93	26.52	28.78	31.27	33.61	37.63	41.90
Italy	37.75	39.98	42.28	45.20	47.49	52.55	55.54

Table 2.2 Percentage recycling urban waste

Table 1.4. shows costs (in Euro per kg) of recycling waste across Italy, and (among other things) that costs of collecting and recycling it are lower in the north than in the center and south of Italy.

Geographic area	2011	2012	2013	2014	2015	2016	2017
North	10.86	15.77	15.99	15.49	15.57	14.95	14.66
Center	15.78	21.98	19.58	22.21	22.19	21.49	20.62
South	23.45	30.35	27.40	26.08	27.05	24.14	24.97
Italy	13.42	18.99	18.38	18.53	18.99	17.84	17.88

Table 2.3. Cost of recycling waste (Euro per Kg)

Data

The information used for this research is sourced from the Italian Institute for Environmental Protection and Research (ISPRA) annual statistical report on the waste sector, which adheres to Eurostat and European Environmental Agency guidelines. The large volume of data collected in this report has provided unique analytical opportunities.

To establish the boundaries of our waste system, we begin at the point of waste collection for recycling and end when waste has been processed and converted into a secondary material that can be reprocessed or reused and sold, with costs expressed net of the revenues generated from selling the secondary materials.

The variables used in our econometric model are the cost of recycling urban waste (TC) in Euros per kg of recycled waste, including only direct costs such as waste collection, treatment, and recycling. We exclude indirect costs, such as administrative and transport costs, to estimate the effects of cost determinants.

The second variable is the amount of recycling waste (Q) produced at the municipal level, including organic, paper, cardboard, glass, wood, metal, plastic, textile, electric, electronic, bulky, mixed, and recovery waste. Both variables were converted into log

form. The macro-area of Italy is also controlled for, based on the Eurostat NUTS-1 classification, to consider cross-regional variations.

$$D_{1i} = \begin{cases} 1\ i = 1 \\ 0\ \text{otherwise} \end{cases} \quad D_{2i} = \begin{cases} 1\ i = 2 \\ 0\ \text{otherwise} \end{cases}$$

$$D_{3i} = \begin{cases} 1\ i = 3 \\ 0\ \text{otherwise} \end{cases} \quad D_{4i} = \begin{cases} 1\ i = 4 \\ 0\ \text{otherwise} \end{cases} \quad D_{5i}$$

Fig. 2.2. The log form of controlling the macro-area (Eurostar NUTS-1 classification)

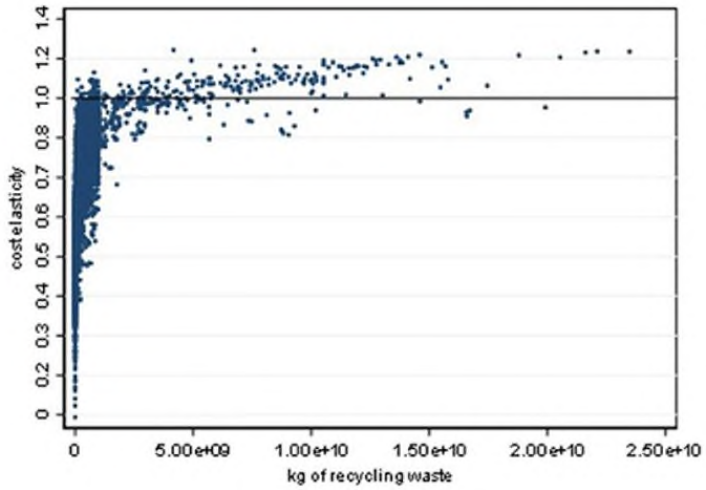

Table 2.4. Cost elasticies of recycling waste

Here: i = 1 is the north-west of Italy (Aosta Valley, Piedmont, Lombardy, Liguria) and the reference group of regions, i = 2 is the north-east (Friuli-Venezia Giulia, Veneto, Trentino-Alto Adige, Emilia-Romagna); i = 3 is the center (Tuscany, Marche, Lazio, Umbria), i = 4 is the south (Abruzzo, Molise, Campania, Basilicata, Apulia, Calabria), and i = 5 is the islands (Sicily and Sardinia).

Variable	Category	Mean	Std.dev.	Min	Max	Obs.
lnTC	Overall	20.68	2.51	10.39	26.99	$N = 24,674$
	Between		2.38	12.05	26.37	$n = 5,520$
	Within		1.03	13.55	27.01	T-bar = 4.47
lnQ	Overall	17.88	2.36	3.93	23.88	$N = 24,677$
	Between		2.24	4.61	23.58	$n = 5,521$
	Within		0.94	6.21	24.06	T-bar = 4.47

Table 2.5. Descriptive statisticsy

The statistics describing the costs and quantities of collected and recycled waste reveal significant variation, as shown in Table 3. It is important to highlight that our dataset is exceptional due to its large number of observations. Furthermore, a group of Italian municipalities demonstrates diseconomies of scale, but only at higher levels of waste recycling output.

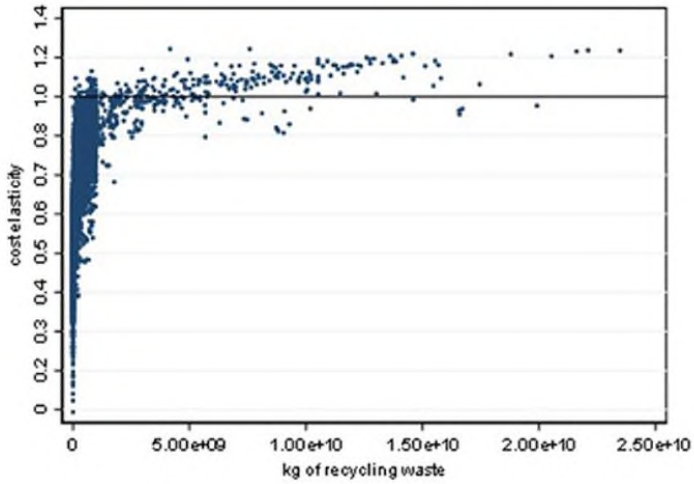

Table 2.6. Cost elasticities of recycling waste

A scatter plot of the predicted marginal costs for recycling waste is presented in:

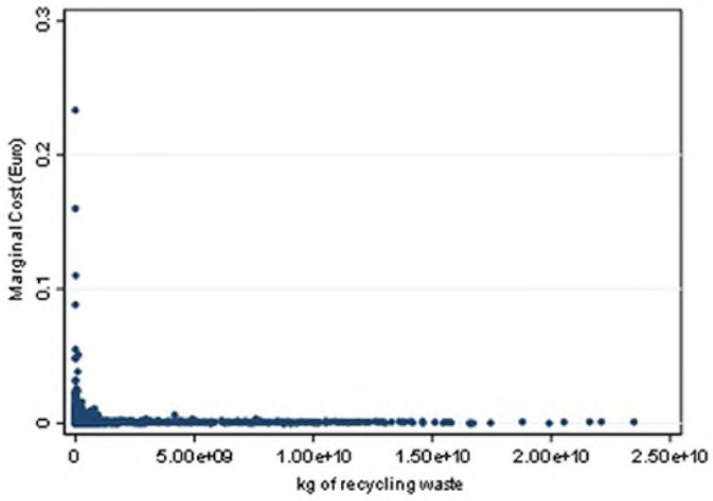

Table 2.7.Marginal costs of recycling waste

This study aims to estimate the cost function of recycling urban waste in Italy by using a fixed-effect municipal-level model with data from the ISPRA for the years 2011-2017. The dataset includes information on the total costs and quantity of recycling waste produced by over 3,000 municipalities. Previous research in this area rarely included cost elasticities and marginal costs of waste recycling, making this study's findings particularly novel.

