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Assessing capabilities to embrace digital transformation: the case of southern Italy

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Abstract. Southern Italy has been confronting dire economic and resource scarcity challenges to keep up with the national growth. Digitalization is a changing phenomenon that transforms the firm's structure and enhances production, operational, and service efficiency helping to reduce economic and geographical disparity. Firms play a crucial role in the development of an economy. In the recent decade, digital transformation has emerged as a driver for economic growth and urban development by transitioning the firms' processes. However, firms need sufficient institutional support during the digital transition process. The Italian government has taken substantial initiatives to stabilize and boost the economic structure of southern Italy. This study aims to determine the existing relationship between southern Italian cities' digitalization and firms' financial capabilities and institutional support. We have applied correlation and regression models to examine the relationship between cities' digitalization, local firms' financial capabilities, and institutional support. Our results highlight the significant relationship between cities' digitalization, firms' financial capabilities, and institutional support in southern Italian cities. This paper produces policy suggestions for the government to extend the institutional financial support toward the southern firms. As the transformation of cities will increase the operational and production efficiency of the firms, which will add to the regional and national economic development.

Keywords: digital transformation, financial capability, institutional support, cities' digitalization

1 Introduction

The last two decades have witnessed rapid economic and societal developments. The changes in economic and societal domains worldwide are catalyzed by the increased deployments of information and communication technologies [1,2]. A country's national or regional transition to technological advancements accompanied by the dissemination of digital technologies is a prerequisite for the economic and societaltransformation to the new stages of development [3].

The evolution of economic processes is changing the competitive business environment. In such a hostile environment, digital technologies and innovation are considered to enhance processes, operational efficiency, and communication in the business sector [4]. Cities' need to embrace digitalization because technologies like big data, ICTs, blockchain, and the internet of thing (IoT) is going to have far-reaching consequences. For the business and economic world [5, 6]. However, an effort is also required by the firms located in the cities area to do so.

Local firms need to have the financial capabilities to develop strategies and

plans to finance digital transformation to improve organizational processes that positively impact local economic conditions [7, 8]. Firms' readiness to adapt to the surrounding challenges is of utmost importance [9]. Firms' capabilities are embedded in their financial resources [10]. In a volatile business environment, assessing firms' financial readiness to adopt advanced technologies is crucial. It is termed a financial commitment by the firm's management to change for which they implement strategies and plans to channel to create a more responsive and receptive innovation context [11]. According to Heeks et al. [12], besides firms' financial readiness, institutional support plays a significant role in driving digital technologies in a city because firms need sufficient institutional help during the cities' digital transition process. [13, 14] defined institutions as formal and informal regulatory bodies crucial to achieving economic and societal well-being in a country, region, or city. According to Büchi et al. [15], digitalization should happen at an equal level across cities in a country; otherwise,it can lead to digital inequalities if the relevant bodies inside a city fail to embrace the phenomenon compared to others.

This study explores the firms' financial capability in 12 southern cities to examine if it channels the city digitalization and how institutional support affects city digitalization. Urbanization enhances firms' productivity and outcomes, thereby, promotes economic growth in this geographical location [16]. Firms' financial capability is crucial as it ensures their readiness to transit traditional organizational structure and adopt more digital technology [17]. Institutionsplay an important role in driving business activities, whether related to the formulationof laws, environmental performance, or financial activities [18]. Thereby, it is crucial to understand the relationship between the aforementioned variables.

The empirical context is particularly relevant for this study because those cities are economically less developed and lag behind digitalization adoption in the operational and services process. Studying the geographical location or region is crucial to analyzethe economic and development differences. Compared to northern Italy, which has undergone massive industrialization, southern Italy is underdeveloped with natural and financial resources constraints [19]. The Italian government has taken the initiative to fund the industrial and economic development process [20, 21]. A researcher, Arokszallasi et al. [22], have explored the organizational financial readiness for digitalization on country-level statistics. Still, Li et al. [23] argue that the firm's response to digitalization adoption is mixed across firms and places. Therefore, we aim to fill the gap in the research to explore the possibilities for southern Italy to harnessthe digitalization opportunities to enhance firms and societal well-being.

