UNDP SHOWCASE PRESENTATION

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MIT MANAGEMENT SLOAN SCHOOL

AGENDA

01 Project Overview

02 Data

03 Microbusiness Landscape

04 Methodology

05 Results

06 Policy Recommendation

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INTRODUCTION

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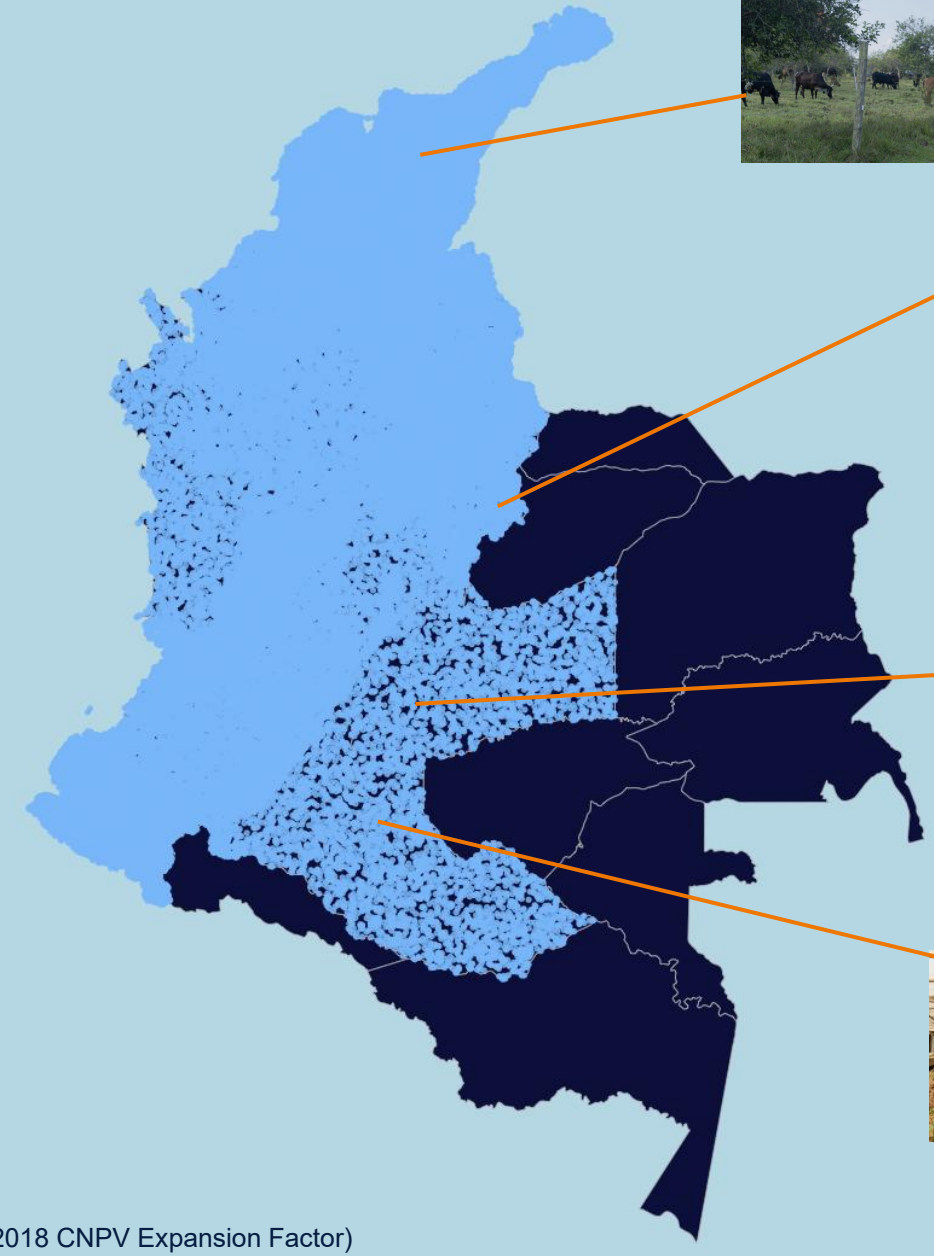
Marta owns a small shop in a neighborhood. Operates locally, without a business name.
GEMSY

Alejandro owns a cattle farm. He sells milk and livestock, mostly in cash.