The results of the econometric model reveal that most municipalities in Italy exhibit increasing returns to scale in waste recycling. The marginal cost trends suggest that after decreasing, the cost becomes constant regardless of the additional amount of waste recycling, indicating that the increase in recycling by municipalities has no impact on costs.

The study also shows that there is a cost advantage to collecting and recycling waste when the amount of recycling waste increases and does not exceed 500 billion kg. However, over this amount, recycling waste activities have higher costs and lower economies of scale, although the cost elasticity increases at a decreasing rate.

These findings can guide policymakers in determining the optimal level of waste recycling needed to avoid surpassing constant returns to scale. Increasing waste recycling would also result in a decrease in unsorted waste sent to landfills, which would have significant health and environmental benefits. Additionally, it would reduce

pollutants and greenhouse gas emissions while conserving non-renewable raw materials. The marginal cost of recycling waste appears to be high at the outset, likely due to high fixed costs.

However, as production increases, the marginal cost decreases and eventually becomes nearly constant, indicating that additional recycling waste may not result in higher costs. Policymakers could leverage this information to increase recycling waste levels, particularly in small municipalities where there are increasing returns to scale.

2.2 Core issues in waste management problems

To begin with, properly managing waste has various benefits for the local community. In addition to avoiding negative consequences, waste management can also be a catalyst for change. By creating jobs and improving health, entire communities can be revitalized.

Waste management is one of the biggest challenges facing humanity and the planet due to the continued trend of industrialization and economic growth. This has resulted in an increase in municipal solid waste, particularly in densely populated cities.

There are several key issues associated with waste management problems. One of them is the inefficient collection and disposal of waste, leading to littering and illegal dumping, which can cause environmental pollution, health hazards, and other issues. Overconsumption and waste generation, a lack of awareness and education, limited infrastructure and resources, hazardous waste management, and economic and political factors are also significant challenges.

Addressing these issues requires a comprehensive approach that involves public awareness campaigns, education and training, policy and regulatory frameworks, investments in infrastructure and resources, and cooperation between stakeholders, including government, industry, and communities.

Identifying the needs

If waste generation is not managed effectively, it can have a negative impact on all countries, regardless of their socio-economic development. However, the challenge is greater for developing countries with less developed infrastructure. These countries

often face several problems in their waste management system, such as inadequate waste collection coverage, irregular collection services, uncontrolled open dumping and burning without proper pollution control, and poor management of informal waste picking or scavenging activities.

Why it's so important

Inefficient waste management can have devastating effects on the community, posing a threat to the environment. Polluted water from dumps and disposal sites can cause serious pollution of surface water, which in turn can harm marine life and lead to a decline in the health of local populations.

As an example of recycling, I came across a project that focused on collecting and recycling various household items from the trash. The assignment required the collection of plastic and metal in equal quantities and the creation of a research report.

Over the course of several weeks, a variety of items were collected for recycling. Four plastic milk pack containers were collected in the first week, followed by three plastic bottles found on the street in the second week. Five plastic plates were found in the third week, and six plastic tea cups in the fourth week. In the fifth week, three plastic dustbins were collected, followed by five hair combs in the sixth week. Twelve ballpoint pens were collected in the seventh week, and plastic lunch boxes were collected in the eighth week. Plastic shopping bags were collected in the ninth week due to their frequent use and negative impact on the environment. Finally, plastic balls used for children's play were collected in the last week of the recycling experiment

.1 ton = 1000kgs

1 Kg = 1000gms

Therefore 1 ton = 1000 x 1000 = 1,000,000gms

1,000,000gms = $1500

Therefore, 1gm = 1500/1,000,000

1gm = $0.0015

As we have 512gms = $0.768

Which = 76.8cents

Items	Quantity	Weight(grams
Plastic Milk Containers	4	120gms
Plastic Bottles	3	60gms
Plastic Plates	5	50gms
Plastic Tea Cups	6	30gms
Plastic Dustbin	3	90gms
Hair Combs	5	25gms
Ball point pen	12	30gms
Plastic Lunch boxes	7	84gms
Plastic shopping bags	8	8gms
Plastic balls	5	15gms
	TOTAL	**512gms**

Table 2.8. Calculation of distribution of plastic and metal

Data Collection Procedure

The necessary items for the assignment were collected and then sorted according to their purpose and type of plastic material. After arranging them in a sequence, it was easier to determine the quantity and size of each item in the inventory

Inventory Management

The assignment required adding a new type of plastic material to the inventory each week for a total of ten weeks. Managing the inventory was simple as the storage area was spacious, and ten shelves were designated to store each type of plastic material separately. This prevented any confusion or mixing up of the items.

Storage Management

The management ensured that the storage area was cleaned thoroughly and properly. Hence, the counting and inspection of all the different plastic recyclable was to be done without any hassle.

Plastic Issue

Over the course of ten weeks, the experience of recycling plastic provided valuable insight into the significance of this practice. It is crucial for individuals to recognize and fulfill their social and ethical obligations when it comes to recycling, especially considering the potential consequences of excessive plastic use. To make global progress in this area, a shift in attitudes is necessary, and spreading awareness of the importance of recycling is a critical first step. By doing so, we can all take responsibility for the well-being of our planet and its inhabitants.

Composting is a traditional waste reduction method that has been used for a long time. It involves breaking down organic solid waste in an oxygen-rich environment, resulting in the production of useful fertilizers. Humus, a byproduct of composting, is helpful for plant growth and can be used on both small and large scales to reduce organic waste.

Composting is a natural way of recycling that has a significant impact on reducing waste, mitigating climate change, and promoting healthy soil. It is a powerful tool that allows us to convert food scraps and yard waste into a valuable soil amendment, leading to environmental protection and the development of strong communities.

Composting is a practical way to recycle the food scraps and yard trimmings generated in your household throughout the year, as well as to manage your waste in a more sustainable manner. It has numerous benefits, such as:

- Reduces the volume of materials that would otherwise go to landfills or incinerators.
- Prevents powerful greenhouse gases from being emitted into the atmosphere.
- Involves minimal effort, equipment, expense, and expertise.
- Produces a free, high-quality soil amendment that reduces the need for fertilizers and pesticides.
- Helps build healthier soil, prevent soil erosion, conserve water, and improve plant growth in gardens and yards.