This study offers the following critical contributions to the existing body of literature. First, by focusing only on the southern Italian firms, this study produces insights into whether the south Italian firms can transform their traditional organizational process into digitalized ones. Second, most previous research has employed institutional supporters' moderator or mediator variables in either new businesses [24] or multinational joint ventures [25], which has produced a controversial result that cannot be generalized. Our study, however, considers the individual impact of institutional support on a cities' readiness to embrace digitalization. Third, along with possible policy implications, we have provided comprehensive directions for future research.

2 Literature review

2.1 Theoretical framework

The southern Italian region has been facing diverse economic and development crises for decades now. The Italian government has taken a severe initiative to promote

regional development across Italy with different funding programs for industrial and economic growth [20]. Still, the economic output ratio difference between the southern and other Italian regions is visible [19]. Digitalization is an emerging phenomenon that has captured the attention of global leaders striving to excel in their countries' economic growth and development [26].

The empirical context is particularly relevant for this study because the economically less developed cities lag behind digitalization adoption in the business sectors. Studying the geographical location or region is crucial to analyze the economic and development differences. Compared to northern Italy, which has undergone massive industrialization, the southern part is industrially underdeveloped with less natural and financial resources [21].

Institutions are an integral part of a society that stimulates people's behaviors and actions and regulates business with specific ethical codes and policies [27]. Chang et al. [28] stated that inside one country, the same institutions could promote economic growth at one level in the region, state, or city, which may differ from the other area, state, or city. Institutional support is defined as the extent to which government bodies provide sufficient support to firms to decrease the negative impacts of thefirms on the environment and people and increase the industrial efficiency to contributeto national reserves. The institutional support includes financial or technical support, policy, and programs [29]. Considering the importance of business industries in adding to the national GDP, many governments worldwide initiated different funding programs and policies to support the firms to evolve digitally. Henceforth, government institutions play a crucial role in devising plans, programs, and procedures to help the city andthe city firms with inadequate resources adopt competitive practices with the help of advanced digital technologies [30 – 32].

Governmental Institutions play a significant role as institutions can affect a firms' financial capabilities to embrace a specific type of transition. Institutions can help firms with different phenomena, e.g., lower machinery or deployment taxes, financial assistance, and financing the deployment of advanced technology [33]. Firms can excel with improved productivity, environmental concerns, and state and national economic growth by adopting digital practices. However, firms in less developed areas face financial constraints to go digital, as digital transformation requires enormous installation and service costs. Thereby, institutional support (financial aid) holds crucial importance in increasing organizational capability and channel a firm's readiness to adopt digital operation, communication, and production processes.

2.s

For decades, a firm's financial capability to transition from one operational and functional state to another has been of utmost importance [34, 35]. The firms' sensitivity towards resources to transit the traditional organizational practices depicts the significance of financial capabilities. Firms' financial capability is a critical dimension of firms' readiness [36], help firms strengthen their operation and production processes. Thereby, the financial capability or financial readiness is defined as the "firm's available monetary resources to buy and pay for installation cost of any object relating to the operational enhancement or production improvements and the subsequent charges during the practice" [36]. The evolution of economic growth processes is changing the competitive business environment. In such a hostile business environment, when digital technologies are considered to enhance processes, operational efficiency, and communication, it is becoming crucial for firms to embrace the phenomenon to excel in their activities [4].

Economic developments and digitalization are interlinked, which is observed to impact the social aspect, which can be seen in society's health and education sector.

Evangelista et al. [37] argued that digital transformation and technologies in a city channel the structural change process in the economy. Garzoni et al. [38] stated that digitalization refers to the inclusion of digital technologies in the business. Del Río Castro et al. [39] indicated that digitalization is embracing all spheres of society, making it essential for the firms to update their traditional operations to digitalized ones. A company can adopt digital practices if it's already happening in the community. Digital business is ranked among the top three business priorities [40], subsequently is it crucial for firms to adopt digitalization. Digitalization in a country is positively associated with industrial and societal realms [41] and affects all spheres of human society at the micro and macro level [42]. The international organization highlights the importance of digitalization in accelerating economic and social growth in a country [43].