*5.2 million businesses with 9 or fewer employees

*55% are owned by individuals from poor or vulnerable



*EMICRON 2023 Survey from DANE (extrapolated using 2018 CNPV Expansion Factor)

BROAD PROBLEM

Informality

- 87% of microbusinesses operate entirely informally
- Neighborhood stores rely on informal financial networks
  - These networks limit growth and increase risk
  - Some turn to illicit funding in absence of support

Financial Exclusion

- 70% of small shop owners are unable to obtain formal credit due to inadequate financial records
- UNDP is working to “score the invisible” and expand access
  - Alternative credit scoring
  - Financially inclusive policies

OBJECTIVES

Understand Colombia's Microbusiness Landscape

- Understand regional trends and the underlying causes of microbusiness informality and financial exclusion
- Characterize businesses that remain informal or excluded
- Identify traits of businesses that are highly formal, financially included, or successful

Develop Quantifiable Indices to Summarize Complex Business Traits

- Indices should help guide financial inclusion policies for poor and vulnerable microbusinesses
- Can serve an alternative credit scoring model
- Produce concrete, data-driven recommendations that are transferrable to other countries

DATA

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DATA

DANE
DEPARTAMENTO ADMINISTRATIVO NACIONAL DE ESTADÍSTICA

GEIH
(Gran Encuesta Integrada de Hogares)

Demographics

Household Labor & Connectivity

General Household Population Survey

EMICRON
(Microbusiness Survey)

Real Estate

Labor

Finances

Sub-module Focused on Micro-Businesses

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MICROBUSINESS LANDSCAPE

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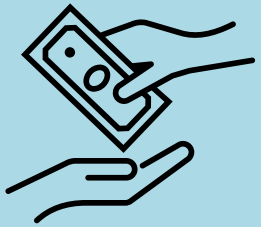
BUSINESSES APPLYING FOR LOANS



