Can digitalization foster Social Inclusion? Evidences from Italy and Switzerland

FEDERICO MERTOLI[1] CARMELA ELITA SCHILLACI[2] JOSÉ MANUEL ALONSO[3]

Abstract

The study examines the impact of digitalization on social inclusion, focusing on Italy's significant investment in digital transformation under the Next Generation EU program. Using a Difference-in-Differences approach with treatment intensity, we compare Italian regions with high digital investments to Swiss regions that have not implemented similar policies. The results show that digitalization reduces the rate of people "At Risk of Poverty or Social Exclusion", "People in Households with Very Low Labor Market Participation", and "Unemployment". Adopting Amartya Sen's Capability Approach, this paper analyzes the conditions necessary to maximize the effectiveness of these investments in promoting social inclusion.

Framing of the research. *In recent years, governments and international organizations have increasingly embraced digital transformation, integrating digital technologies into public administration to enhance efficiency, accessibility, and citizen engagement (Mora et al., 2021; Padeiro et al., 2021; Stolterman & Fors, 2004). This shift aims not only to modernize public services by making them more transparent and user-centric but also to streamline administrative procedures and optimize resource management (Adjei-Bamfo et al., 2019; De Boer, 2021; Faulkner et al., 2019; Ramaprasad et al., 2017).*

Recognizing the strategic importance of digitalization, the European Union has placed it at the core of its Next Generation EU program, a 750 billion euro recovery plan designed to support economic and social resilience. As part of this initiative, each member state was required to allocate at least 20% of its national recovery and resilience plan (NRRP) to digital transformation (European Commission, 2021). Italy has played a leading role in this effort, committing over 48 billion euros, the highest investment among EU countries, to modernizing its digital infrastructure and public services. While these investments are expected to improve governance and economic performance, their ability to reduce social exclusion remains a critical and underexplored issue.

Social exclusion, broadly defined as the condition in which individuals or groups face barriers that limit their full participation in economic, social, and civic life (Rawal, 2008), is a persistent challenge that digitalization is often seen as a tool to address. However, simply introducing digital tools does not automatically foster inclusion, what matters is whether individuals can effectively use them to enhance their lives. To understand this dynamic, this study adopts Amartya Sen's Capability Approach (1999), which shifts the focus from the mere availability of resources to an individual's ability to transform them into meaningful opportunities. From this perspective, digitalization is not just about expanding technological access; rather, it is a means to empower individuals by removing structural barriers and enabling them to participate more fully in society (Hildebrand et al., 2019; Sen, 1999).

Through this lens, digitalization can promote social inclusion in multiple ways. First, it improves access to essential services, particularly for marginalized communities. E-government platforms simplify bureaucratic procedures, ensuring that citizens, especially those in remote areas or with mobility limitations, can interact with public institutions more efficiently and access critical services such as tax administration, social benefits, and legal documentation without facing physical or bureaucratic obstacles (Houwen, 2011; Jacobson, 2016; Toboso, 2011). Similarly, telemedicine and digital healthcare solutions help bridge health disparities by offering remote medical consultations, making healthcare more accessible for those who might otherwise be excluded due to distance or economic constraints (Nikou et al., 2020).

Beyond improving service access, digitalization also fosters economic inclusion by enabling participation in the labor market. The rise of remote work, digital job platforms, and online training programs reduces dependency on physical proximity to employment opportunities, allowing individuals in disadvantaged areas or with mobility constraints to integrate into the workforce more effectively (Andersson et al., 2022; Morte-Nadal & Esteban-Navarro, 2022). Additionally, digital platforms facilitate lifelong learning and upskilling, helping individuals enhance their employability and adapt to an evolving labor market (Toboso, 2011).

[1] University of Catania, Italy
e-mail: federico.mertoli@phd.unict.it
[2] University of Catania, Italy
e-mail: cschilla@unict.it
[3] University of Cantabria, Spain
e-mail: jmanuel.alonsoalonso@unican.es

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At the societal level, digital tools enhance civic engagement and institutional trust by increasing transparency and participatory governance. Open government initiatives and online engagement platforms provide citizens with greater access to information and decision-making processes, strengthening democratic participation, particularly among marginalized groups (Marsman, 2022; Gandini & Gandini, 2016). The availability of digital tools such as Voting Advice Applications (VAA) and participatory budgeting platforms fosters a sense of political inclusion, ensuring that diverse voices are heard in public discourse (Dobija et al., 2023; Fleischer & Carstens, 2022).

