Cornerstone International
Community College of Canada

Good night everyone!

HARDWARE ENVIRONMENTAL IMPACT

Analyzing Correlations and Testing Hypotheses

NAME OF PROJECT:
Data Analysis of Hardware Environmental Impact

PRESENTED BY:
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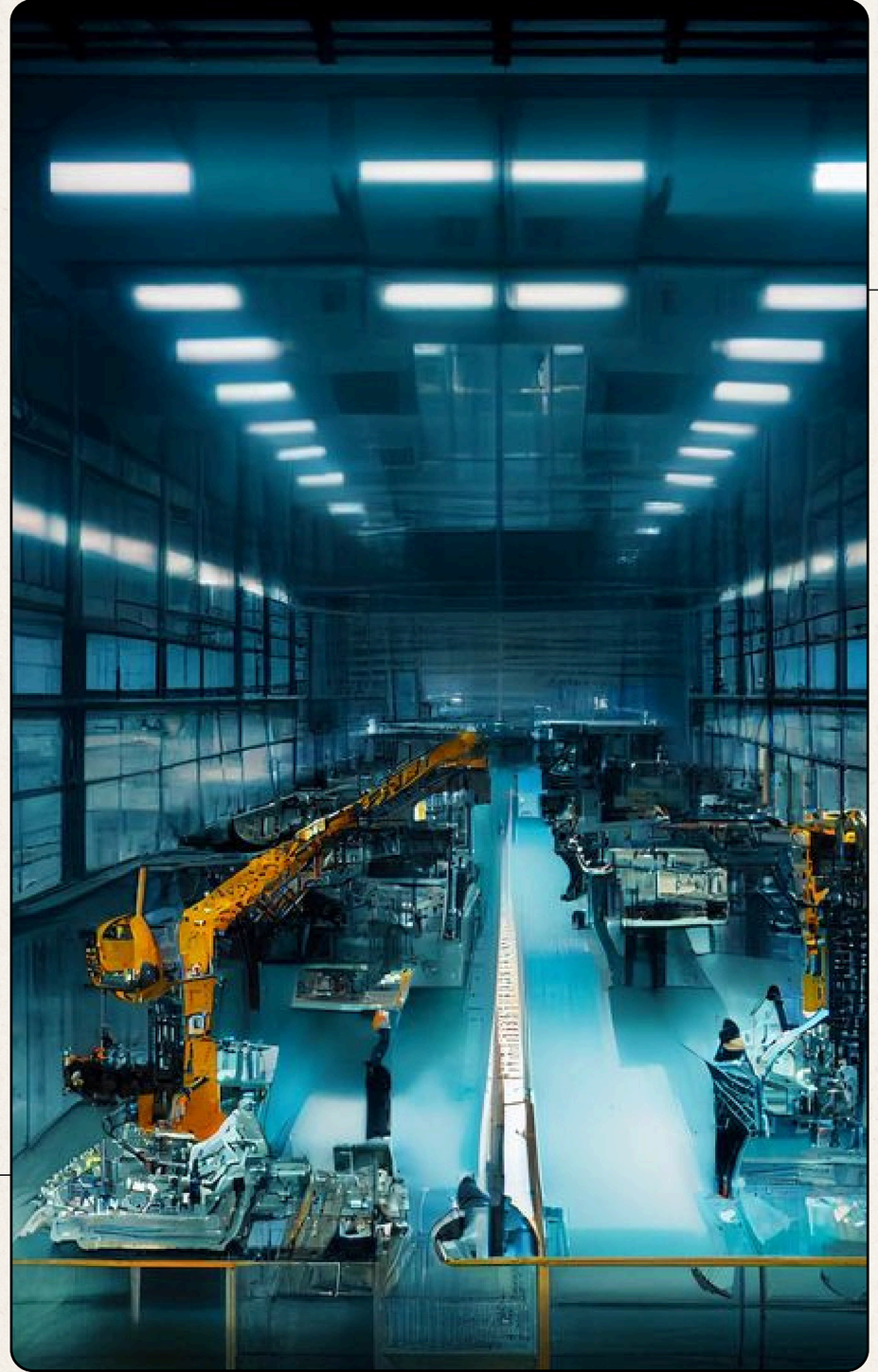
Agenda

01	Introduction
02	Objective and Goals
03	Stakeholders *
04	Manufactures
05	Municipalities
06	Improvements

Objectives and Goals

Looking forward to finding statistically driven solutions for hardware lifetime (e-waste and industrial processes)

Structure a meaningful project that solves stakeholders' problems or helps them take advantage of the information to improve their own macro decisions for e-waste management.



For industrial processes, we mean:

- Manufaturing
- Devices preparation
- Transportation / Logistics

STAKEHOLDERS

On this project, we consider all possible stakeholders as partners to work with, mainly those most closely related or affected by the hardware's environmental impacts. Those can be considered clients or employers.