18%

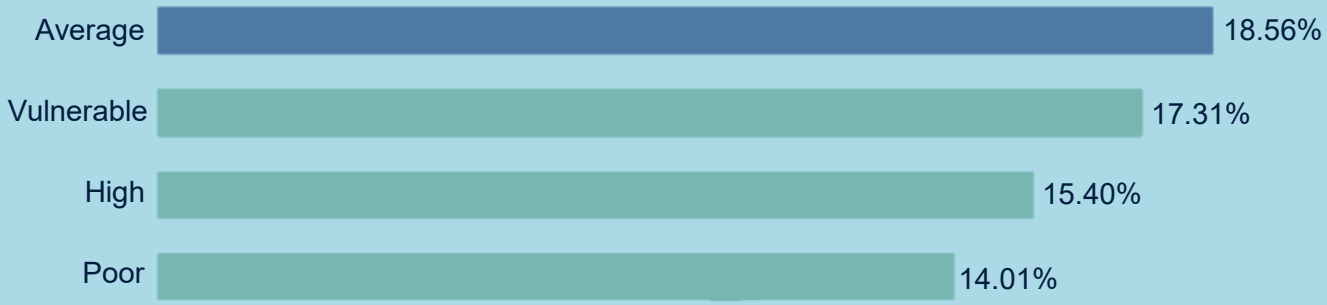
Applied for a loan in the last year

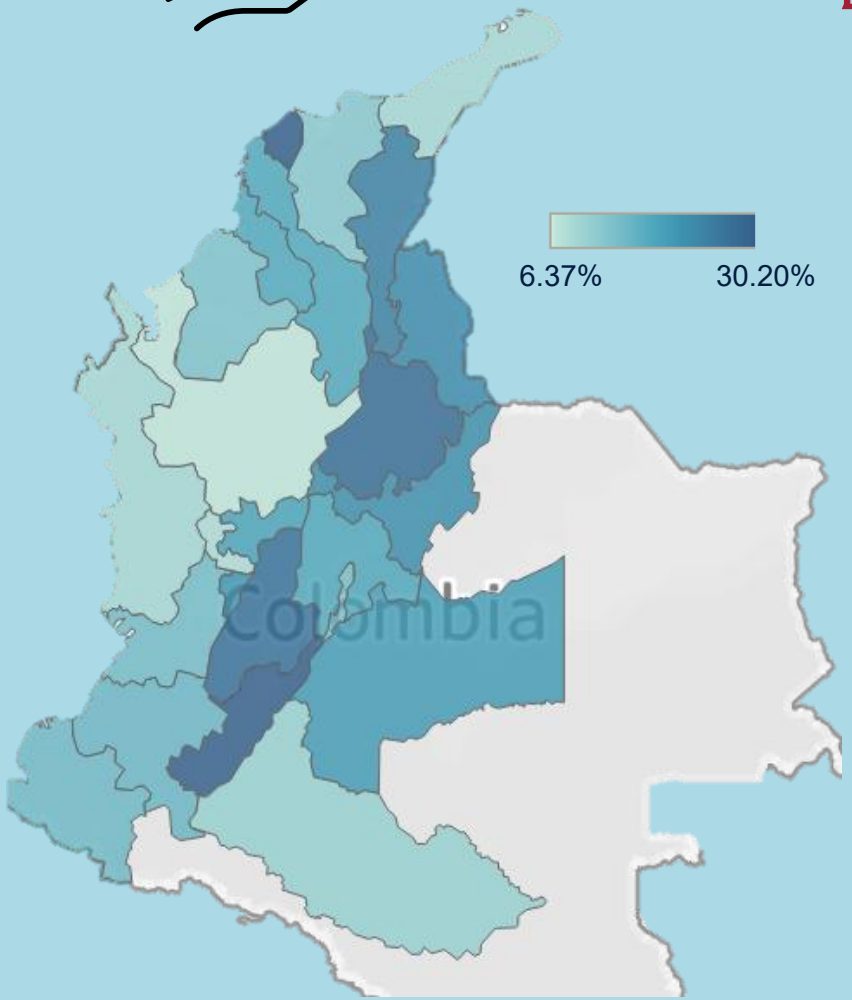
43%

Did not apply due to fear of debt

94%

Of loan applications are approved





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BUSINESSES SAVING MONEY IN FINANCIAL INSTITUTIONS

19%

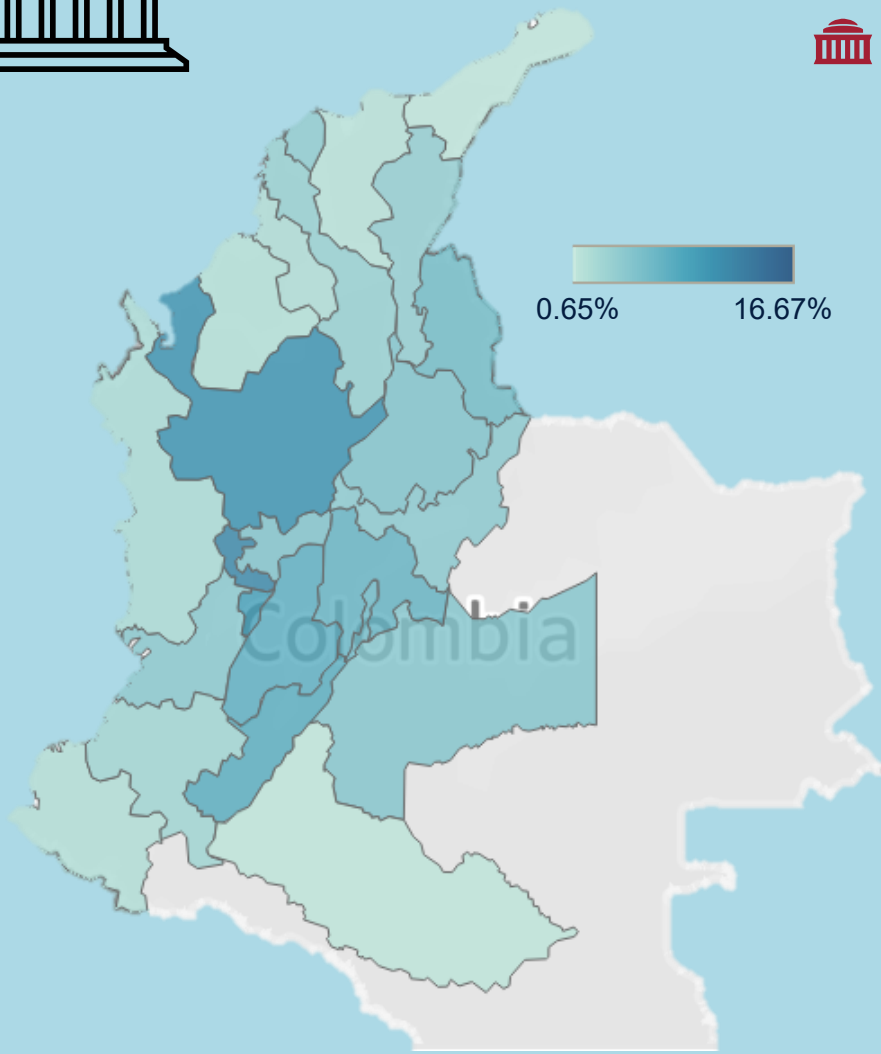
Saved money in the last year

24%

Of savers do so in financial institutions

67%

Of savers do so at home



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METHODOLOGY

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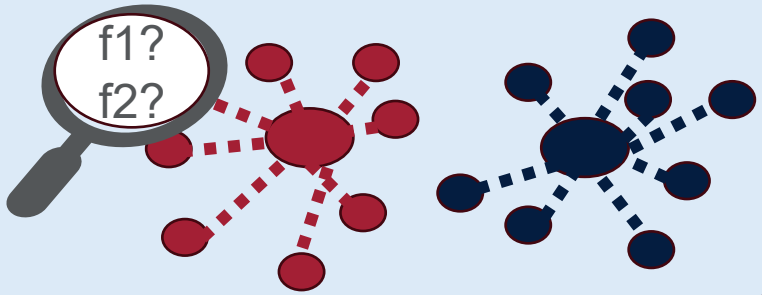
METHODOLOGY

Clustering

KMeans Clustering

Identify Differentiating Features



How naturally do businesses group together — and what features explain these groupings best?

