Chief Digital Officer and Organizational Creativity Toward Digitalization

Veronica Scuotto, Domitilla Magni, Tzanidis Theofilos, and Manlio Del Giudice

Abstract—Through the microfoundation lens, this article explores how dynamic capabilities (DCs) of Chief Digital Officers (CDOs) trigger digitalization and organizational creativity of 2124 small to medium enterprises (SMEs) across 39 different European countries. As a result, the significant DCs are substantive and adaptive capabilities, which are offering new solutions, seizing new opportunities, and coping with changes. Besides, those two DCs also assume a mediator role in triggering organizational creativity within SMEs. In terms of theoretical and managerial implications, threefold contributions are provided: the first one offers a fresh study on the digital transformation context of SMEs through a microfoundation perspective; the second emphasizes the crucial role of CDOs as supported and remarked upon previous studies; and, then, the third one stresses out the importance of the individual leverage to generate creativity by the moderating role of DCs. By highlighting the originality of the research, since CDOs are seen to be the spark of unique ideas and innovations in the organization, further insights are proposed to position the need for conceptualizing new paths for developing technologies toward organizational creativity and humanity.

Index Terms—Chief Digital Officer (CDO) organizational creativity, digital transformation (DT), dynamic capabilities (DCs), microfoundation.

I. INTRODUCTION

In the era of business humanization, digital transformation (DT) is addressing the focus of scholars and practitioners toward individual dynamic capabilities (DC). Such capabilities are classified as substantive, adaptive, and change [28], [77] that can be embraced in the new business digital role of Chief Digital Officers (CDOs). CDOs influence organizational strategy [51] to achieve businesses’ goals [57]. They also assume a leadership role in evolving a business toward a digital mindset by employing digital technologies. The use of digital technologies is the core skill in the DT era. DT is defined as a way to enclose digitalization by using digital technologies to improve business performance, customers’ relationship, organization structure, and so business models [10], [73] but nothing seems to illustrate or explore the impact of DT on individual creativity. The impact of DT has been studied mostly on the organizational point of view [8], [17], [36], [50], [55], [64] along with the impact on society [72], but none on the individual perspective. In this sense, the present research questions if individuals such as CDOs can drive new trajectories for emerging technologies and so overcoming risk and resistance but generating more creative ideas. On this basis, through the microfoundation lens and going beyond the mere human resources analysis, this article investigates the substantive, adaptive, and change of DCs belonging to CDOs in the DT context and their impact on organizational creativity. Moreover, such a context is researched on a sample of 2124 small to medium enterprises (SMEs) across 39 different European Countries. To test our conceptual model, we run an ordinary least squares (OLS) regression analysis using the statistical package IBM SPSS 25.0. Findings support our hypotheses regarding the role of CDOs’ substantive and adaptive capabilities on digitalization, which has also a positive mediation role on organizational creativity in European SMEs.

The present analysis offers three distinctive contributions. First, studies on DT are extended offering a microfoundation perspective by looking into DCs. CDO’s capabilities are made of microfoundations relating to substantive and adaptive capabilities, which highlight the need to provide a rapid response to the market and be flexible driven by individuals rather than organizational settings as [17] and [66] postulate. In particular, CDOs are more prone to get new solutions [71] and adaptive to changes, which circumvent periods of inactivity and stagnation that can be usual in SMEs.

Second, we remark the crucial role of the decision-makers in building DCs [77] and more specifically, the relevant role of CDOs to trigger digitalization within SMEs. The quantitative analysis enlarges insights emerged by a qualitative and case-based study [57], [58], [62] and can encourage new theory—testing research. Yet, if it is well demonstrated that large companies have already embraced the CDO role [37], [75], this article offers an overview on SMEs that is unexplored. It shows a new job position, which is diverse from another related role as chief information officer [7].
Third, this article suggests how to stimulate creativity in an organizational environment. In fact, it shows digitalization significantly positively mediates the effect of CDOs’ individual DCs (substantive and adaptive capabilities) on organizational creativity. In turn, the current business is moving toward “the right-brained intuitive and creative world instead of a left-brained logical thinking world” [58, p.167] to increasingly become more antagonistic and pushing the more traditional roles into extinction and placing greater demand for more creative and entrepreneurial skills. CDOs are therefore seen to be the catalyst and the trigger of novel ideas and innovations in an enterprise. Overall, we emphasize the key role of CDOs in triggering digitization and consequently organizational creativity. This overcomes individual and organizational reluctance in exploring emerging technologies but shows new trajectories to facilitate the dissemination of those technologies.