Additionally,

By composting, there are benefits for the environment, economy, and society. This includes reducing the amount of organic waste that goes to landfills, which limits the production of harmful gases like methane. Composting also reduces the need for chemical fertilizers and pesticides that can negatively impact the environment. In addition, composting can be a cheaper option than landfill disposal, as the compost can be sold or used as a valuable soil amendment.

Composting has various advantages, such as environmental benefits, economic benefits, and social benefits. Through composting, less organic waste is sent to landfills, which reduces the production of methane and minimizes the use of harmful fertilizers and pesticides. Additionally, composting is often less expensive than landfill disposal and can create employment opportunities in the waste management and agricultural sectors, which can benefit local communities.

The practice of composting offers advantages for the environment, economy, and society. These include reducing the amount of organic waste that ends up in landfills, which reduces greenhouse gas emissions such as methane. Composting also provides a cost-effective alternative to landfill disposal, as the resulting soil amendment can be sold or used on-site. Furthermore, composting can generate jobs in the waste management and agricultural sectors, creating opportunities for economic growth and social development.

Of course, there are also challenges with composting:

Technology and facilities: The effectiveness of composting relies on having the right technology and facilities, which can be costly to establish.

Regulatory requirements: Composting sites need to meet state and federal guidelines, which can make the process more complicated and expensive.

Public perception: Despite the safety and usefulness of properly managed compost, some individuals may have reservations about utilizing composted soil due to concerns about contaminants or pathogens.

All in all, composting can be a cost-effective waste management solution in areas with significant organic waste production, supportive policies, and public awareness. However, its competitiveness can be affected by various factors such as the availability

of other waste management alternatives, the costs associated with composting infrastructure and technology, and regulatory compliance. In some instances, composting may not be the most economical option available, but it can still be an essential means of promoting sustainability and environmental responsibility.

What You Can Compost

What You Can Compost at Home	**What to Avoid Composting at Home**
Nitrogen-Rich Material ("Greens")	Meat, fish and bones
Food and vegetable scraps	Cheese and dairy products
Most grass clippings and yard trim	Pet waste and cat litter
Coffee grounds and paper filters	Produce stickers
Paper tea bags (no staples)	Fats, oils and greases
Eggshells (crushed)	Glossy paper
	Treated or painted wood
Carbon-Rich Materials ("Browns")	Aggressive weeds/weeds with seeds
Dry leaves	Diseased and pest-infested plants
Plant stalks and twigs	Compostable food service ware and compostable bags
Shredded paper (non-glossy, non colored) and shredded brown bags	Cooked food (small amounts are fine)
Shredded cardboard (no wax coating, tape, or glue)	Herbicide treated plants
Untreated wood chips	Dryer lint

Table 2.9. What You Can Compost [29]

To sum up, composting results in carbon-rich humus that contains plant nutrients and can be produced through different methods, including windrow composting, tunnel composting, in-vessel composting, and composting toilets. Compost can be used to enhance the quality of soil for gardens, lawns, indoor plants, and trees by mixing it into

the top layer of soil or using it as a mulch. Using compost in this way reduces the need for chemical fertilizers and pesticides that can harm the environment.

On another note, human activities such as driving, home heating, and using electricity from non-renewable sources produce greenhouse gas emissions. The amount of greenhouse gases produced by an individual can vary depending on their location, behavior, and choices.

To give specific examples:

- Your household's greenhouse gas emissions from electricity usage will depend on the types of fuel used by your power plant and the amount of electricity you consume.
- The emissions from your home's heating system will depend on factors such as the size and insulation of your house, the efficiency of your furnace or boiler, and the type of fuel used.
- The greenhouse gas emissions from your vehicle will depend on factors such as how much you drive, the fuel efficiency of your vehicle, and your driving habits.
- Furthermore, enhancing your recycling efforts can effectively decrease the amount of waste deposited in landfills.

Fig. 2.3. The Carbon Footprint [30]

The carbon footprint is a gauge used to quantify the level of greenhouse gas emissions, particularly carbon dioxide (CO2), that result from human activities. Analyzing and researching the carbon footprint involves recognizing the origins of emissions, pinpointing places where emissions can be minimized, and devising tactics to alleviate the consequences of emissions.

Here are some steps involved in research and analysis of carbon footprint:

Data Collection: Collect data on sources of emissions, such as energy use, transportation, and waste generation.

Emissions Inventory: Develop an inventory of greenhouse gas emissions produced by each source, such as CO2 emissions from energy use and transportation.

Analysis: Analyze the emissions inventory data to identify areas where emissions can be reduced.

Setting Goals: Set goals for reducing emissions based on the analysis, such as specific targets or general commitments.

Implementation: Develop and implement strategies to reduce emissions, such as adopting energy-efficient technologies and using renewable energy sources.

Monitoring and Evaluation: Monitor and evaluate the effectiveness of the strategies in reducing emissions by tracking data and making adjustments as necessary.

2.3 The foundation of Zero waste Ukraine

Zero waste is a philosophy that promotes reducing waste generation, maximizing recycling and reuse, and minimizing the amount of waste that ends up in landfills. Implementing zero waste principles can lead to enhanced ecosystems in Ukraine by reducing pollution, conserving natural resources, and promoting a more sustainable economy. Here are some ways in which zero waste can enhance ecosystems in Ukraine:

1. **Reduction of pollution:** Implementing zero waste principles can reduce the amount of pollution in the environment, particularly air and water pollution. By reducing the amount of waste that goes to landfills, the amount of methane and other greenhouse gases emitted into the atmosphere can be minimized. This can

improve air quality and help mitigate the impacts of climate change. Additionally, by reducing the amount of waste that ends up in waterways, the quality of water resources can be improved, benefiting aquatic ecosystems and human health.

2. **Conservation of natural resources:** Zero waste principles promote the reuse and recycling of materials, which conserves natural resources and reduces the environmental impacts of resource extraction and processing. By using resources more efficiently, the pressure on ecosystems and biodiversity can be reduced.
3. **Promotion of sustainable economy:** Zero waste can promote a more sustainable economy by creating jobs in the recycling and reuse sectors, reducing the need for waste disposal infrastructure, and reducing the cost of waste management. This can create economic opportunities for local communities while reducing the environmental impacts of waste management.
4. **Reduction of litter:** Zero waste principles can also help reduce litter in urban and natural environments, improving the aesthetic value of public spaces and reducing harm to wildlife. By promoting waste reduction and responsible disposal, zero waste can encourage people to take greater responsibility for their waste

When embarking on a journey towards a more sustainable lifestyle, you will encounter a choice between two approaches: zero waste and low impact. But what sets these movements apart?

The zero waste movement emerged in 2000, evolving from the aspirations of recycling activists who aimed for a world with "No Waste." Over time, it has grown into a comprehensive lifestyle embraced by individuals worldwide.