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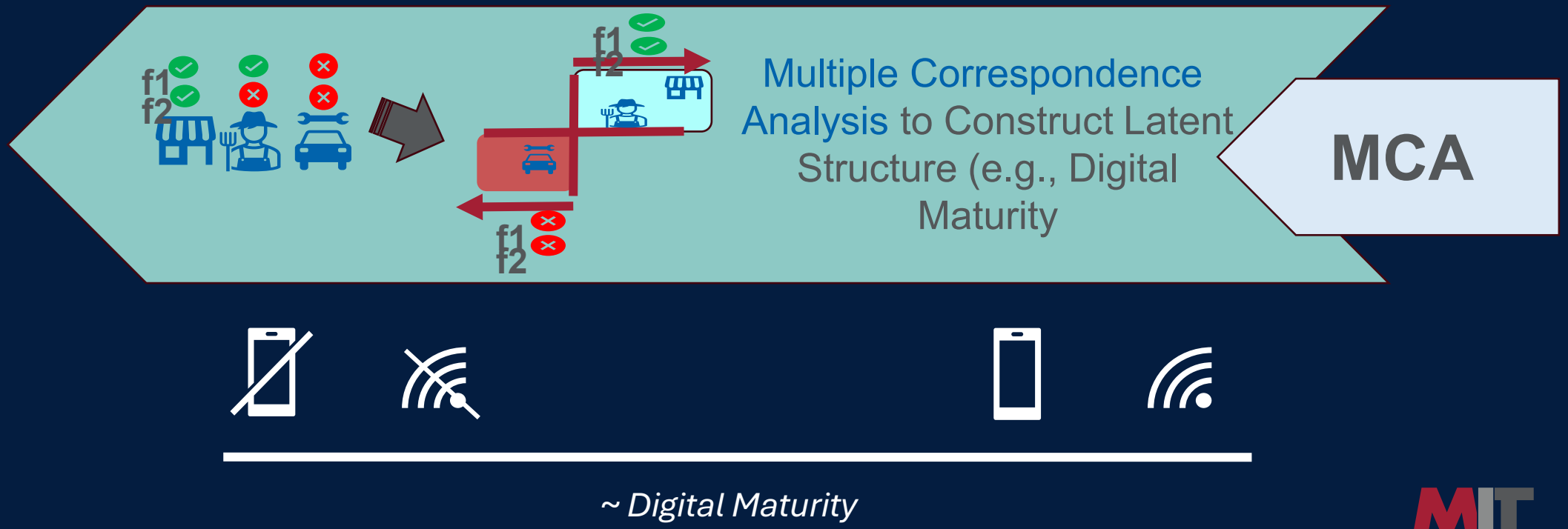
METHODOLOGY

How well does the data reveal underlying structures across categorical features?



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METHODOLOGY

How well does our theory explain the relationships in the data?

If we can predict whether a business will invest its loan productively — then the most important features tell us what sets them apart!

Modeling

Structural Equation Modeling (SEM) - interrelationship between latent structures

Assessment: Comparative Fit Index

Random Forest (RF) - identify features that predict productive loan use

Assessment: Out-of-Bag Error Rate

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METHODOLOGY

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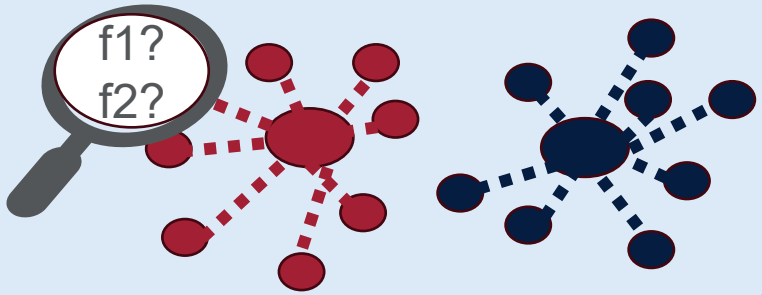
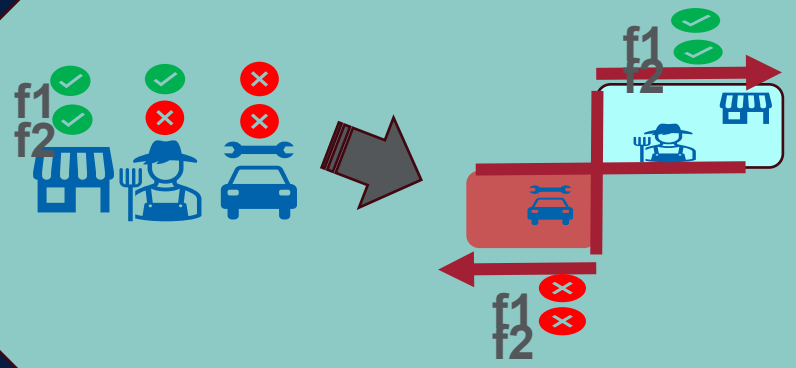


MCA



Multiple Correspondence Analysis to Construct Latent Structure (e.g., Digital Maturity

Modeling

Structural Equation Modeling (SEM) - interrelationship between latent structures

Assessment: Comparative Fit Index

Random Forest (RF) - identify features that predict productive loan use

Assessment: Out-of-Bag Error Rate

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RESULTS

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RESULTING INDICES

FORMALITY

- Registered with the Chamber of Commerce?
- Has a single tax registry?
- Paid Occupational Risk insurance?
- Paid compensation fund or SENA/ICBF (social and labor welfare)?
- Paid for health or pension in the last month?