II. THEORETICAL BACKGROUND

A. Digitization, Digitalization and DT

As our economies slowly drift into a new era, defined by virtuality, digitization, and real-time user interactions and data availability, it is hard not to assume that this evolving trend leads to some kind of “technological singularity” moment. We see digital platforms and the fast intervention of artificial superintelligence changing how we do business, how we interact, buy, and communicate in our efforts to integrate machine input in our daily business. This is not the first technological acceleration as we now live through the third epoch of technological transformation following the Information Age (1947–1995), the Digitization Age (1997–2007) and it is termed as the Age of Acceleration. This rapidly growing 21st century phenomenon is built around digital platforms and cloud ecosystems that aim to assist DT and create sustainable business societies.

The transformative effects of digitization, digitalization, and consequently DT is felt fully by marketers and the wider organization, with the ever-accelerating process creating more channels for customer and business interaction, as well as opening new avenues for data utilizing products and services [67]. The digitization, digitalization, and DT of the communication process have allowed for the reduction in costs of measuring communications data, with costs becoming lower while increasing the requisite specialisms from marketing communications professionals to operation managers working to the factory floor [35].

According to [49], digitization is an evolutionary process toward Industry 4.0 and Industry 5.0 frameworks, a journey from analog to digital for the organization. The authors provide an interesting metaphor presenting DT as a spectrum whereby overtime the options of digital technology use, the assorted complexity, and the development of both hardware and human resource move into cyclical revolutions. That suggests that the main stages along the DT spectrum [70] are that of an analog state of being and that of digitization or digitalization.

Autio [5, p.1] defined digitization as the transformation of physical entities into digital objects, or in his own words “technical conversion of analog information into digital form.” A good example here is handwriting on paper (analog) and evolving into using a stylus pen to write on a word document. Digitalization is linked to a dwindling number of digital technologies implemented in an organization. Digitization as a stage along the DT spectrum is often historically linked with 1960s and 1970s growth in computational processing and application in industry [22], [52], [76].

Tilson et al. [68] defined digitalization as being the term that refers to describe the sociotechnical processes surrounding the use of most digital technologies that have an impact on social and institutional contexts that require and increasingly rely on digital technologies. Autio [5] pinpointed 1980s and 1990s as the period during which the growing interconnectivity and increased digitalization of businesses and consumer markets led to the era of the fourth industrial revolution otherwise known as Industry 4.0 [40], [60]. According to [2], the growth of sensors for real-time data collection led to the transformation of many technologies that developed the capacity to communicate autonomously leading to the Internet of Things and artificial intelligence.

Digitalization is broadly defined as the application of digital technologies and infrastructures in business, economy, and society [5]. The impact of digitalization can broadly be said to be a disruptive one, especially at this point in history, as the accelerated nature of digitalization has a consequential effect on business, society, and the economy at large. This has been most significantly felt through the advent of ‘Web 2.0’ in 2004, which ushered in the introduction of smartphones and the subsequent establishment of cloud computing technologies, algorithms, performance analytics, digital communications, and big data technologies [5]. Furthermore, organization-wide engagement with these digital tools and technologies can result in the development of an embedded digital culture within the organization.

According to [67], this growth of adoption and evolution of a business process and modeling was beneficial to many SMEs but was not equally fertile to everyone. Many organizations that were both established and had long-standing traditions in their respective industries were found to be struggling to change on time failed to adapt and retain their market share and, in many cases, they have vanished from the marketplace. These companies relied on an older belief system [26] and insisted on attempting to engage with modern problems using solutions fit for non-digital environments. Given the accelerated nature of technologically fueled change, many businesses are forced to revise their business models and attempt to creatively integrate digital technology into their businesses. That creative organization’s technologically driven change is known as DT.

As previously articulated, in this article, DT is a multidimensional phenomenon and it manifests differently for every business. Some businesses may be about adopting innovative technologies (e.g., Internet of Things or Industrial Internet of Things) [27], [73], for other businesses may be about harnessing social media to engage with clients and prospect sales or leads [30]. These multiple dimensions of DT may differ in various ways depending on the type of the organization, size, and goal of each stage of their transformation cycle. Some use DT to optimize a business and production process, create cost
efficiencies, create value by enhancing products and services new to the market and sometimes some businesses see it as a natural way to evolve forward. The glue that binds this together is also often the missing element that allows companies to integrate and embed DT as part of their business model and approach evolution is organizational creativity.