At its essence, the zero waste movement revolves around a singular objective: preventing waste accumulation on our planet. To achieve this ambitious yet crucial aim, zero wasters concentrate on two key aspects: waste prevention and transforming resource lifecycles.

In simple terms, adherents of zero waste principles strive to generate no trash. They actively avoid using single-use plastics and non-compostable products. This means refraining from candy bar wrappers, disposable coffee cup lids, plastic ballpoint pens, and numerous other items that contribute to waste generation.

Hence, another fundamental objective of the zero waste movement is to establish a circular economy. By manufacturing products using renewable, recyclable, and easily compostable resources, we can halt the expansion of landfills and the formation of plastic-ridden patches in our oceans.

On the other hand, as the name suggests, the low impact approach is a sustainable lifestyle that seeks to diminish one's ecological footprint through everyday actions and habits. From supporting local businesses and reducing meat consumption to avoiding single-use plastics, the choices we make on a daily basis directly influence the future of our planet. Although these choices may appear insignificant in isolation, their cumulative impact becomes significant, especially when adopted by a larger population.

While long-term decisions like purchasing a smaller home or limiting air travel contribute to the low impact movement, it is the daily choices that exert a more substantial influence on the world around us.

The key distinction between the zero waste and low impact movements lies in their focal points. The zero waste movement concentrates on waste generation, whereas the low impact movement encompasses the entirety of one's ecological footprint.

As individuals, we cannot do everything. However, we have the power to decide where to allocate our time, energy, and financial resources.

Zero waste and low impact are two concepts that are often used in discussions of environmental sustainability. While they share some similarities, there are also important differences between the two concepts. Here are the main differences between zero waste and low impact:

1. **Focus:** Zero waste is primarily focused on reducing waste generation and maximizing resource efficiency. The goal is to create a closed-loop system where all waste is reused, recycled, or composted. Low impact, on the other hand, is focused on minimizing the environmental impact of human activities across all areas of life, including transportation, energy use, food choices, and more.
2. **Scope:** Zero waste is focused specifically on waste reduction, whereas low impact has a much broader scope that includes other environmental impacts, such as greenhouse gas emissions, air and water pollution, and land use.

3. **Implementation:** Zero waste is often implemented through specific waste reduction strategies, such as reducing packaging, promoting reuse, and composting organic waste. Low impact, on the other hand, is implemented through a range of strategies that can vary widely depending on the context, such as reducing energy use, choosing sustainable transportation options, and supporting regenerative agriculture.
4. **Metrics:** Zero waste is often measured in terms of the amount of waste generated and diverted from landfills or incineration. Low impact is measured using a range of metrics, such as carbon footprint, water use, and biodiversity impact. [32]

The Zero Waste Alliance Ukraine is a group of Ukrainian activists and organizations that are dedicated to solving Ukraine's waste problem. Their primary objective is to advocate for reform of Ukraine's waste and resource management system. The organization is a grassroots movement that aims to promote sustainable waste management practices and reduce waste generation across Ukraine. It was founded by a group of environmentally conscious citizens, waste management experts, and activists who recognized the need to tackle Ukraine's growing waste crisis urgently.

The Zero Waste Ukraine movement is based on the principles of the global Zero Waste movement, which emphasizes the importance of a waste-free society that prioritizes the reduction, reuse, and recycling of materials. The organization recognizes that waste is a result of unsustainable production and consumption patterns rather than an inevitable byproduct of modern life. They aim to promote sustainable practices that eliminate waste and preserve natural resources.

Since its official founding in 2018, the organization has been working to raise public awareness about the significance of waste reduction and sustainable waste management practices. Their activities include public education campaigns, waste audits, and advocacy efforts to influence public policy and promote best practices in waste management. Zero Waste Ukraine has also been working to establish partnerships with businesses, NGOs, and government agencies to promote the adoption of sustainable waste management practices. Additionally, they have been developing innovative

solutions, such as composting and recycling programs, to reduce waste generation while advocating for a circular economy that prioritizes resource efficiency and waste reduction.

A resident of a zero waste city produces no more than 6 kg of garbage per year. Everything else is sorted, composted or reused. Zero waste cities do not have landfills or incinerators. Residents live by the principle of "reduce, reuse, recycle" — they prevent unnecessary acquisition, reuse and sort. Also, this concept involves giving up everything disposable (dishes, bags...). All organic waste is composted.

Brand audit is conducted by activists in cities of different countries. They check the contents of garbage cans and identify the biggest companies that pollute the environment. The purpose of this action is to understand what is actually in our garbage cans, and which business is involved in the production of this or that container, packaging, and garbage. In Ukraine, organizations that are part of Zero Waste Alliance Ukraine conducted brand audits three times (2019-2021). Polluting companies are addressed with opportunities to reduce their waste.

Also, we can consider another Ukrainian sorting station - No Waste Ukraine.

The public sorting station is primarily an educational platform that changes people's habits and builds new skills. It changes the idea of garbage, because when you sort, the garbage disappears.

What do they do?

1. **Public education campaigns:** Zero Waste Ukraine organizes public education campaigns to raise awareness about the importance of waste reduction and sustainable waste management practices. The organization holds workshops, seminars, and other events to educate the public about the impacts of waste on the environment and the benefits of adopting Zero Waste principles.
2. **Waste audits:** Zero Waste Ukraine conducts waste audits to assess the composition and quantity of waste generated in different communities and sectors. The organization uses the results of these audits to identify opportunities for waste reduction and to develop tailored solutions for different communities.

3. **Advocacy and policy development:** Zero Waste Ukraine advocates for the adoption of policies and regulations that promote sustainable waste management practices. The organization works with government agencies and other stakeholders to develop and implement policies that support waste reduction, reuse, and recycling.
4. **Innovative solutions:** Zero Waste Ukraine develops and promotes innovative solutions for reducing waste generation and promoting resource efficiency. The organization has been involved in the development of composting and recycling programs, as well as initiatives aimed at reducing packaging waste and promoting sustainable consumption.

They not only teach you how to sort, but also help you get rid of disposable items in your life forever. In their shop you can buy your coffee cup, water bottles, shopping bags and balls, books for children and adults and your first bamboo toothbrush.

Let's take a look at how a waste collection initiative at your doorstep works:

1. You put clean and dry recyclables + non-liquid plastics into a bag of 120 liters (you can not sort, we will do it for you). Please check our policies carefully to ensure that your packages do not contain prohibited or hazardous waste.
2. Separately put textile waste into a 20 l, 60 l or 120 l bag, following the rules for accepting textile waste.
3. You order the service and wait for the UBS Courier to arrive within 2-5 working days, depending on whether the Courier was in your area this week or not.