Manufacturers

Device producers
Hadware Industry

Municipalities

City Halls and Government agencies

Investors

FUTURE WORK
e-waste Recycling companies

Manufacturers

(H1) Higher product weight correlates with higher manufacturing emissions. [Rejected]

#1 Variable(s) Involved

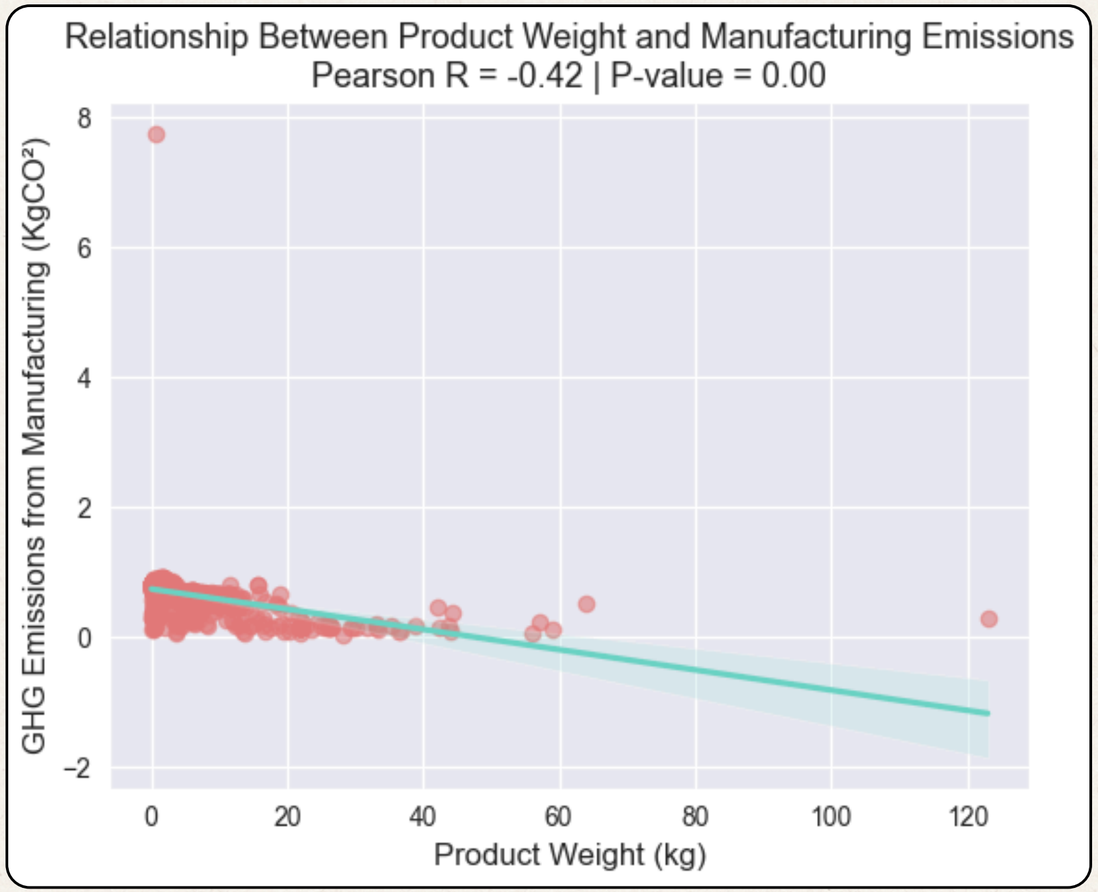
weight
gwp_manufacturing_ratio

#2 Variable(s) Type(s)

Continuous
Continuous

#3 Test(s)

Pearson correlation test



Manufacturers

(H2) Devices from different manufacturers have different average GHG emissions.