However, while digitalization has the potential to promote inclusion, its effects are not universally positive. Several studies highlight that it can, in some cases, exacerbate existing inequalities if certain groups, such as low-income individuals, the elderly, or those with limited digital literacy, lack the necessary skills or resources to navigate digital platforms (Adamczyk & Betlej, 2021; Buchert et al., 2023; Schou & Pors, 2018). Furthermore, the increasing reliance on algorithmic decision-making raises concerns about involuntary discrimination, as biases in automated systems may disproportionately disadvantage individuals from lower socio-economic backgrounds (Kwiliński et al., 2020; Ranchordás, 2022). These contrasting perspectives suggest that while digitalization holds promise as an inclusion-enhancing tool, its effectiveness depends on how it is implemented and whether complementary policies address existing digital divides.

This study seeks to clarify this debate by providing empirical evidence on the relationship between digitalization and social inclusion. By comparing Italian regions that have significantly invested in digitalization with Swiss regions that have not implemented similar policies, this research applies a Difference-in-Differences (DiD) approach with treatment intensity to assess how digital investments impact key exclusion indicators. By integrating the Capability Approach into this framework, this study also aims to provide a conceptual contribution by identifying the conditions needed to maximize the impact of digital investments in reducing social exclusion.

Purpose of the paper. *This study aims to assess whether and to what extent digitalization can reduce social exclusion by expanding individuals' capabilities and improving their access to essential services, economic opportunities, and civic participation. By examining the role of digital transformation in fostering inclusion, this research seeks to identify the key conditions under which digital policies can effectively bridge social inequalities and contribute to a more equitable society.*

To this end, the study tests the following research hypothesis:

***RH:** The digitalization of public services reduces social exclusion.*

Methodology. *To examine whether digitalization policy is related to a reduction in social exclusion, we compare levels of social inclusion in Italy and Switzerland, adopting the Difference-in-Differences (DiD) methodological approach. This method is widely used in social sciences for causal inference and evaluation of public policies (Fredriksson and Oliveira, 2019; Furquim et al., 2019). It allows to compare changes over time between a treatment group and a control group, attributing the observed "differences in differences" to the effect of the implemented policy (Stuart et al., 2014).*

Italy, being the European country with the highest investment in digitalization policies, represents a case of "natural experiment". To estimate the causal effects of this intervention, the Italian areas will be considered as the "treatment group", while the Swiss ones, where similar policies have not been implemented, will serve as the "control group", setting 2021 as the treatment year, i.e. the year in which the investments were made. To ensure maximum comparability between the two countries, the analysis is conducted at the regional level. For Italy, only the northern regions are included in the analysis (rather than the entire country), since they share similar demographic and socioeconomic characteristics to the Swiss ones, which are considered as a whole. This approach increases the precision of our estimates of the effects of digitalization policies.

Furthermore, to deepen the analysis, we take into account the intensity of investments in the different Italian regions. Indeed, as highlighted by the report of the Agency for Digital Italy (AGID), investment levels vary significantly across the country, which in turn affects the effectiveness of digitalization initiatives. Therefore, we extend the DiD model to incorporate treatment intensity and change the perspective from a simple binary approach to one that also considers continuous treatments or variable levels of exposure (Callaway et al., 2021). This adaptation allows for a more careful comparison of effects between groups with different levels of exposure, enriching the causal framework (Callaway et al., 2021; Hersche & Moor, 2020; Yanagi, 2022). It then becomes possible not only to measure the average effect of digitalization on social inclusion, but also to estimate its incremental effect at higher levels of investment. The developed methodology is therefore able to determine whether higher investments lead to higher benefits, ensuring a comprehensive view of the intensive impacts of digitalization on social inclusion.

The model structure is defined as follows:

$$y_{it} = \alpha_{it} + \delta_t + \beta\,(TI_{it} * d_t) + \varepsilon_{it}$$

The dependent variable "y_{it}" represents the outcome of social exclusion, given region "i" and year "t". The model also includes a regional fixed effect "α_{it}" that captures stable and unobservable characteristics relevant to each region (such as pre-existing structural differences) that may influence levels of social inclusion independently of digital

investment. We consider a temporal fixed effect "δ_t" to account for year-specific variation and to capture phenomena common to all regions, such as national economic or political fluctuations, that may influence social inclusion independently of digital investments.