Regarding the cost of the service, we can consider the table:

UWR Uklon	UWR Delivery
waiting time	
delivered on the day of the order	3-5 working days
min number of packages	
1 60l / 120l (in Kyiv)	3-5 working days 2/ 120l (in Kyiv) 20/ 120l (radius of 20km)
max number of packages	
2/ 120l	85 / 120l (in Kyiv) 20/120l (radius of 20km)
work shedule	
Mon - Fri 9:00 to 20:00 Sat - Sun - holiday	Mon - Fri 10:00 to 17:00 Sat - Sun - holiday

Table 2.10. The cost of NWU delivery [33]

What to do if you do not live in Kyiv and want to sort, but are not sure about the responsibility of local operators who provide a separate collection service? Or if you don't have a place to dispose of non-liquid plastics? UBS has also created a solution for you!

From July 23, 2020, you can also send your hopeless clothes and shoes for disposal by mail. This option can be selected directly in the "Plastic by Post" application form. Unreliable clothes are exclusively those that are completely unfit for wear.

Personally, the most interesting thing at the station is the opportunity to give plastic a second life in the recycle workshop.

How does the service work?

You talk about your idea and the masters look for a solution to implement it as best as possible.

They manufacture parts or the entire product using recycled materials. Masters are currently experimenting with the following materials:

– polypropylene ("PP");

– low-density polyethylene ("LDPE");

– solid polystyrene ("PS");

– dense polyethylene ("HDPE");

– polycarbonate ("PC");

– filament made of PLA plastic.

And what they can do?

- facing materials for furniture from "HDPE", "LDPE" materials;

- table tops for furniture made of "HDPE", "LDPE" materials;

- plastic tiles for internal cladding of premises made of "HDPE", "LDPE" materials;

- beams for benches made of "HDPE", "LDPE" materials;

- various design products (wall clocks, foams, etc.) with "HDPE", "LDPE", "PP", "PS". [33]

CHAPTER 3
THE UTILIZATION OF LOCALITY OF PRODUCTS AS A COMPETITIVE ADVANTAGE

Businesses in the food and agriculture sectors can gain a significant advantage over their competitors by leveraging the fact that their products are locally sourced. Such products have various advantages, for example, they are fresher and of higher quality, which leads to lower transport costs and emissions, and also contributes to the development of the local economy. As a result, businesses can use the location of their products in several ways to gain a competitive advantage.

Highlighting local ingredients: Promote the use of local ingredients in products to stand out from competitors. This is particularly effective for food and beverage producers who can highlight the unique flavors and characteristics of local ingredients.

Emphasizing sustainability: Utilize locally sourced products to demonstrate commitment to sustainability. By reducing transportation and supporting local agriculture, businesses can reduce their carbon footprint and contribute to the development of more sustainable food systems.

Building community partnerships: Create a reliable and sustainable supply chain by building partnerships with local farmers and suppliers. Supporting local agriculture can also help businesses build relationships with the community, demonstrating their commitment to supporting the local economy.

Leveraging local branding: Use local branding and marketing to differentiate from competitors. By promoting products as locally sourced, businesses can tap into the growing demand for local and artisanal products.

3.1 Basic concepts of locality of products in different businesses

The idea of a producer to localize pertains to a producer suts a specific market or geographical area. Here are some basic concepts of locality of products in different businesses:

In the food and agriculture industry, product locality is essential, with a growing emphasis on using local and sustainable products, as locally sourced food is typically perceived as fresher, healthier, and better for the environment.

In the tourism sector, product locality refers to utilizing locally made goods and services, such as local cuisine, handicrafts, and guides, to support local economies and conserve cultural heritage.

For retailers, product locality means providing products that are relevant and accessible to a specific market, often by adjusting product offerings to local tastes and preferences.

In manufacturing, product locality involves producing goods in a specific location to minimize supply chain disruptions, transportation expenses, and to support local economies.

For service industries, product locality involves adapting services to meet the requirements of local customers, which may include customizing marketing strategies or providing services that are specific to a geographic region**.**

Although the internet and social media have offered the promise of a worldwide market, some companies have realized the advantages of emphasizing their:

- location
- proximity, availability, and promptness of delivery
- local expertise and knowledge
- utilization of local ingredients and components in their products or services.

During the pandemic, smaller local businesses were able to fulfill customer needs more promptly than larger online competitors.

Based on practical experience and research, it can be inferred that any business operating in a particular area should carefully consider localization to streamline their operations

. To begin, it is important to understand what a business location is and why it is significant for a business. A business location is the physical space or building that a company uses to carry out its activities. This encompasses any facility or establishment used for conducting business.

The capital construction industry should focus on areas that provide access to ample water and soil resources, as well as sufficient space to build a large plant, preferably located in the outskirts of urban areas to minimize disruption to city residents. [34]

The proper selection of a business location has an impact on several factors. These factors can be categorized into two types:

- Supply factors
- Demand factors

1. Supply factors

Supply factors consider the expenses associated with operating a business in a particular location. Examples of these supply factors are:

- **Labor:** The cost of hiring workers to perform a task varies based on location. An abundance of labor in a specific area can increase labor costs, as opposed to a location where there is a limited pool of workers.

Let's analyze examples of my practice at Royal Engineering. Each factory has many employees, given the scope of work - these can even be professions that are difficult to imagine in this field, especially in the field of capital construction. So, in this company there are about 40-50 professions, each of which has 4-5 people with different degrees of knowledge.

- Land cost: The cost of land can differ across various locations based on whether it is leased or purchased outright. Additionally, the expenses associated with improvements made to the land can also impact its overall cost.

  For instance, a manufacturing plant located on a vast piece of land located far from the city might need to be expanded due to increased demand, upgraded equipment, and technological advancements. This could lead to higher fees for the land.

- Non-financial factors: Factors that are not directly financial, such as political stability, language, social amenities, and government support, can affect the decision to choose a business location and the associated costs.

- Energy cost: The expenses associated with energy consumption can vary based on the country, the type of business production, and the number of employees hired. For instance, the cost of energy in the UK may differ from that of Germany.

Currently, with the state of war in the country, production is more difficult due to constant blackouts. So, in the absence, generators are used, which take a significant amount of money, due to the huge scale of production, and the large amount of work.

- Transportation cost: This refers to the cost of transporting raw materials, finished products, and other essential business inputs to and from the business location. It is crucial for the business location to be in close proximity to its raw materials or services supply to reduce transportation costs. For instance, in the food processing industry, business locations are often located near the farm to minimize transportation expenses.

Building construction is a constant transportation of both materials and workers, and of course ready-made buildings to the place of construction. [35]

2. Demand factors

Demand factors refer to factors that impact the services provided to customers and business revenue. These factors include:

Skilled labor: Businesses seek locations where they can find the right expertise. For instance, in the construction industry, there are various categories of engineers, mechanics, and fitters, and each has different ranks with higher earnings for more dangerous work.

Location suitability: Some businesses perform better in specific environments. For example, hotels in the hospitality sector are often located in popular tourist destinations. In contrast, in the construction industry, company offices are typically located in cities, while the construction sites are located further from city centers due to noise and other considerations.

Customer convenience: A business must be located where customers can easily access its products or services. For example, a coffee shop located in the city center provides convenience to customers.