B. Building Individual DCs on Microfoundation Lens

DT is addressing the focus of scholars and practitioners toward individual DC that are classified as substantive, adaptive, and change [28] that can be embraced in the new business digital role of CDO. CDOs aim to achieve businesses’ goals [57] influencing organizational strategy [51]. They also assume a leadership role in evolving a business toward a digital mindset by employing digital technologies. The CDO is defined as the principal frontrunner responsible for evolving processes and the clear communication of a holistic DT strategy across the organization, advocating for the company’s digital initiatives to internal and external stakeholders and consequently leading DT [23], [48], [58]. Fitzgerald et al. [20] showed how the digital capability productively engages with digital technology capability and expedites the innovation process by integrating and mobilizing both human and technological strengths and resources. According to [8], a digital strategy has to leverage digital resources to develop a differential value.

Resources such as digital experience and expertise (human resource), digital strategy (management and leadership), digital infrastructure (hardware and software), and digital business process and procedure shape what we call digital capabilities that according to [5] digitization definition make up the definition of digitalization. These resources and capabilities are essential for the development of the digitization process in SMEs. Crupi et al. [11] highlighted the impact of digitization and DT to an organization of a larger size and its effects on processes, routines, capabilities, and organizational structure. Raymond et al. [47] asserted that DT is providing a competitive advantage to an SME in comparison to larger organizational entities given the slower adoption rates due to larger organizational structures, size of operations, and capacity to deliver change with minimum disruption. On the other hand, for this competitive advantage to be achieved the need for SME tailored planning is essential to encompass gaps in capacity and skills required to drive the transformation process. Isensee et al. [29] identified several links with strategic orientation, internal capabilities, management amongst other capabilities that drive and enable digitization in an SME and affirm the importance of a central role in the business to drive digitization.

The authors of this study will employ the microfoundation viewpoint aiming to engage and transcend the HR dimension that often brands CDOs DC as potential organization creativity triggers within SMEs. The microfoundation lens evaluates individual elements in an organizational environment [18], which is shifting toward the DT [61]. By adopting this perspective, it is possible to explore the DCs capabilities to enhance the DT process by focusing on creativity at an individual level and organizational creativity at an organizational level. As Scuotto et al. [54] stated, the microfoundation approach describes organizational learning capabilities and microlevel components. This is referenced in some of the first studies using microfoundations, that reflect on the importance of the microeconomic behaviors of individual agents, and this has been remarked upon numerous studies [13], [21], [64]. Sousa-Zomer et al. [61] further highlighted the importance of microfoundation lens in studying how SMEs in comparison to larger organizations build processes around those DC capabilities. The authors indicate that there is a need for more research in this area to understand how building and maintaining DC can be linked to microlevel elements, and how these elements in turn affect substantive capabilities, digitalization, and DT.

C. Substantive Capabilities and Digitalization

Substantive capabilities refer to an individual’s problem-solving skills, the adaptation of capabilities is the capacity to adjust the behavior in line with changes, and the change capability concerns the mode to resolve an issue. Those DCs are analyzed on a microlevel point of a view as defined by Zahra et al. [77] “as the abilities to reconfigure a firm’s resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s)” (p. 918). The great relevance of DCs is that they enhance competitive advantage [64] and foster innovations, looking beyond the mere operational activities [64].

In this vein, we consider that the substantive capability in this case refers to the CDOs problem-solving skills. Venkatakrishnaiah and Ramanathan [71] highlighted the complexity and multidimensional role of a CDO and the role’s tendency to often employ problem-solving to fill evolutionary technological or procedural organizational voids during the process of digitization or digitalization of an SME. Pool [46] indicated that CDO’s role and goal achievement of their innovations is often being driven by experimentation. Usually, one of their main tasks include the development of stakeholder value through the generation of new streams from leveraging data and novel technology. These tasks indicate that problem solving is the core substantive capabilities.