FINANCIAL FORMALITY

- Saves money in a financial institution?
- Accepts online payments?
- Accepts credit cards as payment?
- Applied for a credit or loan in the last year?

DIGITAL READINESS

- Has an email?
- Uses a cellphone?
- Uses a laptop or tablet?
- Has internet service?

BUSINESS SOPHISTICATION

- Has a trade name?
- Has workers who receive payments?
- Has a website?
- Does accounting or daily bookkeeping?

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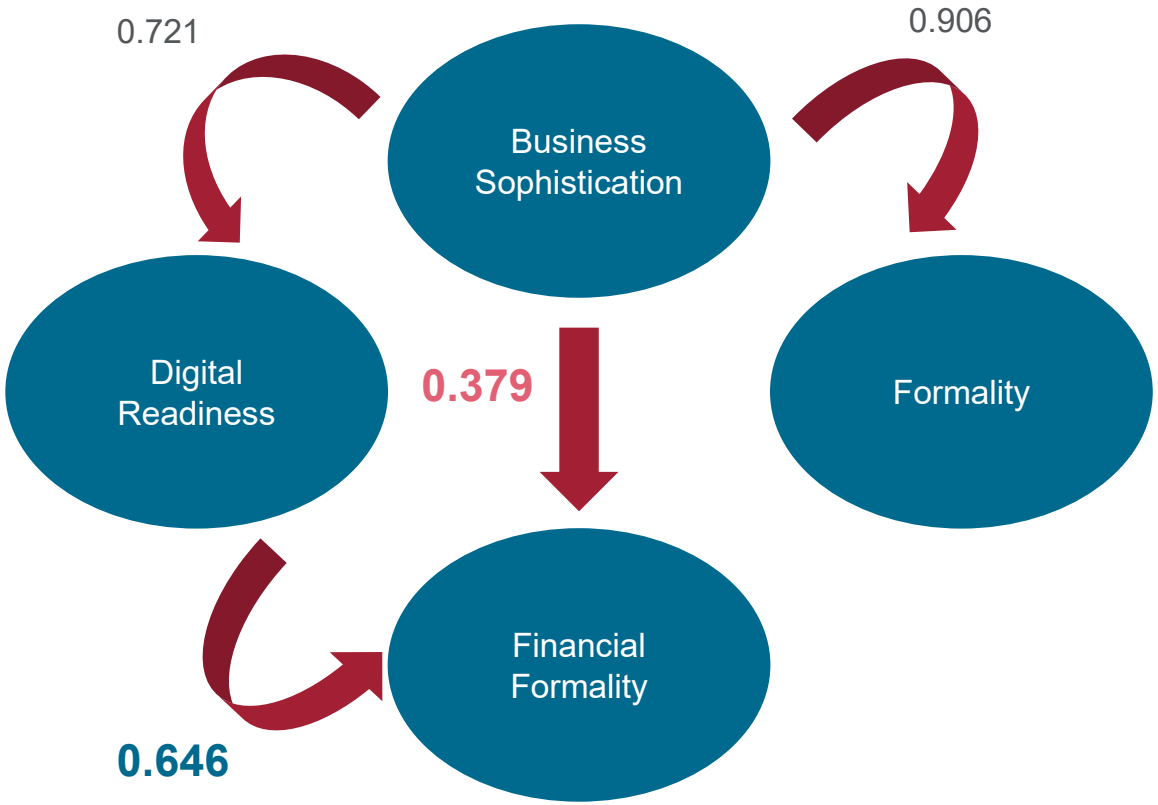
RELATIONSHIP BETWEEN THE INDICES



Structural Equation Modeling (SEM)

- *Multiple regressions between hidden traits — like formalization, digital readiness, or financial inclusion — using the data we can observe.*