#1 Variable(s) Involved

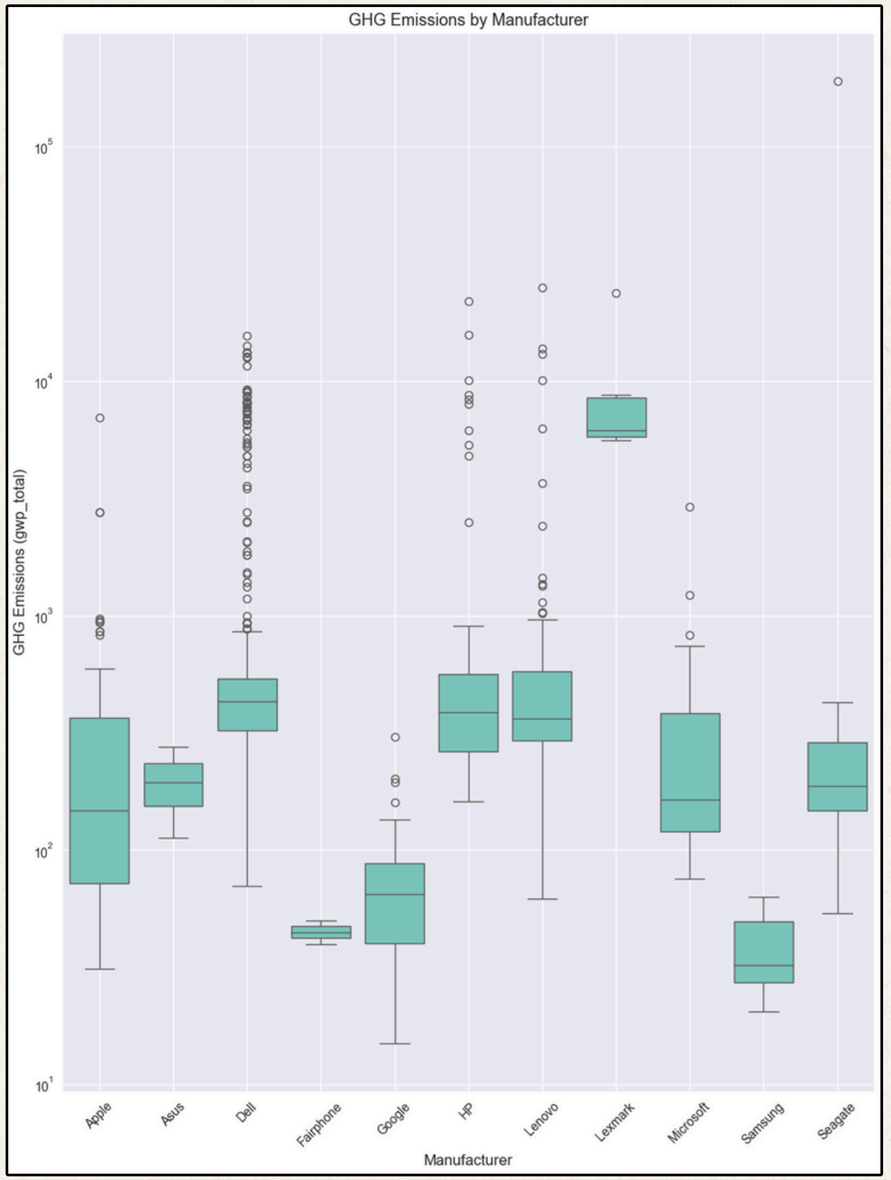
manufacturer
gwp_total

#2 Variable(s) Type(s)

Nominal
Continuous

#3 Test(s)

Anova



Fairphone

We’re making a positive impact across the value chain in mining, design, manufacturing and life cycle.

German Environment Foundation

German Environmental Award 2016 for our founder Bas van Abel

The Lovie Awards 2016

Lovie Emerging Entrepreneurs

European Business Awards for the Environment (EBAE) 2016

The International Business Cooperation Award

Sustainia 2014

Community Award

UN Momentum for Change Award 2015

ICT Solutions

d&ad 2016

White Pencil in Service Innovation and Graphite Pencil in Product Design

The Next Web 2015

Tech5 - Fastest Growing Tech Startup in Europe

GreenTec Awards 2015 ProSiebenSat.1

Accelerator Start Up Prize

Manufacturers

(H3) Larger screen sizes are associated with higher transportation emissions.

#1 Variable(s) Involved

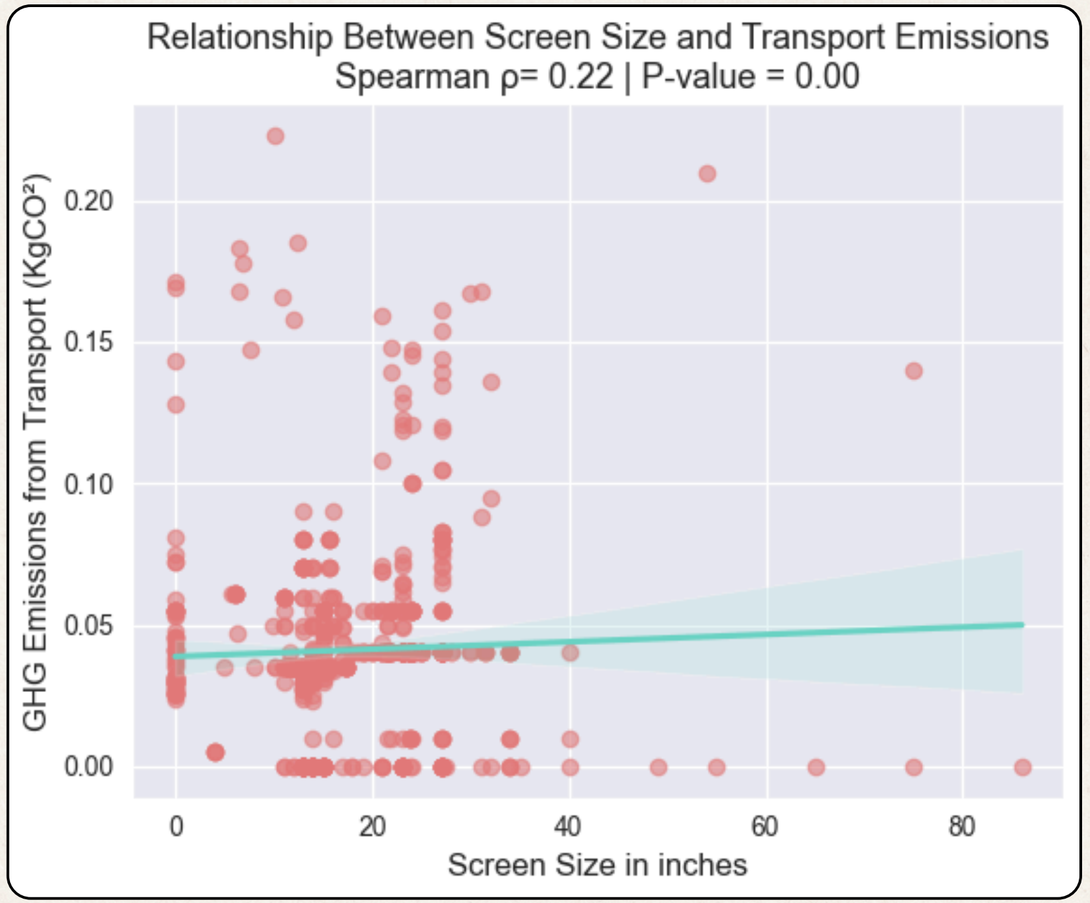
screen_size
gwp_transport

#2 Variable(s) Type(s)

Continuous
Continuous

#3 Test(s)