Therefore, we deem that

$$\text{H01—CDOs' substantive capabilities drive digitalization within SMEs.}$$

We affirm that CDOs adaptive capabilities consist of the individuals’ willingness to change, ability to adapt change and the individual tendency to avoid extended times of inactivity and stagnation. As this is the ability to reshape companies’ resources and operational routines in the way intended by decision-makers [77]. Those decision-makers are prone to undertake changes and be adaptive [45]. In this sense, CDOs are considered agents of change and the existence of the role in a company alone represents the willingness of the organization to progressively engage with continuous change that follows DT [14]. Overall, CDOs are able to manage digital technologies to create business values. They focus on grasping new opportunities, evaluating the variety of data. Yet, CDOs build DCs by observing the market of emerging digital technologies. However, they do not know the
results of their actions and so to accomplish digitalization they need to be familiar with iterative experimentations and cope with indeterminacy [63]. This is confirmed by many authors [33], [57], [62], that point to resilience, change leadership, and change management skills as some of the core adaptation capabilities. Consequently, we consider that

Hp2—CDOs’ adaptation capabilities steer digitalization within SMEs.

To enable digitalization, the need for a new centralized responsibility role for DT led to the development of the CDO. According to [19], a centralization of responsibility is essential to avoid lags of activity during the process of DT and facilitate and accelerate progress and direction during times of change. This is a change from caterpillar to butterfly that is ongoing and cyclical, while the acceleration rate of digital and technological change will only increase over time and this highlights that buying just technology (digitization) or converting analog process into digital (digitalization) without having a central human resource to manage this perpetual metamorphosis will inevitably steer away the company from DT. Del Giudice et al. [13] highlighted that managers and leaders have to support and develop new capabilities and knowledge over time. According to [34], practitioners themselves are not aware of the target state, although they must decide the goals on the DT journey, so it is imperative that someone cast an eagle eye perspective over the DT operation within an SME for the DT process to progress and push further with change.

With this background, we retain that

Hp3—CDOs’ change capabilities push digitalization within SMES.

Therefore, we suggest that CDOs change capabilities have a direct effect on the pace of change and digitalization of SMEs. According to Woodman et al. [78], organizational creativity is the creation of value that can be useful or the development of innovation in products and services, ideas, and procedures that originate from individuals who work together in a complex social context. De Vasconcellos et al. [15] added that organizational creativity is an outcome of social interaction between employees’ creativity that makes up the organization. Moreover, AlNuaimi et al. [3] noted that leadership roles are core in influencing and directing change in an organization, and usually that leadership focus is around transformational leadership. They showed that transformational or transactional leadership styles influence innovation capability. Ogbeibu et al. [41] talked about the need of firm direction and leadership as well as interdependence between a team in an organization and the necessity to be efficiently supported by the appropriate digital capabilities needed to push changes in the organization. Becker et al. [79] asserted that the CDO position has been developed to face the aforementioned challenges that occur during a business model undergoing DT. Their study shows that in SMEs CDOs can be assigned to categories of digitization and strategic management that may involve (leaving the main task of the overall DT aside) developing new business areas, producing new digital solutions, and working in evolving new business models [32].

The CDO also engages with strategic management planning and implementation while at the same time may engage in HR to appraise and emit the notion of cultural change to the organization. Managing stakeholders and partners may be also part of the tasks involved. The authors of this study conclude that CDOs are critical in mediating and triggering change to the organization in SMEs as they are involved in every aspect of it. In turn, we state that

Hp4—By the mediating effect of digitalization CDOs’ capabilities trigger organizational creativity.

III. METHODOLOGY

A. Research Scenario and Data Sample

By applying the lens of the microfoundation theory, this study explores how the DCs of CDOs trigger organizational creativity within European SMEs. The managerial literature has observed that individual DCs can benefit firms to achieve competitive goals, especially in the new business digital era [15], [57]. Indeed, the choice of considering the technology as a fundamental driver for the firms’ development and advantage is relevant in the age of digitization [49], [67].

This article focuses on the European scenario to assess the impact of DT on individual perspectives of DCs and suggests new ways to trigger creativity within SMEs to be more competitive. In Europe, SMEs operate heterogeneously for various reasons, mainly depending on the European countries in which they set off [16].

1) Some European countries make fewer investments in digital technologies (e.g., Bulgaria, Greece, and Romania) other than countries (e.g., Finland, Sweden, and Denmark), which mainly linked to the widespread diffusion of medium and small digital enterprises
2) Some countries (e.g., Italy and Greece) are characterized by low digital skills in their human capital, whereas others (e.g., Germany) invest a lot of capital in digital training
3) Some (e.g., Poland, Hungary, and Bulgaria) have low attractiveness for the most qualified human capital, whereas others (e.g., Ireland, Belgium, and Denmark) can attract the most qualified digitized human resources.