0.972 **Comparative Fit Index (CFI)**

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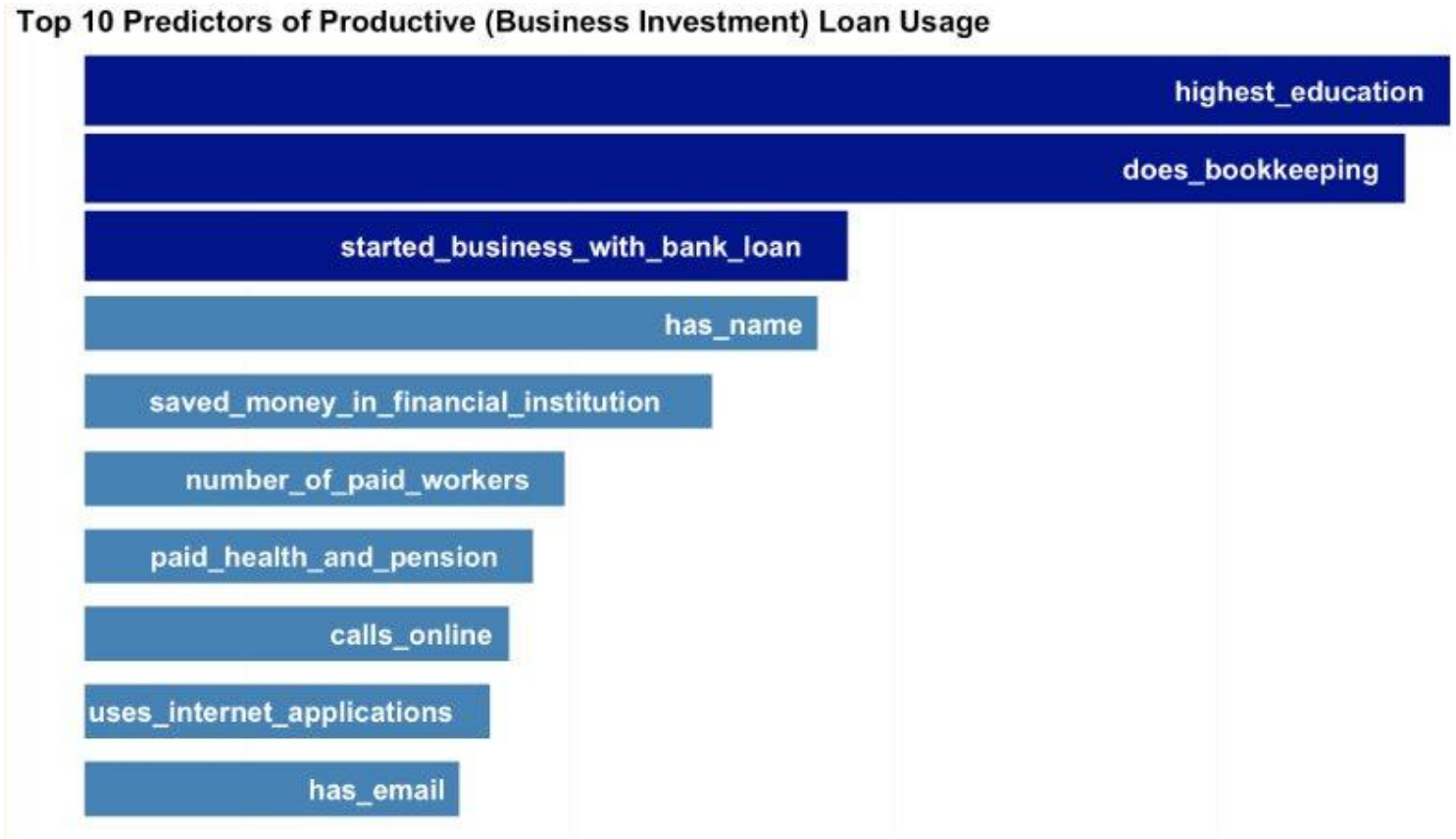
INDICATIVE POWER AS AN ALTERNATIVE SOURCE

23.73% Out-of-Bag Error

Random Forest

Can we predict if a business will invest its loan in business development?