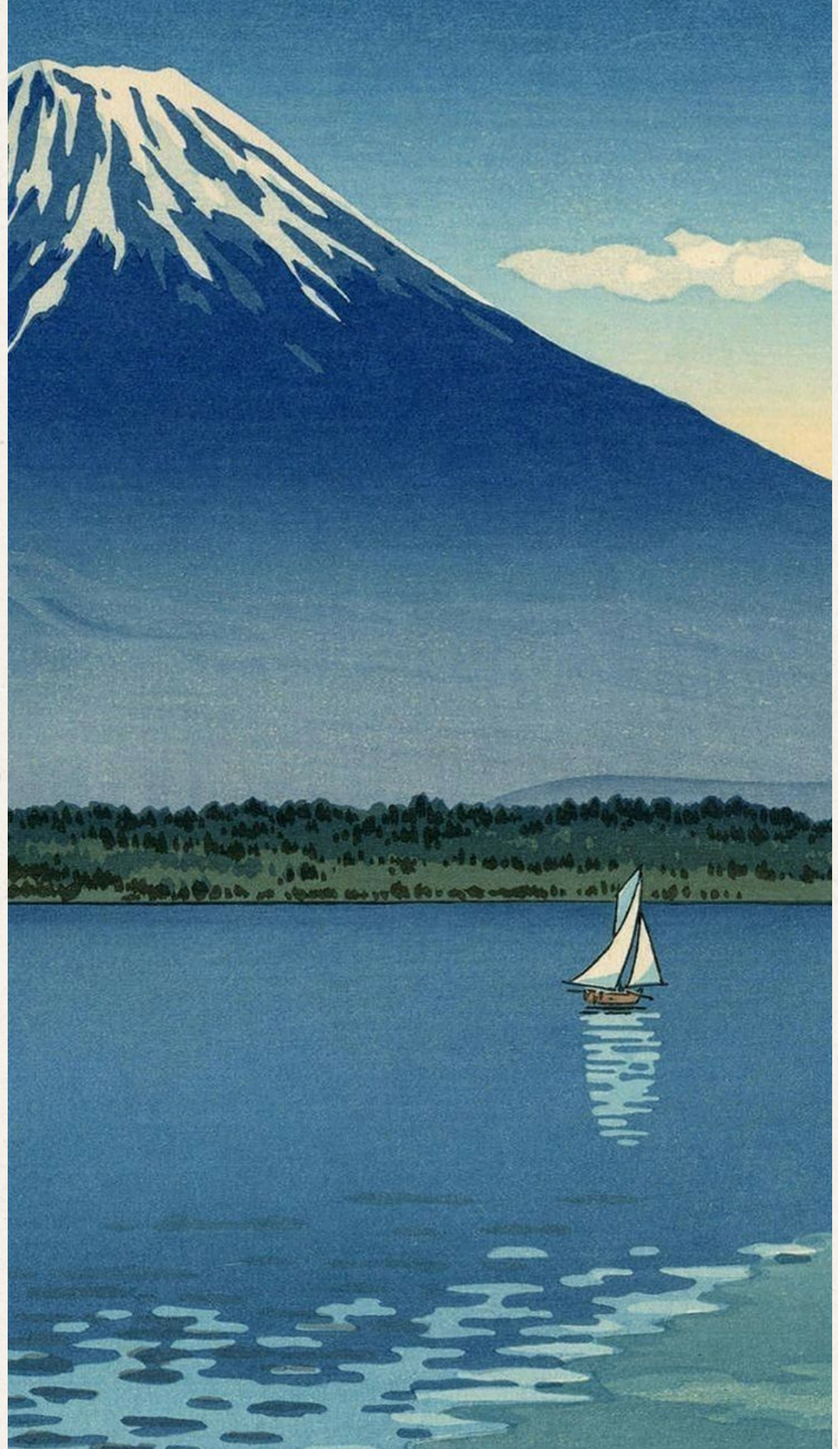
Spearman
Kendall's Tau [τ = 0.18]



01 Focus on optimizing the manufacturing process for lightweight devices, since this phase contributes proportionally more to their emissions.

02 High-emission manufacturers like Lexmark and Dell should invest in cleaner materials and production, while low-emission brands like Fairphone set a clear benchmark for sustainable design in the industry.

03 Devices with larger screens may slightly increase transport-related emissions due to bulkier packaging and lower shipping efficiency, highlighting an opportunity to improve logistics and packaging design for large-format devices.



Improvement

How can stakeholders refine the manufacturing process?

Municipalities

(H1) Devices with shorter lifetimes contribute to higher yearly emissions.