Future expansion: A business location that allows flexibility for future growth is crucial. For example, a manufacturing business with potential for growth and expansion should choose a larger venue in the beginning to provide flexibility for future facility expansion.

Selecting the right business location is essential for business success, and it offers several benefits, including attracting and retaining skilled workers, striking a balance between business costs and revenues, offering necessary infrastructure for business growth, positioning the business to take advantage of government policies and grants, ensuring the smooth running of business operations, and providing an ideal location to attract enough traffic or maintain business confidentiality.

In addition, let's spread the localization to the product from the client side.

Consumers often prioritize purchasing from local suppliers due to the convenience of proximity and the desire to reduce their carbon footprint by minimizing travel distance. This trend has been accommodated by online search engines like Google, which now uses location-based results.

Being a local supplier can be a competitive advantage, not only for B2C transactions but also for B2B deals, as it assures businesses of quick issue resolution and potentially lower overhead costs.

The familiarity and trustworthiness of local suppliers have also become increasingly appealing to consumers, leading to a loyal customer base and a more personalized purchasing experience. While locality may not be the sole factor in purchasing decisions, it is gaining more significance.

Next, I want to present 6 **online ways to be visible locally:**

Local Search Engine Optimization (SEO): Optimize your online listings like Google My Business to increase your visibility in relevant searches. Provide detailed descriptions of your products/services, business hours, payment methods, and relevant categories. Upload photos of your business premises, products or services, and your company logo. You can also post updates to showcase any special news or offers.

Social Media: Make sure your social media content highlights your local presence. Include your location in your profile and use locally-focused content and

stories in your posts. Instagram, Facebook, and YouTube are great platforms for advertising to potential clients.

Your website's content: Make sure your business address and contact details are easy to find on your website. If your business operates in more than one location, create a unique page for each location to expand your local ranking potential.

Endorsements: Encourage customers to review your business on key review sites such as Facebook, Google Business Review, Trustpilot, and others relevant to your industry. Profile these on your website too and include that customer's location against the endorsement.

Groups: Utilize local social network groups by lending support and advice.

Online advertising: Consider online advertising if your market is competitive, even locally. Be precise about the territory you want your ads to cover, and use more detailed search phrases rather than generic terms.

In summary, these online marketing strategies can help you be more visible locally and attract larger numbers of customers closer to home.

Of course, let’s see the offline ways o be visible in the current location:

Local Sponsorships

Consider sponsoring a local sports team, community event, or charity fundraiser. This can be a great way to increase brand awareness in the community, as well as show support for causes that align with your company's values.

Direct Mail

While it may seem old-fashioned, direct mail can still be effective in certain situations. Consider sending postcards or flyers to targeted neighborhoods to promote your business or special offers. This can be especially effective for local businesses that rely heavily on foot traffic.

Vehicle Wraps

If you have a company vehicle, consider getting it wrapped with your branding and messaging. This can be a great way to increase visibility while on the road, and can also make your business look more professional and established.

Networking Events

Attending local networking events can be a great way to meet other business owners and potential customers in your area. Consider joining your local Chamber of Commerce or other business associations to get involved in the local business community.

Referral Programs

Encourage your existing customers to refer new customers to your business by offering incentives or rewards for referrals. This can be a great way to increase word-of-mouth marketing and generate new business from within your local community.

Community Involvement

Getting involved in local community events and causes can be a great way to increase visibility and show support for the community. Consider volunteering, donating to local charities, or participating in community events to get your business more involved and recognized locally.

3.2 The main decisions in capital investment in businesses

Making decisions about investing capital is a crucial part of a business's overall strategy, as it involves the allocation of financial resources towards long-term projects and investments that are expected to generate future returns. In order to make informed capital investment decisions, businesses often follow a series of steps, which may include:

Project Identification: The first step involves identifying potential projects that are aligned with the company's long-term goals. This can involve brainstorming sessions, market research, and consultations with experts in the relevant fields.

Cost-Benefit Analysis: Once potential projects have been identified, the next step is to conduct a cost-benefit analysis. This involves evaluating the financial feasibility of each project by estimating the costs involved in implementing the project, as well as the expected returns on investment. This could include cash flow projections, expected profits, and other financial metrics.

Risk Assessment: Investing capital involves risk, so it's important for businesses to assess the risks associated with each potential project. This can involve identifying potential risks, evaluating the likelihood of those risks occurring, and developing strategies to mitigate or manage them. For example, a business may decide to invest in a project with high potential returns, but also high risks, and may choose to mitigate those risks by purchasing insurance or taking other protective measures.

To achieve future growth, companies need to invest in long-term assets, such as new equipment or facilities. **Capital investment** decisions are strategic choices that allocate financial resources towards these long-term investments, which are expected to generate returns. This process involves several crucial steps. First, the company identifies potential projects that align with its long-term goals. Secondly, it assesses the financial feasibility of these projects by conducting a cost-benefit analysis to estimate the expected returns and project costs. Thirdly, it assesses and mitigates risks associated with each project.

After the project is identified and evaluated, the company needs to determine how to finance it. This could be done through internal funds or external financing, such as loans or equity. Once the project is financed, it is time to implement it by hiring staff, purchasing equipment, and other necessary activities. After the project is implemented, it is crucial to monitor its progress and evaluate its success, including tracking financial performance, identifying areas of improvement, and making necessary adjustments.

Capital investment decisions occur frequently and play a crucial role in a company's development. These decisions involve a lot of uncertainty, and the long-term financial impact may not be immediately known. Long-term assets may depreciate over time, and the returns on investment may increase or decrease over time. Therefore, it is essential for a company to carefully determine its project needs and establish a clear path for business development.

Capital decision-making is a multi-step process that involves determining the financial requirements for both new and existing projects, setting limitations on available resources, establishing criteria for evaluating alternatives, and ultimately making a decision. Capital investments are often sought by companies for various

reasons, including diversification, modernization, and expansion of business operations. Examples of capital investments may include land acquisitions that businesses can use for development or expansion purposes.

. Some specific types of capital investments include:

- **Land:** Companies may buy bare land to be used for development or expansion.

Considering the place of my practice, as a reminder, Limited Liability Company Royal Engineering, the production is located on a relatively large area, far from the city center, which allows the production to work at full capacity without worrying about the fact that it disturbs the city dwellers.

- **Buildings:** Companies may buy existing buildings for manufacturing, storage, production, or headquarter operations.

The territory of Royal Engineering is large, which allows to widely place all construction processes, as well as offices, living spaces, warehouses, and other additional buildings.

- **Assets Under Development:** Companies may incur spending over time to assemble assets that may be capitalized. For example, a company can build its own building; the accumulation of charges may be considered a capital investment.

That is why the company lays down an additional budget for periods of construction of buildings for its own use, for the repair of machines and equipment, and for other additional and unforeseen expenses.