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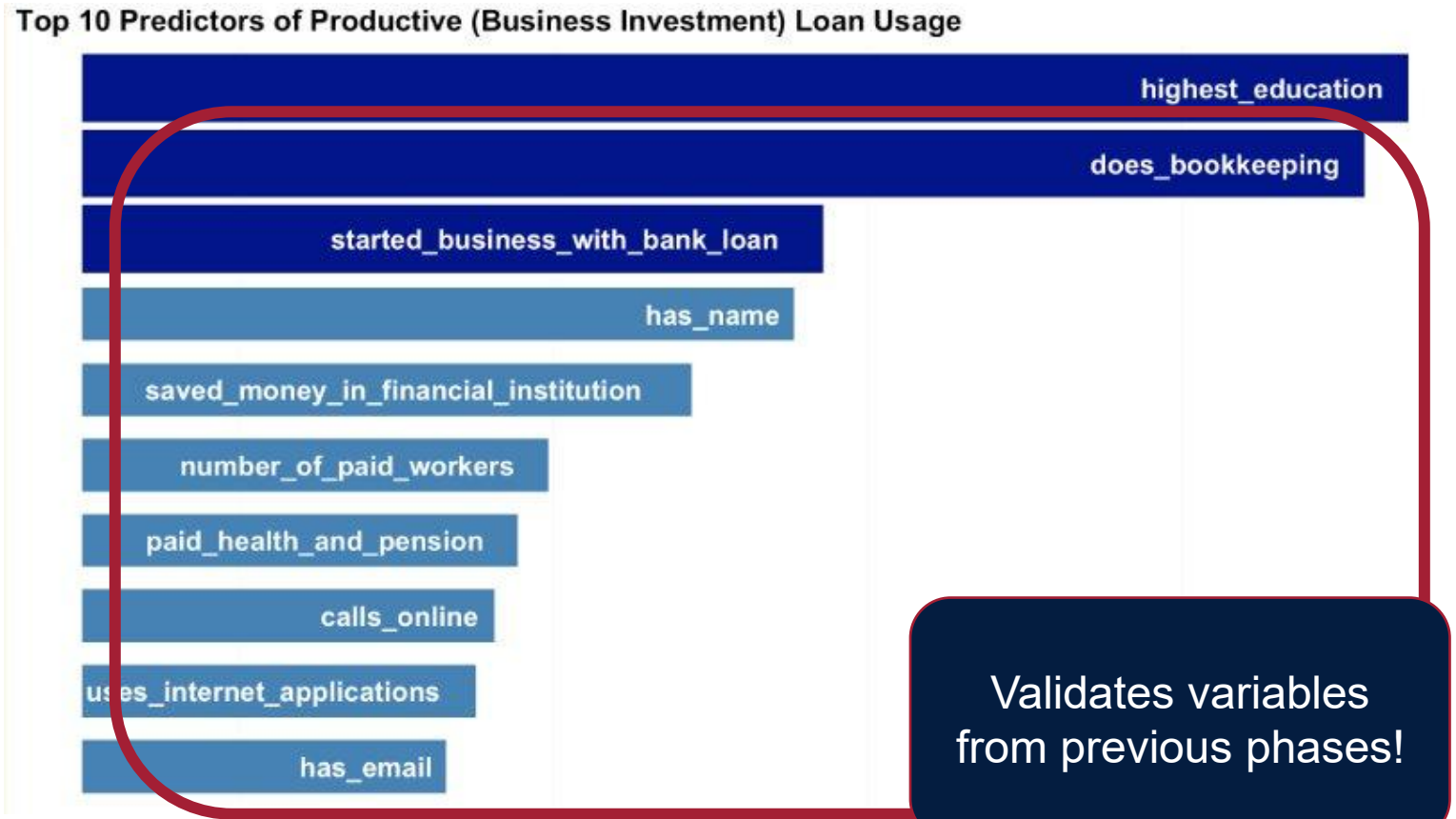

Validates variables from previous phases!

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DASHBOARD

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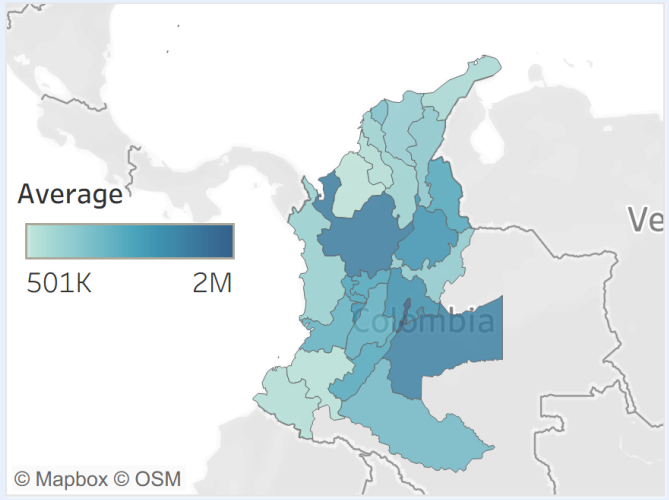
Colombia Microbusiness Credit Scoring Index

Select the feature you'd like to assess and apply filters as needed

Select Feature

Net Profit

Survey Year 2023



Age

2 111

Gender (Multiple values)

Education Level (Multiple values)

Why not applied for credit or loan? (Multiple values)

What did business use loan for? (Multiple values)

Who did business apply for the loan from? (Multiple values)

Business applied for credit or loan last year? (Multiple values)

Did business get requested credit or loan? (Multiple values)

Business has single tax registry (RUT)? (Multiple values)

Got / renewed chamberce of commerce registeration this year? (Multiple values)

Business is registered with chamberce of commerce? (Multiple values)

Did business save money in previous year? (Multiple values)

Business has website? (Multiple values)

Business has email? (Multiple values)

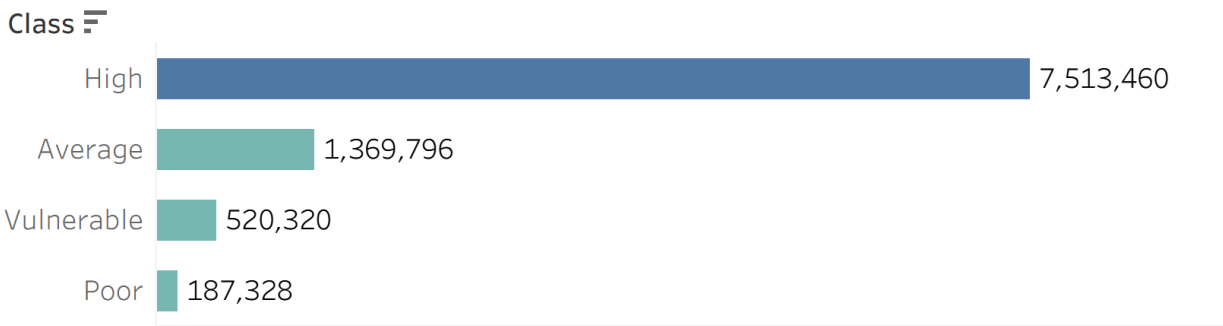
Business has name? (Multiple values)