#1 Variable(s) Involved

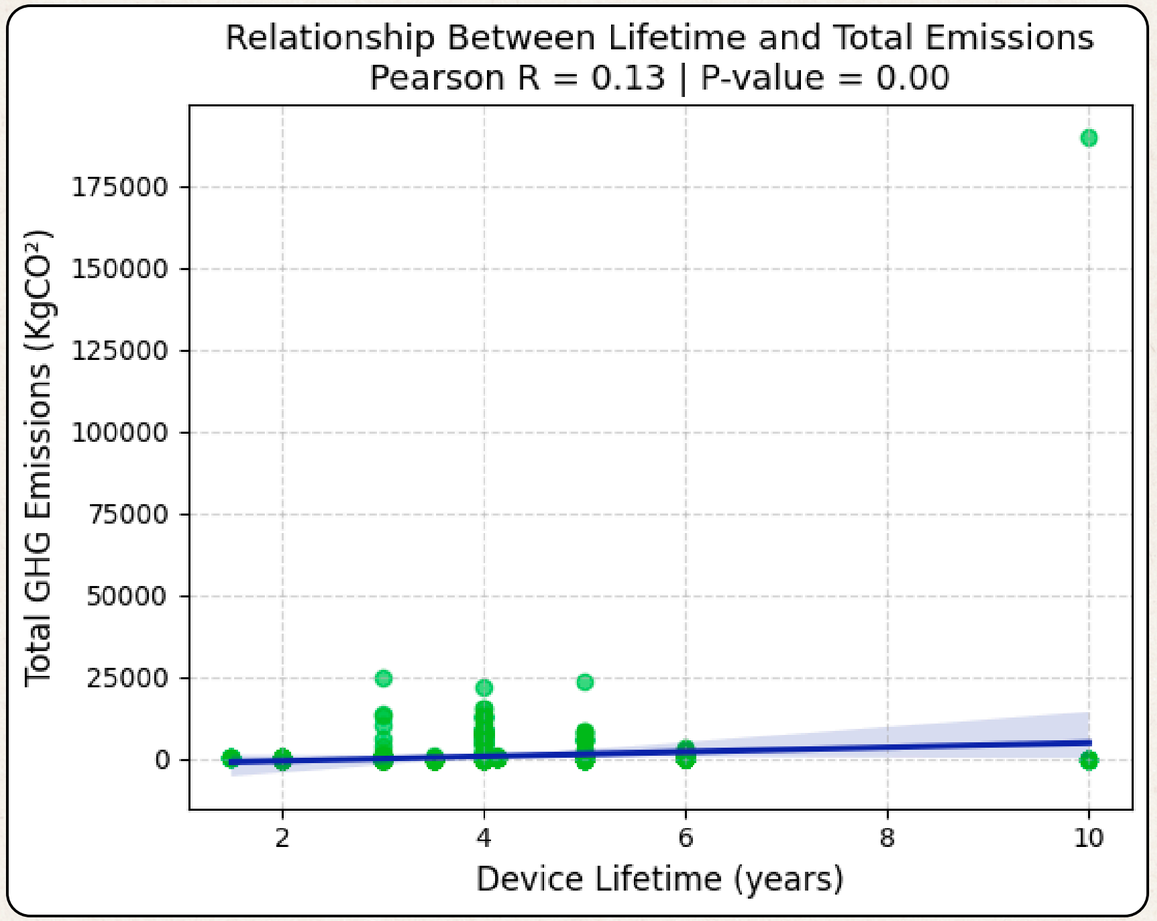
lifetime
gwp_use_ratio
gwp_total

#2 Variable(s) Type(s)

Discrete
Continuous
Continuous

#3 Test(s)

Pearson correlation test
Spearman



Municipalities

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lifetime
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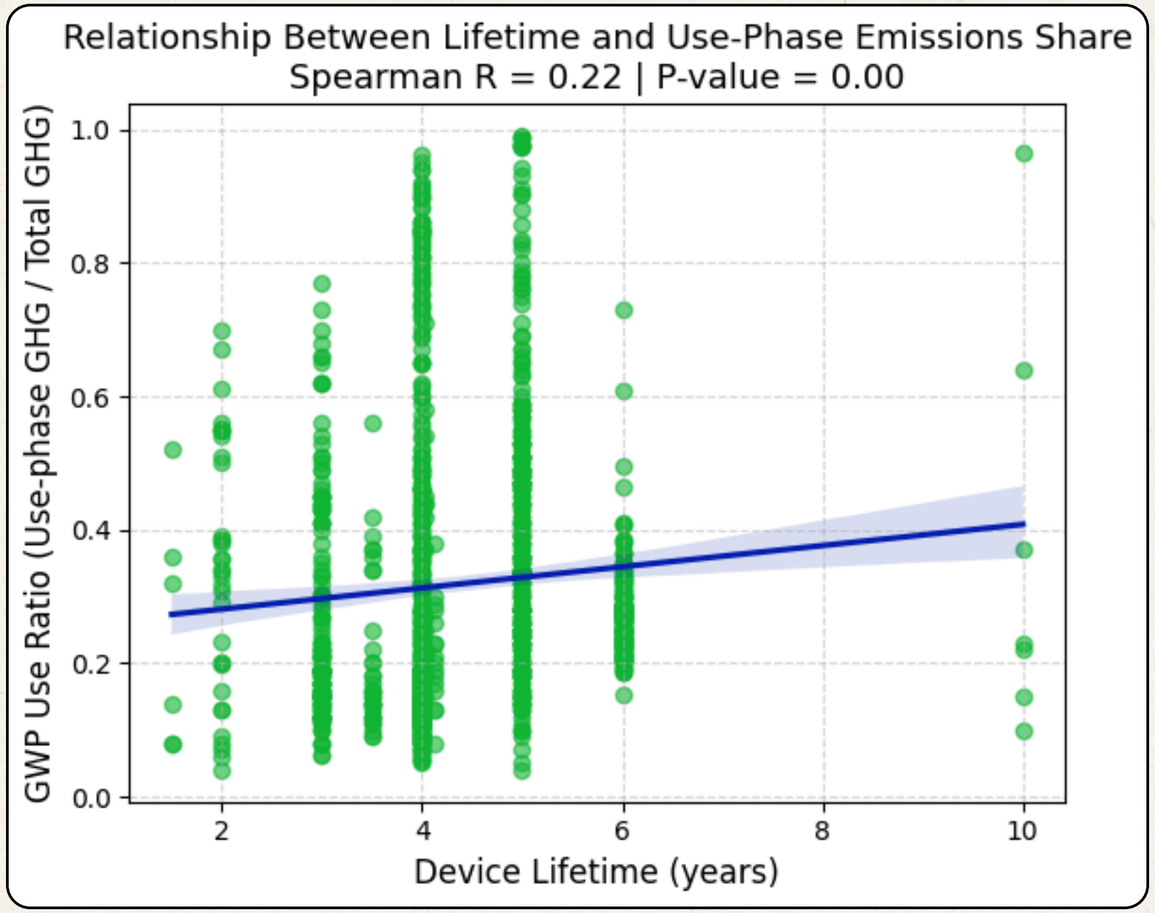
#2 Variable(s) Type(s)

Discrete
Continuous
Continuous

#3 Test(s)

Pearson correlation test
Spearman



Municipalities

(H2) Workplace devices have a higher total weight than Home and Datacenter devices combined.