The world bank emphasized the inclusion of digitalization in the national plan. It benefits the business firms and people [44] by tailoring more jobs, time-saving, effective operational efficiency, and less environmental impact. In international cross-sectoral research. The digital activities of businesses have far-reaching implications for an economy. Therefore, it is crucial to map the digitalization in a country, state, or region [45,46]. The city's digitalization is proven to boost economic growth; however, the impact of digitalization developments and its impact on the economy differ from place to place. The leading five cause of such difference is embedded in the economic and societal structure of the developed and developing regions [47]. It's not easy for a society to transit from a static context to a more complex and digital process as it requires massive investment and time. Still, it is beneficial to deal with persistent economic, business, and societal challenges in the developing areas [48]. Ritter and Pedersen [49] argued that a firm’s capability to adopt digitalization could vary across industries and the urban regions in a country. Hence, it is essential to study how firms’ financial capability or readiness affects cities’ digitalization and act as a prerequisite for societal, environmental, and organizational efficiency to stay competitive in the hostile economic and business environment [50, 51].

In the light of the above literature, we, therefore, propose the following hypothesis:

H1: Firms financial capabilities in cities is positively related to the cities’ digitalization

2.3 Institutional support, firms’ capability, city digitalization

Institutions are responsible for economic, social, and environmental well-being [13, 52]. It shapes the behavior of relevant factors and makes them behave in devised constraints. North [14] defined institutions as formal and informal regulatory bodies which play a crucial role in achieving economic growth and societal well-being in a country, region, or city. Institutions are an integral part of a society that stimulates people's behaviors and actions and regulates business with specific ethical codes and policies [27]. Chang et al. [28] stated that inside one country, the same institutions could promote the economic growth at one level at a point in the region, state, or city, which may differ from the economic growth level of the other region state, or city.

When a society undergoes tremendous development or infrastructure changes, institutions offer support to relevant stakeholders and businesses to help them transit for the national long-run benefits [53]. In an underdeveloped society, firms don't have sufficient resources to normalize the advanced business practices by deploying digital technologies and, therefore, face huge constraints and challenges [54]. The academic and practitioner world has realized the importance of digitalization, but some firms can still not digitally transform their organizations. Digitalization can change the organizational structure, but it requires enormous investment to deploy advanced

communication and production technologies [55]. Firms' financial readiness helps to efficiently deploy digitalization to compete in domestic and international markets [56]. Thereby, the lack of sufficient financial support hinders the deployment rate of digital infrastructure in economically deprived areas and its firms [57].

In the past few studies [58, 59] have reported institutional support passively associated with cities' digitalization, while others [60, 61] have found a negative impact [62]. In most studies, institutional supports are used as mediation or moderation variables that can channel the relationship between two variables, and the findings of such moderation and mediation are mixed and cannot be generalized [29, 63]. The varying results can explain the different sizes of study samples or the difference in the theoretical approach and the various geographical contexts and diverse policies [29, 64]. The significant impacts of institutional support on a particular firms' perspective are not well explored [65].

In the light of the above gap and mixed results, this research focuses on exploring the effect of institutional support on cities' digitalization. According to Ingram and Silverman [66], institutions under specified constraints channel transitioning processes in a place. Based on the above literature, we, therefore, proposed the following hypothesis,