- **Furniture and Fixtures:** Though furniture and fixtures may be more temporary in nature, certain aspects of accounting rules result in some overlap between FFE and capital investments.
- **Machines:** Companies that invest in the production elements of making goods are making capital investments.

In capital construction, large equipment is expensive and, of course, has its useful life, so the company lays down an additional budget for it.

- **Software Development or Computing Devices:** Companies more frequently invest capital to build software; these costs now commonly qualify for capitalization and amortization over time.

Currently, the company introduces new technologies, starting from the smallest: websites, online forms to fill in, in case of employment, dismissal, or vacation, and to the big ones - the development of new machines to speed up work and make it easier for workers with heavy objects and dangerous work.

3.3 The main characteristics of capital construction and food business comparison through locality of products

Capital construction and food businesses have different characteristics, but both can benefit from the utilization of locality of products as a competitive advantage. Here are some main characteristics of each industry and how they compare in terms of utilizing local products:

Capital construction:

- Involves the construction of buildings and infrastructure
- Typically involves large-scale projects with long-term timelines
- May require specialized equipment and skilled labor
- Local products may not be as relevant in this industry, as the focus is more on construction materials and equipment than on food products
- However, capital construction businesses can still benefit from utilizing local suppliers and contractors, which can help reduce transportation costs and support the local economy

Food business:

- Involves the production, processing, and distribution of food products
- Can range from small-scale artisanal operations to large-scale industrial production
- Quality and freshness of ingredients are critical to the success of the business
- Customers are increasingly interested in locally sourced, sustainable, and artisanal food products

- Utilizing local products can help food businesses differentiate themselves from competitors and attract customers who value high-quality and locally sourced food products

It is essential to recognize that utilizing local products may require a different approach depending on the industry, whether it is capital construction or food businesses. Capital construction may concentrate on engaging local suppliers and contractors to support the local economy and lower transportation costs, while food businesses may prioritize acquiring local ingredients to ensure the quality and freshness of their products.

Moreover, businesses conduct a business location analysis to determine the most appropriate location for their operations. This process involves comparing the features of various locations and considering factors such as labor costs, tax rates, market demand, and access to resources and infrastructure, among others.

1.Demographic analysis

This pertains to analyzing the population of a specific area, taking into account various factors such as average age, income, education level, occupation, and regional governance.

Now let's compare the localization of products for two different industries, namely product business and capital construction. These industries operate in distinct spheres and require different considerations such as accommodations, transportation, and economy.

For food businesses, it is important to choose a location that attracts customers. The place should always have a crowd, and the overall atmosphere should align with the customers' preferences and moods. Generally, the more people that pass by a business, the higher the chance of attracting visitors.

On the other hand, when selecting a site for a factory, various factors such as climate, geography, strategic industrial areas close to transportation routes, availability of natural gas, electricity, and fast connectivity need to be considered. These factors support productivity and efficiency.

2. Location area analysis

This analysis examines the areas that offer the greatest potential customer base for a business, as well as the accessibility of those areas to the business location.

When it comes to incentivizing a factory's location, proximity to both customers and the supply chain is crucial. The ideal location would be equidistant from suppliers and customers.

Moreover, during the factory's construction, it is important to consider the possibility of future expansion. If the company is expanding, it is more practical to expand the factory's existing territory rather than searching for new land.

3. Traffic analysis

This analysis involves comparing the number of people who pass by different business locations during working hours, including both automobile and foot traffic. The aim is to identify a location that can provide the business with maximum exposure.

When it comes to traffic, for businesses like restaurants, cafes, or similar establishments, it is important to choose a location that is easily accessible and has ample parking. If parking is difficult to find or limited, potential customers may choose to dine elsewhere.

For factories, the location should be close to transportation routes so that various means of transportation, such as cars, trains, or planes, are available for delivery. A shorter distance to transportation routes can help reduce the cost and time involved in delivery.

4. Economics of location analysis

The analysis aims to reduce the cost of operations and investment for your business. Operational costs are those involved in the daily running of your business.

The economic factor is undoubtedly the most important purpose of the construction mission. Obviously, you'll be working within a tight budget, but it's worth finding out if there are city, county, and state incentives for building in an area that might otherwise be out of your price range.

On the other hand, if the cheap price category is located far from the city, this leads to an increase in prices for delivery and the term of work.

The same situation with restaurants - the economy has a significant impact on the location.

To conclude, the utilization of locality of products can be a valuable strategy for businesses in both the capital construction and food industries. By supporting local suppliers, reducing transportation costs, and tapping into the growing demand for locally sourced and sustainable products, businesses can differentiate themselves from competitors and attract customers who value high-quality and locally sourced products.

CONCLUSION AND PROPOSALS

In conclusion, the utilization of locality as a competitive advantage in global business is a critical strategy for organizations seeking to differentiate themselves in the global marketplace. By leveraging the unique characteristics and resources of their local area, businesses can create products and services that resonate with consumers and drive success in the global economy.

The aim of this diploma program is to equip with the knowledge and skills needed to leverage the unique characteristics and resources of their local area as a competitive advantage in the global business landscape. Through this program, learners will gain a deep understanding of the importance of local business ecosystems and how to effectively navigate them, build relationships with local partners, and implement sustainable practices that create a competitive edge in the global marketplace. The ultimate goal is to enable learners to create products and services that meet the needs of global consumers while staying true to their organization's values and mission, and contribute to a more sustainable and equitable future for all.

The tasks of this scientific work were to study basic concepts of recycling, analyze disposal system in the food business, provide basic concepts of food sharing and technologies on food waste recycling, analyze of the competitiveness of composting, find out main differences between zero waste and law impact, systemize information concerning “The foundation of Zero waste Ukraine, conduct research of the waste management of products as a competitive advantage on Royal Engineering case, identify the main decisions in capital investment in businesses, formulate the main characteristics of capital construction and food business comparison through locality of products.

Upon the completion of the work, it can be confidently stated that the objective of this endeavor has been successfully achieved by accomplishing all assigned tasks.

The first section provides the necessary overview of basic concepts of recycling, and basic concepts of food sharing and technologies on food waste recycling. Moving through we can considered that

Recycling is essentially the practice of gathering waste materials that would otherwise be discarded as trash and transforming them into fresh products. Engaging in recycling can bring advantages to both your community and the environment.