#1 Variable(s) Involved

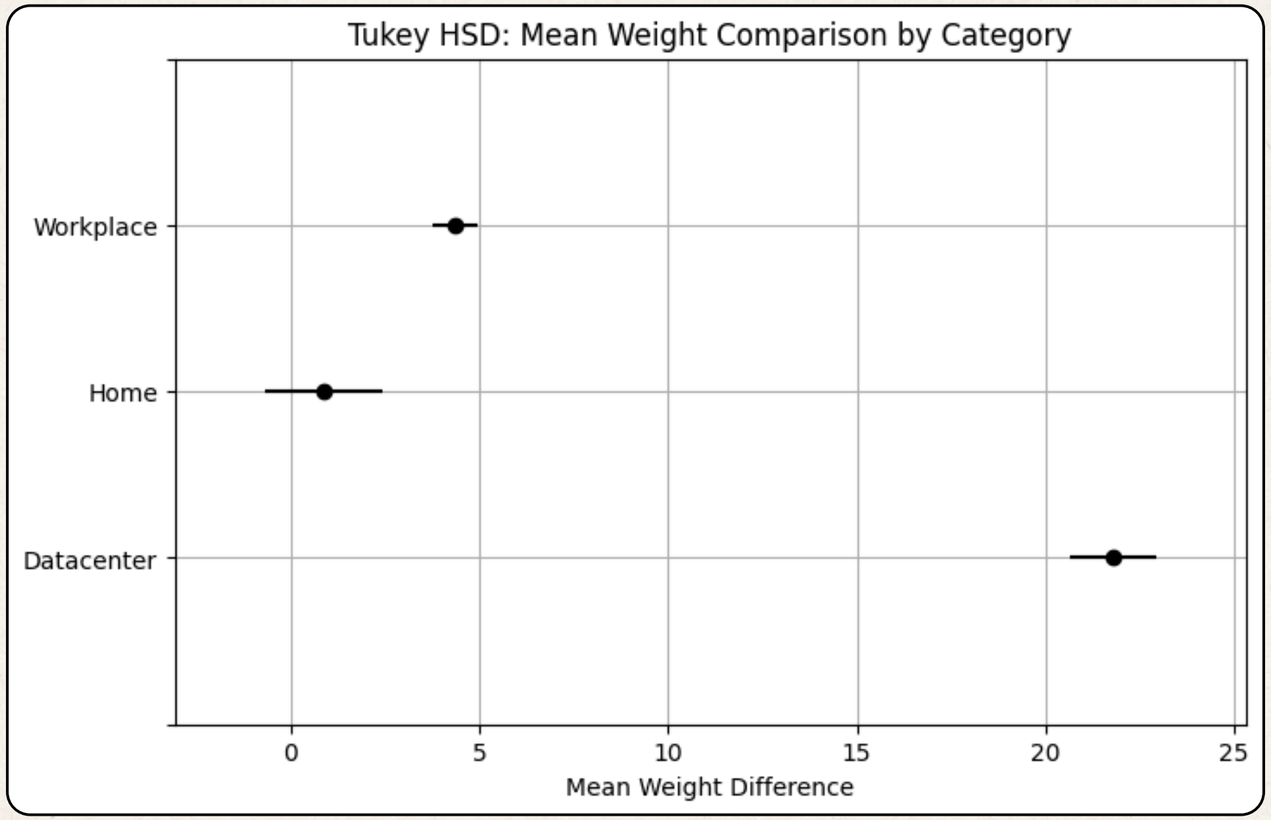
weithy
category

#2 Variable(s) Type(s)

Continuous
Nominal

#3 Test(s)

Anova



Municipalities

(H3) There is a significant relationship between device lifetime (in years) and its classification as having a sustainable lifetime, based on a minimum durability threshold of 5 years.