The coefficient "β" measures the effect of treatment intensity in the post-intervention period and describes how social inclusion changes for each additional unit of investment per capita.

Treatment intensity ("TI_{it}") instead represents the level of digital investment in region "i" in year "t", while the variable "d_t" is equal to 1 in the years following the implementation of the digitalization funds (after 2021) and 0 for the previous years, thus distinguishing the effects observed before and after the start of the treatment. Finally, the error term "ε_{it}" captures all the random factors that influence the outcome but are not explicitly included in the model, varying across regions and years and capturing the unexplained part of the variability.

To assess the levels of social exclusion, we selected three key indicators identified in the literature, capable of capturing different dimensions of the phenomenon and providing an overall view of socio-economic conditions (Atkinson et al., 2002; Giambona & Vassallo, 2014). The data used are public and provided by Eurostat and Ardeco, and they have been summarized in Tab.1.

The first indicator is "At risk of poverty or social exclusion (AROPE)", which combines monetary poverty, material deprivation and low participation in the labor market (Atkinson & Marlier, 2010). This data offers a broad and integrated perspective, useful for understanding economic difficulties and barriers to inclusion, helping to measure the overall level.

The second indicator is the "Percentage of people in households with very low labor market participation", which measures the percentage of individuals belonging to households with reduced work activity. Such families, according to the literature, are particularly vulnerable to social exclusion (Ward & Özdemir, 2013).

Finally, we consider the "Unemployment rate for the population aged 15 to 74", a central variable to measure social inclusion, since the lack of work often promotes social isolation and marginalization (Gallie, 1999).

Tab. 1: Descriptive statistics for Social Exclusion

	Switzerland			Norh of Italy		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Social exclusion indicators						
At Risk of Poverty or Social Exclusion	63	19.34	5.83	81	14.85	3.90
People in Households with Very Low Labor Market Participation	63	5.69	2.1	81	5.43	2.21
Unemployment	63	4.76	1.60	81	6.19	1.88

Source: our elaboration

Results. *The results of our DiD analyses are presented in Tab. 2, which reports estimates for three key indicators of social exclusion. Overall, the results suggest that regions that have undertaken digitalization policies have experienced a reduction in social esclusion outcomes compared to untreated regions. Starting with the effect of digitalization on "At Risk of Poverty or Social Exclusion", the DiD estimates indicate that digitalization policies are associated with a reduction in the share of individuals at risk of poverty or social exclusion by approximately 1.624 (95% CI [-3.113, -0.1345]). This result is statistically significant, supporting the hypothesis that digitalization investments contribute to a decline in social exclusion.*

When examining labor market participation, the results indicate a possible reduction in the share of people in households with very low labor market participation, with an estimated coefficient of -0.324 (95% CI [-1.686, 1.039])

Turning to the impact on unemployment, the results show a significant association between digitalization investments and lower unemployment rates. The estimated coefficient for unemployment is -1.328 (95% CI [-1.675, -0.980]), and the effect is statistically significant.

Tab. 2: Difference-in-differences estimates

	Social Exclusion		
	At Risk of Poverty or Social Exclusion	**People in Households with Very Low Labor Market Participation**	**Unemployment**
D estimate	-1.624	-.324	-1.328
	[-3.113, -.134]	[-1.686, 1.039]	[-1.675, -.980]
N	144	144	144
Unit effects	Yes	Yes	Yes
Time effects	Yes	Yes	Yes

Source: our elaboration

Tab. 3 presents estimates based on treatment intensity, further confirming that higher levels of digitalization investments are associated with reductions in social exclusion indicators. The effect of digitalization intensity on the risk

of poverty or social exclusion is estimated at -0.086 (95% CI [-0.162, -0.0106]), with statistical significance, suggesting that the extent of digitalization investment plays a meaningful role in reducing social exclusion.

For labor market participation, the estimated coefficient is -0.017 (95% CI [-0.093, 0.059]).

The estimates for unemployment show a consistent and significant effect of digitalization intensity. The coefficient is -0.071 (95% CI [-0.087, -0.054]), and the effect is statistically significant, providing further evidence that digitalization contributes to reducing unemployment.