H2: The institutional support positively related to the cities 'digitalization

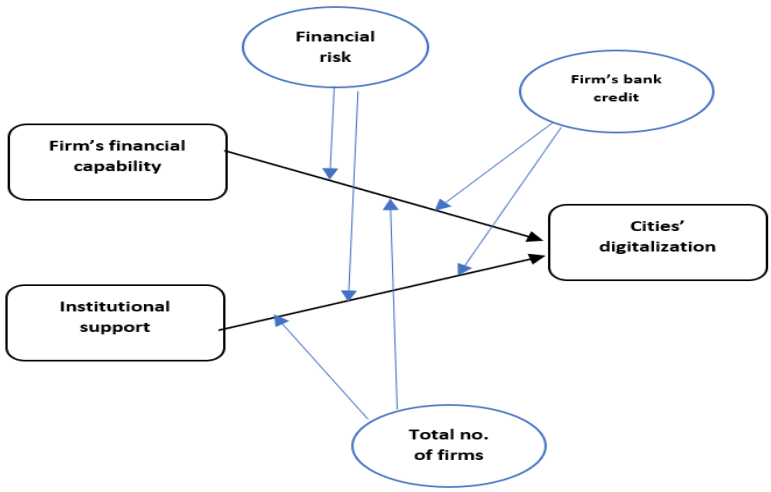

Fig. 1 Conceptual Framework

3 Methodology

3.1 Sample and Data collection

In this study, we focused on 12 cities in the center-south of Italy, traditionally considered less developed both technologically [38] and economically [67] compare to the northern cities, for a period ranging from 2012 to 2019. To select the center-south Italian cities, we considered the statistical territorial units of Italy NUTS used for statisticalpurposes at the European Union level (Eurostat). According to this ranking, the least the cities are Rome concerning Italy's center; Naples, Salerno, Bari, Lecce, Cosenza, Reggio Emilia, Foggia, and Caserta concerning the south of Italy and Messina and Cataniaconcerning the Island.

The city-level data used to analyze the financial capability, firms' statistics, and R&D investment were collected by the Italian National Institute of Statistics (ISTAT) through

the firms' regional analysis. Data is mainly related to the digitalization process. Cities are based on an index considering nine indicators based on data sources such as ISTAT, FPA, and AGCOM to represent technological advances in cities and the technological services offered to their stakeholders.

This analysis is conducted using the ordinary least squares method (OLS) to verify the research framework and hypotheses. We analyzed 12 Italian cities during an 8-year period (2012 to 2019). The Hypothesis testing is conducted using a panel data regression analysis model that intends to predict the extent of the strength of the impacts of both independent variables on the dependent variable.

3.2 Operationalization of the variable

The digitalization index is our dependent variable. This index aims to measures the technological development of the cities based on a set of indicators that covered a large panel of technological services. These indicators include online services, broadband access, municipal app, home banking, diffusion, digital transparency, digital openness, social public administration, public wi-fi, and IoT development in cities to produce an index that measured the proportion of digitalization in a city. This variable is usually used to assess the technological advance in cities to understand the impact of technologies in the urban area [68].

Our model includes two independent variables: financial capability and institutional support. The first independent variable is the financial capability; in this variable, we consider the firms' financial capability in each city based on access to appropriate financial services evaluates using the differential of active lending rates on cash loans offirms in cities. The firms' abilities to raise capital from existing shareholders, the public, and easy access to bank financing, also considering the geographical position, are usuallyrelated to advantage on firm's competitiveness within an industry [69].

Our second independent variable, institutional support, considers each city's public expenditure in R&D over the city's population. The institutional support perspective is usually consistent with the notion that access to tangible and intangible resources from both government and private individuals is a crucial enabler of entrepreneurial activity [70].

In the regression model, we controlled several factors at both the city and firms' levels. All variables are continuous variables, and the model specification includes the following indicator as a control variable. To assess the financial development of firms in cities, we looked at the financial risk of a firm's city, using the percentage of the decay rate of the financial loan. We also control bank credit by considering theTotal value of banker's credit lines used by firms in cities over the population. Moreover, we also use the total firms in the city by considering the total number of firms registered in the Chamber of Commerce over the population of each city.

Table 1 presents the summary statistics of the variables used in the regressions, and Table 2 the correlation matrix related to this model.

Table 1. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Digitalization Index	96	0,339	0,128	0,152	0,768
Financial Capability	96	0,402	0,274	-0,062	1,001
Institutional Support	96	107896	258820	4764	1059
Firms Bank Credit	96	1,322	1,931	0,005	5,247
Total Firms	96	0,084	0,011	0,068	0,116

3.3 Results

This article is focused on exploring the relationship between cities' digitalization, local firms' financial capability, and institutional support in southern Italian cities in the presence of two control variables, financial risk, and bank credit, respectively. Table 1 describes the data statistics, and table 2 presents the correlation matrix. The weak correlation between local firms' financial capability and cities' digitalization is explained by the scenario of the southern Italian firms. According to Lukonga [71], firmsrequire enormous financial resources to shift traditional operations to digitalized ones. Firms need institutional support to fund the shift. Chen et al. [54] describe institutional support as financial aid provided by the government to the local businesses to adopt advanced technological operations to protect the environmental, economic, and societal concerns

Table 2. Correlation Model

	Variable	[1]	[2]	[3]	[4]	[5]	[6]
[1]	Digitalization Index	1					
[2]	Financial Capability	-0,291	1				
[3]	Institutional Support	0,514	-0,391	1			
[4]	Financial Risk	-0,133	0,353	0,136	1		
[5]	Firms Bank Credit	0,463	-0,361	0,964	0,148	1	
[6]	Total Firms	0,464	-0,314	0,698	-0,063	0,678	1

The results of the regression matrix are presented in table 3. Collinearity in regression leads to an increase in the variance of coefficients and thereby produces unbiased results. To avoid multicollinearity, we deployed the VIFs (variance inflation factors). For all four-study models, the maximum and mean VIF values are less than the threshold of 3.5. Therefore, no collinearity in the study model is confirmed, and the study results are compelling and unbiased.

