Tracking the Digital Divide: Factor Analysis and Time Trends in Italian Firms

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Cumulative Dissertation

Chapter 1



Bibliometric Analysis of European Research on Digital Divide: An Exploration of the Corporate Landscape

Chapter 2



Adapting Van Dijk's Resources and Appropriations Theory: Toward a Resources and Technology Integration Framework at the Firm Level

Chapter 3



Exploring Patterns and Shifts: Factor Analysis of the First and Second-Level Digital Divide in Italian Enterprises

1. Introduction

- ▶ DT play a pivotal role in reshaping business models (Trischler and Li-Ying, 2023), driving innovation (Ciarli et al., 2021), and fostering competitive advantages (Jegan Joseph Jerome et al., 2024).
- ► The unequal adoption of DT has led to significant challenge: the digital divide.
- The digital divide at the firm level is a multifaceted gap characterized not only by disparities in access, skills and usage of DT, but also the derived benefits from different types of use.
- While the digital divide is a global issue, its impact on enterprises, especially in Italy, presents unique challenges and opportunities.

2. Objectives

- Develop composite indices to track trends in the first and second-level digital divide.
- Analyze variations in the first and second-level digital divide across firm sizes, sectors, and regions in Italy.
- Evaluate the alignment of resources and technology integration theory with observed data.
- Propose targeted policy interventions based on research findings.

3.1. Research Questions

- ► How does the Resources and Technology Integration theory reflect observed patterns in DT adoption across different Italian enterprises?
- What are the evolving patterns and shifts in access, skills, and usage among Italian enterprises, and how do these dynamics reflect the disparities between the three indices across different firm sizes, sectors, and regions over a six-year period?
- According to the findings, what policy interventions can be recommended to help Italian enterprises more effectively bridge the digital divide?

5. Data

- ► The dataset was derived from the ICT Usage in Enterprises Survey conducted annually between 2014 and 2019 by ISTAT.
- ▶ In total, 29 variables were used to extract three factors that represent the theoretical constructs.
 - Access index: 6 variables
 - Skills index: 9 variables
 - Usage index: 11 variables
 - Control variable: Firm size with three categories (small, medium, large)
- Considerations and Limitations.
 - ► Independence of Annual Data
- ▶ Data treatments, codes, and summary statistics, are available on my GitHub repository for replicability and further analysis.

6 Methodology

- The indices were constructed using dimensionality reduction techniques Factor Analysis for Mixed Data (FAMD) and Multiple Correspondence Analysis (MCA).
- Visualise and measure adoption patterns.

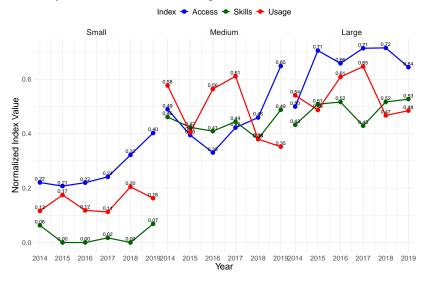
Access Index_i =
$$a_1 \cdot X1_i + a_2 \cdot X2_i + \ldots + a_6 \cdot X6_i + d \cdot \text{Size}_i$$

Skills Index_i = $b_1 \cdot Y1_i + b_2 \cdot Y2_i + \ldots + b_6 \cdot Y6_i + e \cdot \text{Size}_i$
Usage Index_i = $c_1 \cdot Z1_i + c_2 \cdot Z2_i + \ldots + c_{11} \cdot Z11_i + f \cdot \text{Size}_i$

Where X, Y, and Z are the matrices of observations, a, b, and c are the vectors of weights derived from FAMD and MCA contributions of each variable to the retained dimensions, and Size, represents the firm size control variable with its respective weights d, e, and f.

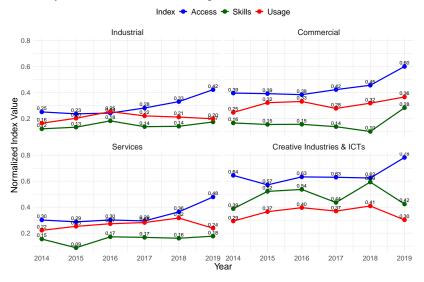
7. Results I

Yearly Trends in Access vs Skills vs Usage



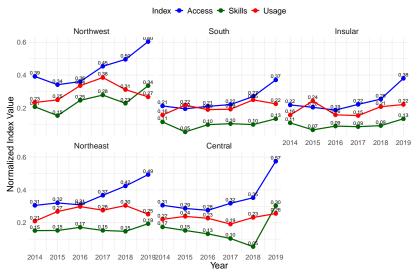
7.1. Results II

Yearly Trends in Access vs Skills vs Usage



7.2. Results III

Yearly Trends in Access vs Skills vs Usage



8. Q&A

Thank you for your attention

References I

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