#1 Variable(s) Involved

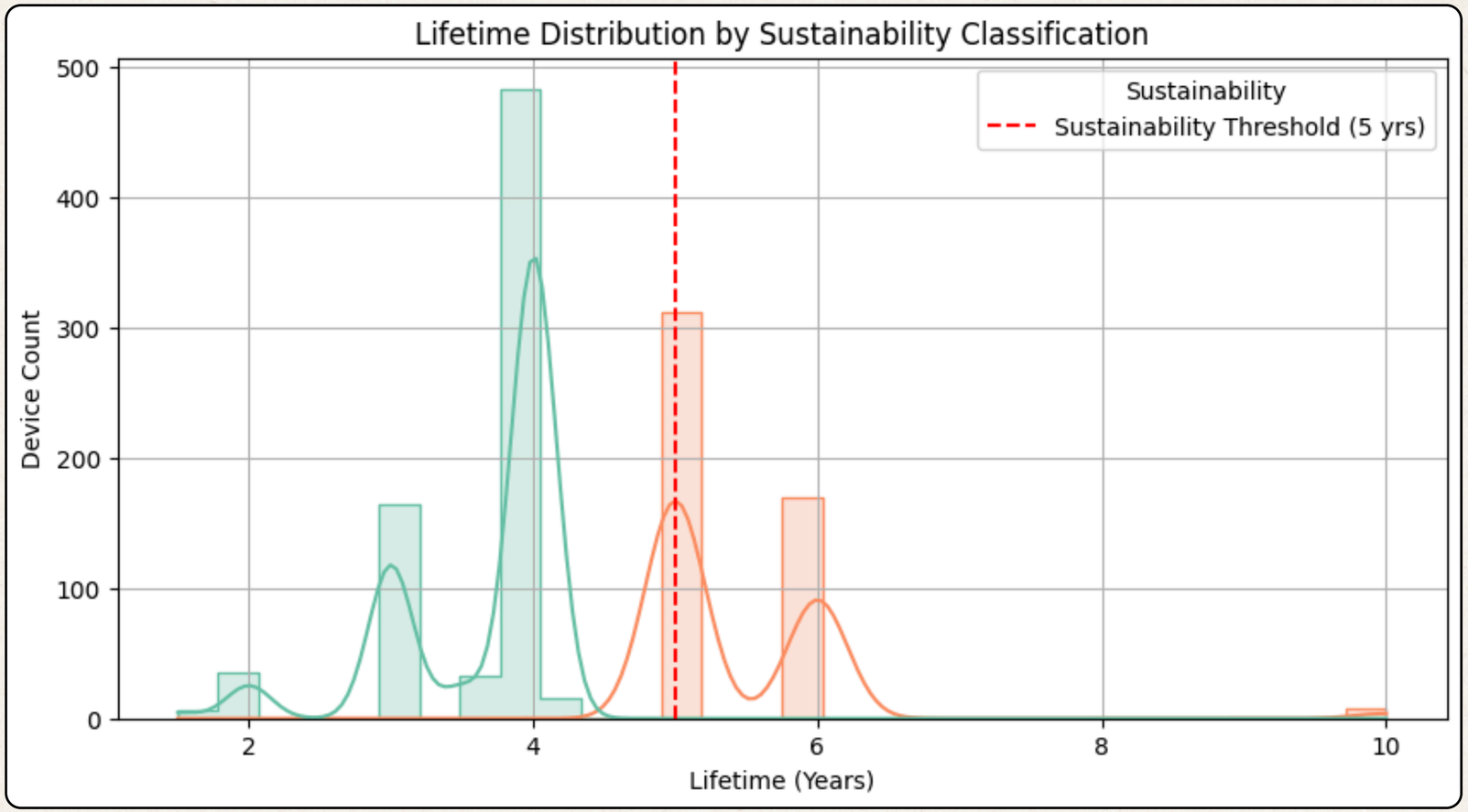
lifetime
sustainable_lifetime

#2 Variable(s) Type(s)

Continuous
Binary

#3 Test(s)

Point-Biserial



Municipalities

(H4) There is a significant association between the device's category and whether it was assembled in the same country it is used.

#1 Variable(s) Involved

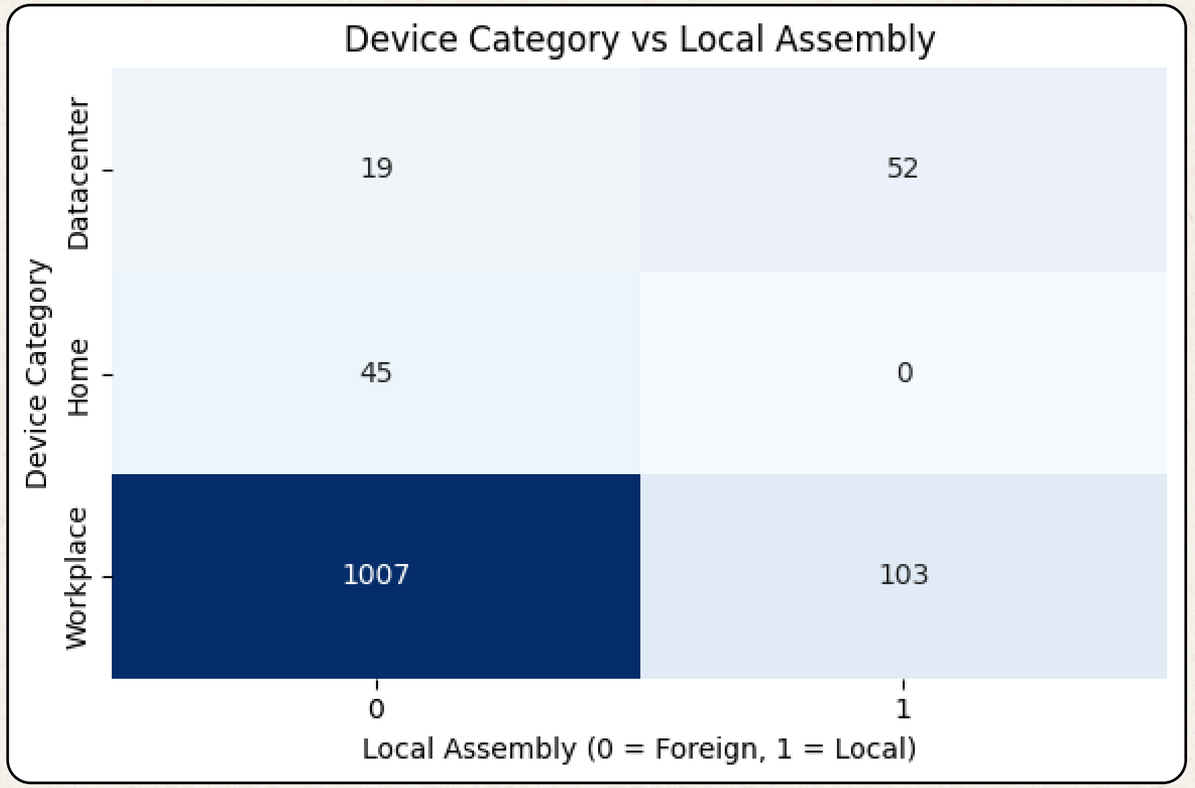
category
assembly_location
use_location

#2 Variable(s) Type(s)