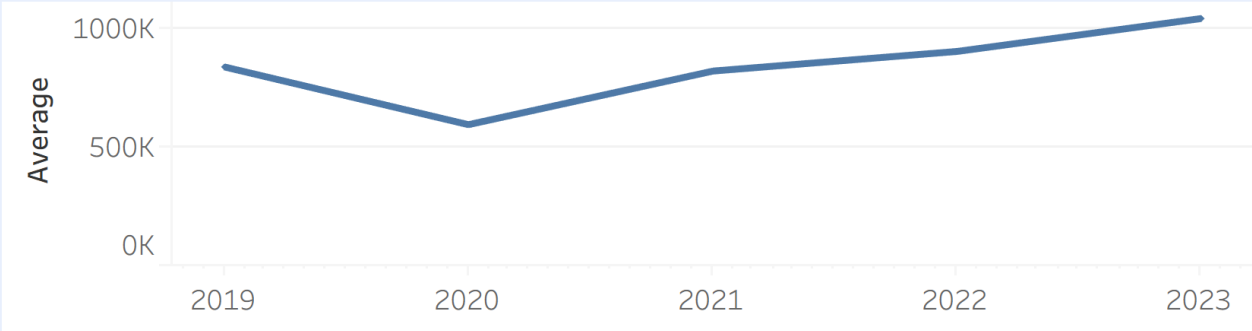
Business has internet service? (Multiple values)

Business uses cell phone? (Multiple values)

Urban or Rural (Multiple values)

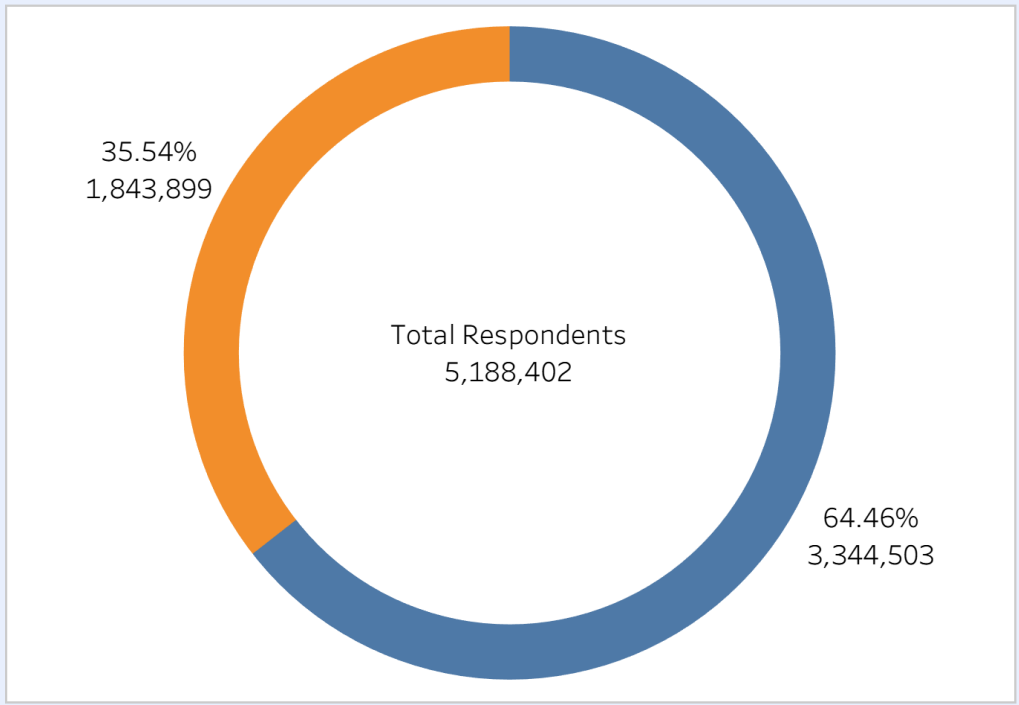
Average 1,041,810 Total Respondents 5,188,402





Formality	Financial Formality	Digital Readiness	Business Sophistication
0.51 / 5	0.50 / 4	1.32 / 4	0.22 / 4

Optional: Use the chart below to explore the different filters and more



Select Filter to Look At

Gender

Key

- Male
- Female

POLICY RECOMMENDATION

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4 POLICY RECOMMENDATIONS

Encourage Digital Transformation

BANCA DE LAS OPORTUNIDADES

Survey Business Progress, Not Only Status

Promote Formality via Business Sophistication

bold

Boost Loan Uptake and Savings Accounts

DANE
INFORMACIÓN PARA TODOS

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THANK YOU!

MIT, UNDP, AND OUR MENTOR PROF. ZHENG

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