Tab. 3: Treatment intensity estimates

	Social Exclusion		
	At Risk of Poverty or Social Exclusion	**People in Households with Very Low Labor Market Participation**	**Unemployment**
Treatment intensity	-.086	-.017	-.071
	[-.162, -.011]	[-.093, .059]	[-.087, -.054]
N	144	144	144
Unit effects	Yes	Yes	Yes
Time effects	Yes	Yes	Yes

Source: our elaboration

All models include unit and time fixed effects, allowing us to control for time-invariant and region-specific characteristics.

Research limitations. *This study presents some limitations that should be acknowledged. First, the reference period of the analysis may be relatively short, potentially limiting the ability to capture the long-term effects of digitalization policies on social inclusion. Digital transformation is a complex process that unfolds over time, and its full impact may only become evident in the longer run. Second, the study relies exclusively on quantitative indicators, which, while providing robust empirical evidence, may overlook qualitative aspects that could offer a deeper understanding of the mechanisms driving digital inclusion. Future research could address these limitations by extending the observation period and integrating qualitative methods, such as interviews or case studies, to complement the quantitative findings and provide richer insights for shaping more effective public policies.*

Managerial implications. *The findings of this study contribute to the growing body of literature examining the relationship between the digitalization of public services and social inclusion. In particular, the results provide empirical evidence that Italian regions with higher investments in digital technologies have experienced a reduction in social exclusion. However, the effectiveness of these investments depends on how they are allocated, as digital transformation alone is not sufficient to promote inclusion.*

According to Amartya Sen's Capability Approach (1999), access to digital technologies must be accompanied by the necessary tools and skills to enable individuals to fully exploit their potential. Without this support, digitalization risks reinforcing existing inequalities and widening the digital divide rather than reducing it. In this regard, Thijssen and Van Dooren (2016) highlight that certain digital platforms tend to favor younger populations, unintentionally creating barriers for older individuals and thereby exacerbating generational disparities. To address these challenges, policymakers should prioritize investments in digital literacy programs for vulnerable groups and in ICT infrastructures that ensure equitable access to digital services (Okunola et al., 2017; Petrović et al., 2012).

Moreover, consistent with the theoretical framework adopted in this study, Berg et al. (2020) emphasize that citizens' engagement with digital processes is not solely dependent on technology availability but also requires effective communication and inclusive strategies. In regions characterized by low digital literacy, users may prefer traditional service delivery channels, making a multi-channel approach essential. For instance, combining mobile platforms, websites, and physical access points can facilitate a smoother digital transition and prevent exclusion (Rodriguez Müller et al., 2021; Sharma and Mishra, 2017). Consequently, regions with lower levels of digital skills could benefit from hybrid solutions that integrate both digital and offline services.

Beyond access and usability, for digitalization to have a meaningful impact on social inclusion, individuals must be able to translate digital technologies into tangible economic and social benefits (Colding et al., 2024; Bose, 2016). This highlights the importance of an enabling environment where digital tools can be effectively leveraged. Such an environment requires robust technological infrastructure, widespread digital literacy, and inclusive service design to ensure that digital transformation fosters an equitable and inclusive society (Britz et al., 2013; Hillerbrand et al., 2019).

Originality of the paper. *This study provides a novel contribution to the literature by adopting a Difference-in-Differences methodology with treatment intensity, an approach that enhances the ability to establish causal relationships between digitalization investments and social inclusion. While previous studies have explored the impact of digital transformation on social outcomes, most have relied on descriptive or cross-sectional analyses, limiting their explanatory power. By integrating treatment intensity, this study moves beyond the traditional binary distinction between digitalized and non-digitalized regions, offering a more precise understanding of how varying levels of investment influence social exclusion.*

From a theoretical standpoint, this study also advances the discussion by applying Amartya Sen's Capability Approach (1999) to digitalization policies. The analyses suggest that while digital access is a necessary condition for

inclusion, it must be accompanied by enabling factors such as digital literacy programs, inclusive service design, and targeted policies to prevent the exacerbation of social inequalities.

By addressing these gaps, this study contributes both methodologically and conceptually to the academic debate on the social impact of digitalization strategies.

Keywords: *Digitalization, Social Inclusion, Difference-in-Differences, Public Services, EU Next Generation.*

Declaration: This is a work-in-progress.

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