Nominal
Binary
Nominal

#3 Test(s)

Chi-Square



Improvements

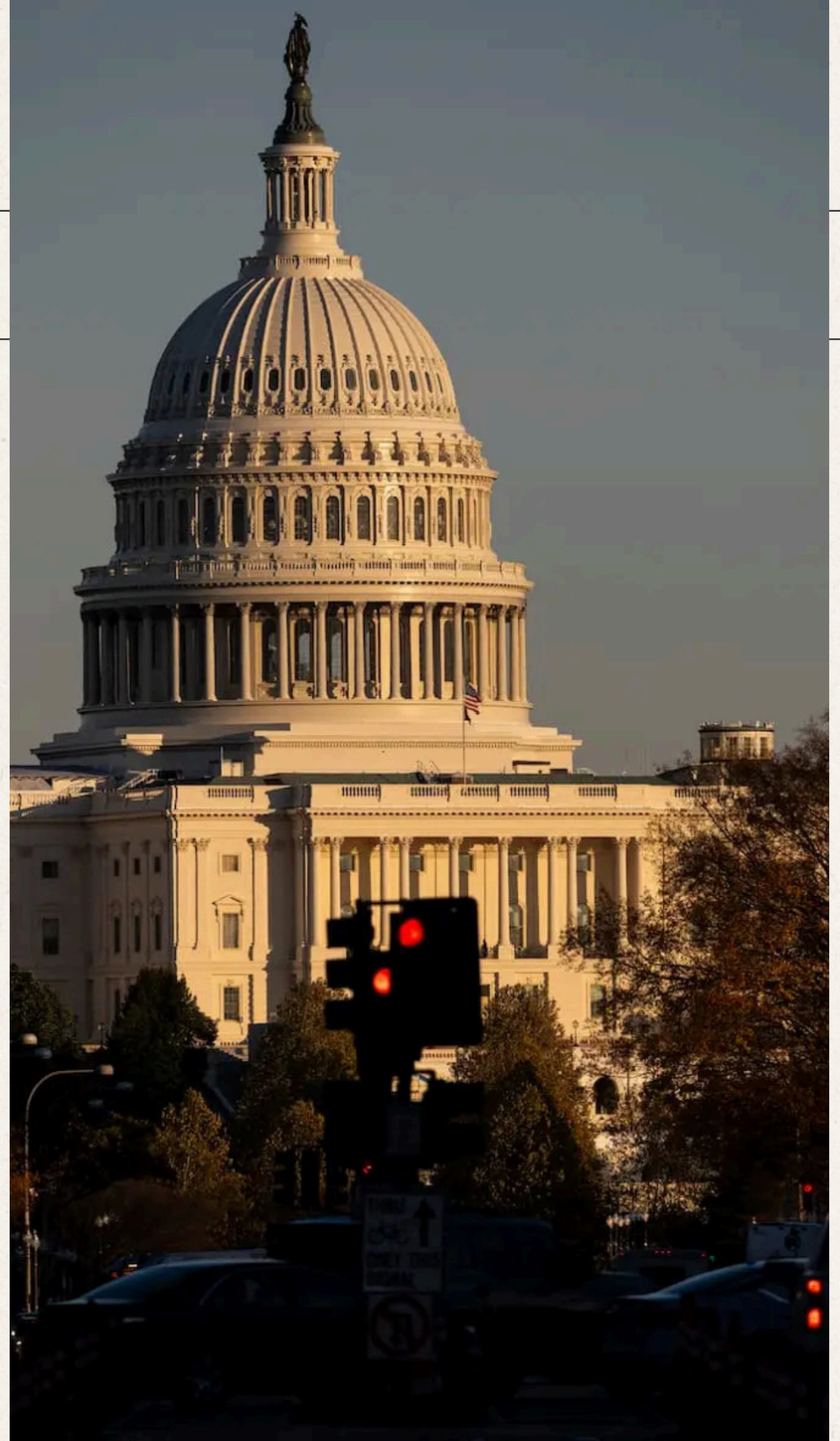
How can stakeholders refine the municipalities process?

01

- Offer tax benefits or funding to manufacturers producing long-lasting, repairable hardware;
- Introduce legislation that promotes devices lasting ≥5 years as a sustainability standard.

02

- Helps the municipalities better organize the urban roads, streets and highways to handle logistics.
- Structure specific ways for device transportation.



03

- Reinforce local legislation for the device's lifetime;
- Implement a hardware detection plan for better destinations (recycling or refurbishment partners) instead of landfills.

04

- Support localized electronics production;
- Encouraging the circular economy and recycling infrastructure

Thank you for your attention !

Project Link	GitHub
Instructor	Austin Eghbal
Class	DS 204 - Analysis for Data Science