For this reason, the choice of considering CDOs in Europe’s SMEs is consistent with the aim of the research to investigate the role of individual DCs to develop digitalization and organizational creativity in several contexts. Indeed, the research is based on a sample of 2124 CDOs operating in SMEs of 39 different European countries (see Table I). The sample was collected from Eurostat and it refers to the years 2019 and 2020.

B. Measures

This article uses a quantitative approach, collecting data from SMEs via a structured survey by Eurostat to identify the dimensions that trigger the digitalization and organizational creativity in Europeans’ SMEs. The measure used is a seven-point Likert scale ranging from “strongly disagree” to “totally agree.”

The empirical section is explored by the theoretical lens of DCs, which is explicated in the form of substantive, adaptation,
and change capability [28]. As stated above, the substantive capability explicates the dynamic ability of individuals to find a solution, the adaptation capability is the capacity to adjust the behavior in line with changes, and the change capability concerns the mode to resolve an issue. In this analysis, we have also included the level of digitalization in European SMEs. Indeed, the DT refers to a process in which digital technologies cause disruptions that force organizations to respond strategically [72]. We employed “digitalization” as a mediating variable able to condition the effect of CDOs’ individual DCs on organizational creativity [15], [19], [34]. Finally, in our model our dependent variable is the organizational creativity dimension that, according to [59], triggers firms to increase innovative digital solutions. Each investigated variable is shown in Table II.

C. Research Model

To the best of our knowledge, this is the first attempt at empirical research that investigates the role of CDO’s individual

<table>
<thead>
<tr>
<th>Countries</th>
<th>CDOs in SMEs</th>
<th>Countries</th>
<th>CDOs in SMEs</th>
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<tbody>
<tr>
<td>Belgium</td>
<td>61</td>
<td>Poland</td>
<td>44</td>
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<td>Bulgaria</td>
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<td>Malta</td>
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<td>Bosnia and Herzegovina</td>
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<tr>
<td>Netherlands</td>
<td>79</td>
<td>Kosovo</td>
<td>28</td>
</tr>
</tbody>
</table>

| Austria   | 66          |

| TOTAL CDOs | 2,124      |

and change capability [28]. As stated above, the substantive capability explicates the dynamic ability of individuals to find a solution, the adaptation capability is the capacity to adjust the behavior in line with changes, and the change capability concerns the mode to resolve an issue. In this analysis, we have also included the level of digitalization in European SMEs. Indeed, the DT refers to a process in which digital technologies cause disruptions that force organizations to respond strategically [72]. We employed “digitalization” as a mediating variable able to condition the effect of CDOs’ individual DCs on organizational creativity [15], [19], [34]. Finally, in our model our dependent variable is the organizational creativity dimension that, according to [59], triggers firms to increase innovative digital solutions. Each investigated variable is shown in Table II.

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### D. Data Analysis

To test our model, we define two main regression equations. Direct Effect (H1, H2, H3): Digitalization = \( \beta_0 + \beta_1 \) Substantive Capability (SC) + \( \beta_2 \) Adaptation Capability (AC) + \( \beta_3 \) Change Capability (CC) + \( \varepsilon \).
Indirect Effect (H4): Organizational Creativity = 𝛽₀ + 𝛽₁ Substantive Capability (SC) + 𝛽₂ Adaptation Capability (AC) + 𝛽₃ Change Capability (CC) + 𝛽₄ Digitalization + 𝜖.

The first equation involves the direct effect between the CDOs’ individual DCs composed by substantive, adaptation, and change capabilities. Here, we assume a positive effect for each DC to digitalization. The second equation supposes that digitalization mediates the relationship between individual DCs and organizational creativity. Even in this case, we assume a positive role of digitalization in the mediation analysis.

IV. RESULTS

Table III presents the first descriptive results between the dimensions. Specifically, the table provides findings of the correlation coefficients, means, and standard deviation of variables.

The results showed that organizational creativity, as a dependent variable, is significantly correlated with some of the antecedent variables (especially with digitalization). While several associations appeared to be significant, we follow the suggestions from academics to use a formal analysis to pre-establish the causal variable is related to the outcome. In this case, we have followed four main steps. First, we have proved that substantive and change capabilities have no significant direct effect on organizational creativity. Second, we need to prove that digitalization mediates the relationship between individual DCs and organizational creativity. Even in this case, we assume a positive role of digitalization in the mediation analysis.