Since each material is made of different things, it needs to be broken down in its own way. By delving into the matter of waste management and analyzing its impact on international business development, we can decide that there are some steps to recycle materials. For example, by collection, sorting, processing, conversation, and manufacturing. Waste management has its own major advantages and disadvantages. The most important advantages said that recycling minimizes pollution, it can work with open-loop and closed-loop systems, saves energy and CO2, recycling minimizes global warming, and helps to make and save money.The main disadvantages are that recycling takes time and effort, high upfront capital costs, recycling sites are always unhygienic, unsafe and unsightly, also, it might not be inexpensive, and, the finally, recycling increased processing cost and low-quality jobs. Also, there are some key issues in waste management, some of them are: inefficient waste collection and disposal systems, overconsumption and waste generation, lack of awareness and education, limited infrastructure and recourses, hazardous waste management, and economic and political factors. Addressing these core issues requires a comprehensive approach that involves public awareness campaigns,education and training, policy and regulatory frameworks, investments in infrastructure and resources, and cooperation between stakeholders, including government, industry, and communities. Food waste occurs at all stages of the food supply chain, from production and processing to distribution and consumption. It can be categorized into three main types: pre-consumer, post-consumer waste, and food loss. Additionally, there are several ways to reprocess food by extracting natural fibers, creating bio-based polymers, producing bioactive compounds, and making animal feed. Food sharing is a nascent and relatively less explored subject that necessitates a comprehensive understanding of prior research through a literature review. Within the realm of reducing food waste, numerous studies pertaining to food sharing focus on macro-level aspects such as socio-ecological, geographical, economic, and cultural dimensions. Key concepts within this domain include food recovery, donation

initiatives, community fridges, gleaning, and meal sharing. Food sharing plays a significant role in addressing food insecurity and combating food waste.

The second section provides analysis of disposal system in the food business, core issues in waste management problems, and the foundation of zero waste Ukraine. In search of information, I found an interesting pyramid “EPA’s Food Recovery Hierarchy” that starts with interacting with food on preliminary level and working up to biting, chewing, then swallowing. The goal is to provide a multisensory experience with the goal of introducing different tastes, textures, and temperatures of food. To continue, let’s take a closer look at it. According to food waste, it refers to any food that is discarded or uneaten, either at the retail, consumer, or industrial level. This includes food that is thrown away, spoiled, or left uneaten on plates. Having gathered extensive theoretical data and conducted thorough research, a comprehensive analysis was conducted to explore the intersection of waste management and business development within the framework of economic globalization. The second phase of the project focused on identifying methods to enhance and improve business development in this context. Various approaches for improvement were examined and scrutinized, both at the individual business level and on a broader scale.

In conclusion, composting serves as a time-honored strategy for minimizing waste. It involves the aerobic decomposition of organic solid waste and represents a significant form of recycling organic waste to generate valuable fertilizers. The end product of composting is humus, which contributes to plant growth and serves as an effective means of reducing organic waste at various scales, whether small or large.

We can compost different things from paper tea bags and eggshells to dry leaves and shredded paper.

In addition, the carbon footprint serves as a metric to gauge the quantity of greenhouse gas emissions, specifically carbon dioxide (CO2), generated by human activities. It is essential to understand the distinction between zero waste and low impact approaches. Zero waste aims to halt the accumulation of waste on our planet, while low impact represents a sustainable lifestyle that seeks to diminish one's ecological footprint through daily actions.

Furthermore, organizations implementing waste management policies exert a powerful influence and act as catalysts for business development. It can be deduced and concluded that waste management has proven to be a highly effective framework for business, enabling expansion, growth, and success while ensuring economic progress and transformation on a global scale.

The third section gathers all the previous data and analysis in order to show the basic concepts of locality of products in different businesses, the main decisions in capital investment in business, and the main characteristics of capital construction and food business comparison through locality of products.

The internship took place at limited liability company “Royal Engineering”, a private licensed business in the Unified State Register of Enterprises and Organizations of Ukraine. The HR manager role assigned during the internship proved to be demanding, encompassing a multitude of responsibilities and tasks. Nevertheless, it proved to be a rewarding experience. The internship successfully achieved its objective and provided a valuable opportunity to apply theoretical knowledge gained at the university in a practical setting.

The report extensively examined the organization's profile, competitiveness, and the prevailing business environment, along with other relevant economic factors. The conclusion and analysis presented in the report unequivocally assert that “Royal Engineering” is well-established business, although with its own weaknesses. At the “Royal Engineering” enterprise, the mission “**A new quality of life - we provide you and your loved ones with the opportunity to purchase high-quality and comfortable housing at affordable prices**” is applied. As a rule, this means that the company will deliver own patented production, own logistics base and technique, and professionalism. According to that, we can overview some ways that businesses can utilize the locality of their products as a competitive advantage, as highlightning local ingredients, emphasizing sustainability., building community partnerships, and leveraging local branding.

The overall conclusion and recommendation for the company “Royal Engineering” is look for any opportunities to rebuild buildings and cities, in general - choose already available places, look for cost-effective materials, and start work, constantly improve production - find new technologies, and constantly make work easier, for speed and quality, also, for employees, develop more systems of bonuses and incentives, since in capital production everything happens within the framework of one production, and a vacation or bonus may not be enough for motivation. For example, holding business breakfasts, seminars, or business meetings. All in all, pay attention to the PR and marketing department - communicate more with clients using various types of advertising and offline interaction.

The internship itself was a pleasurable and insightful experience, and offered a lot of valuable knowledge as well as practical skills. The provided recommendations and experiences have been duly considered in conjunction with the theoretical framework during the dedicated analysis of strategies for improving and fostering business development within the waste management framework. This formed the focal point of the third section of the project.

One of the purposes of this paper was to study waste management and its effect on international business development through a concrete business in order to demonstrate its importance in the world. By analyzing and studying this subject, the conclusion is that the reach of waste is truly global and affect every single person on this planet. It has broken down barriers, changed the principles of how the economy, the society and the world works. It has paved the path for international business development, through political, social events and technological advancements. It has established the current norms and trends of trade, business, intergovernmental and business relations, etc. The effects are both positive and negative, but it is up to the world right now to decide where everything will be headed. However, what is paramount, is that the importance of waste as a whole is truly universal.

By participating in this diploma program, you have acquired the necessary knowledge and skills to effectively recognize and leverage the potential offered by local business ecosystems. You have gained insights into the significance of fostering

connections with local partners, understanding the regulatory framework specific to the locality, and implementing sustainable strategies to establish a competitive edge in the global business arena. Furthermore, the utilization of recycling practices in local business operations can also contribute to the competitive advantage of an organization. Recycling not only benefits the environment, but it also provides businesses with opportunities to reduce costs and improve their reputation among consumers who are increasingly conscious of sustainability. By implementing effective recycling strategies, businesses can reduce their waste output and preserve valuable resources, which can in turn enhance their reputation as socially responsible organizations.

As you continue to explore the utilization of locality as a competitive advantage in global business, remember that incorporating sustainable practices such as recycling into your business operations can also provide a competitive edge. By embracing sustainable practices and leveraging the unique resources and characteristics of your local area, you can create a strong and distinctive brand identity that resonates with consumers, differentiates your organization from competitors, and contributes to a more sustainable future for all.

As you move forward in your career, remember to stay adaptable, stay innovative, and stay connected to your local community. By continuing to explore and leverage the unique resources and characteristics of your local area, you can create products and services that meet the needs of global consumers while staying true to your organization's values and mission.

Congratulations on earning your diploma in the utilization of locality as a competitive advantage in global business. You are now equipped with the knowledge and skills needed to make a positive impact in the global economy and contribute to a more sustainable and equitable future for all.

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