Table 3. Regression Matrix

	Model I	Model II	Model III	Model IV
Financial Capability		-123,17*		-106,94*
		[54,11]		[53,53]
Institutional Support			2177,84**	1952,91**
			[811,75]	[816,332]
Financial Risk	-24,56**	-14,44	-29,11**	-20.130*
	[9,24]	[10,05]	[9,03]	[9.954]
Firms Bank Credit	-7,23	-1.26	-5.24**	-5,299**
	[1,18]	[1,18]	[1,98]	[1,945]
Total Firms	7388.23***	6992.35***	4843.98*	4813,93*
	[2040,67]	[2032,86]	[189,11]	[2311,75]
No. Of Observation	96	96	96	96

R-squared	0,189	0,147	0,221	0,162

*Note: Digitalization Index, dependent variable. P < 0.10; *P < 0.05; ** P < 0.01; ***P < 0.001*

Although all models depict the significant relationship between study variables, the negative value of local firms' financial capability reveals the inability of the southern firms to embrace digitalization as the firms lack sufficient funds. The positive association of institutional support and cities 'digitalization does not imply the strong position of the firms in the region. According to Acemoglu and Robinson [53], institutions in a country affect the different economic areas differently; subsequently, institutional support in southern Italy is not as significant as other Italian regions [19]. Suppose the Italian government extends institutional financial support in southern Italian cities and provides them with sufficient support and resources. In that case, these cities and the firms inside them can embrace digitalization, positively affecting firms'output and economic and societal progress.

4. Conclusion and implications

The present study attempted to explore the relationship between cities' digitalization, firms' financial capabilities, and institutional support in southern Italian cities. We find a positive yet weak correlation between local firms' financial capability and cities' digitalization, which directs our attention towards economic development and institutional resource availability in southern cities of Italy.

Our results show that southern Italian cities are less reactive to digitalization. The analysis results reveal that institutional shares a significant positive relationship with a firm's capability and city digitalization which is in line with the study findings of Shuet al. [63]. However, the negative yet significant relationship between local firms' financial capability and cities' digitalization implies that the institutional support is not substantial to drive digitalization in southern Italy like other Italian regions. Therefore, we proposed the following policy suggestions. First, the Italian government must devise plans to promote regional economic development in southern Italy. Second, the Italian government must allocate sufficient budget and resources to local institutions to channel the digitalization in southern Italian firms.

Our research offers several implications for the firms. Notably, the study has investigated the local firms' financial capability to embrace the digital footprint. It has proved that digital transformation and firms' financial capabilities are strongly linked. A firms' financial capability can be a central source to drive digitalization. However, it requires substantial institutional support if firms are not financially capable of the transition. Together the business can develop a platform to raise their concern for business, society, and environmental efficiency and ask for the proper institutional support from the central government. Collective efforts can be helpful to draw sufficient budgets to fundthe digital transformation in the firms.

4.2 Limitation and future research

This study has several limitations and suggests some directions for future research. First, the study indicators are limited and do not incorporate every aspect of the firms' capabilities. While financial capability can be the central driver for digitalization, another technical and human resource capability can also be effective. The firms' capabilities can be studied in future research to develop a comprehensive taxonomy. Second, the sample is limited to the southern Italian firms and thus, produces results that can be generalized to a similar economic and organizational setup. However,a large and variant sample can generate meaningful and new insights on this topic for future research. Future research can also study the strategic and

management perspective of the firms toward digitalization. Third, although institutional support is a much-required phenomenon an organization needs for their technological or digital transformation, future research can look up to other external societal or state factors like capturing the impact on the firms' digitalization. Cross-sectional data and other external factors can help to dig deeper to examine the longitudinal path towards digitalization.

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