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For the mediation hypothesis (H4), we have followed the suggestions presented in [25], having this method’s several advantages with respect to the traditional method provided by Baron and Kenny [6]. Indeed, the Hayes method allows the use of bootstrap procedures in the analysis and thus permits the model to be more effective in assessing indirect effects.

As demonstrated in Table V, to conduct a mediation analysis, we have followed four main steps. First, we have proved that the causal variable is related to the outcome. In this case, we assume our Y (organizational creativity) as the dependent variable in the regression equation and our X (individual DC) as the predictor variable. This step highlights that there is just a significant and positive relationship between adaptation capability and organizational creativity (B = 0.581; p = 0.004**). Substantive and change capabilities have no significant direct effect on organizational creativity. Second, we need to prove that the causal variable is related to the mediator. Hence, we launch a regression analysis with X (individual DC) as our independent variable and M as our outcome variable. The findings here prove a positive and significant relation between substantive and adaptation capability with digitalization (B = 1.985; p = 0.096*). By observing the results, our study supports H1. This finding is consistent with those presented in [46] and [71].

A significantly positive relationship is also found for adaptation capability and digitalization (H2) (B = 2.293, t-value = 2.896; p = 0.006**). Once more, finding support H2, in line with managerial and business literature [33], [57], [62], [63]. Instead, the relation between change capability and digitalization in European SMEs results is not significant (B = −0.297, t-value = −0.240; p = 0.873).

Thus, H1 and H2 are supported, whereas H3 is not significant.

Regarding the indirect effect of digitalization on organizational creativity, Table V presents the results of the mediation analysis.

Note: p-values for direct effect are in the brackets
LLCI= Lower-level confident interval
ULCI= Upper-level confident interval
∗∗∗p-value < 0.001
∗∗p-value < 0.05
∗p-value < 0.1
the variables ($B = 0.124$, $t$-value $= 3.997; p = 0.000^{**}$). Finally, we have estimated the complete indirect path of mediation, assuming that by the mediation effect of digitalization, CDOs’ capabilities trigger organizational creativity. Specifically, we have found a positive mediation effect on two variables, i.e., substantive and adaptation capabilities. This demonstrate that the digitalization significantly positive mediates the effect of CDOs’ individual DCs (substantive and adaptation capabilities) on organizational creativity (Effect $= 0.396$, $t$-value $= 1.736$, $p = 0.098^{*}$; Effect $= 0.535$, $t$-value $= 3.227; p = 0.002^{**}$).

Furthermore, as shown in Table V, we measure the strength of the indirect (mediation) effect by bootstrap procedures (5000 samples). This bootstrapped 95% confidence interval supports that the indirect effects of digitalization in the relationship between substantive and adaptation capabilities with organizational creativity were significant because the range does not contain zero (LLCI $= 0.0797$, ULCI $= 0.7074$; LLCI $= 0.1993$, ULCI $= 0.8719$). Instead, the bootstrap confidence interval calculated for the mediation effect of change capability and organizational creativity is not significant (LLCI $= -1.169$, ULCI $= 0.4501$). These results lead us to support H4, having assumed the mediation role of digitalization on the impact of CDOs’ capabilities (substantive and adaptation capabilities) toward organizational creativity.

Table VI shows a summary of the tested hypotheses.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Effect</th>
<th>Assumption</th>
<th>Findings</th>
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<tbody>
<tr>
<td>H1</td>
<td>Direct</td>
<td>Positive relationship between substantive capability and digitalization</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>Direct</td>
<td>Positive relationship between adaptation capability and digitalization</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>Direct</td>
<td>Positive relationship between change capability and digitalization</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4</td>
<td>Indirect</td>
<td>The mediating effect of digitalization CDOs’ capabilities trigger organizational creativity</td>
<td>Supported for substantive and adaptation capability, not supported for change capability</td>
</tr>
</tbody>
</table>

V. DISCUSSION

As emerged, the empirical analysis shows a positive relationship between substantive and adaptive capabilities and digitalization; however, change capabilities appear not to have a significant effect on digitalization. Yet, the mediating effect of CDOs’ capabilities triggers organizational creativity appears to be positive with digitalization. It emphasizes the key role of substantive and adaptive capabilities in developing organizational creativity. The lens of microfoundation is useful to evaluate both individual and organizational perspectives and offers a wider overview of the DT phenomenon. Indeed, by applying the microfoundation lens, the CDO assumes the specific role to support a firm, organization, or public institution to face DT, using new technologies and managing Big Data to achieve faster business improvement and growth objectives. Due to the peculiar DC, CDO perceives digital as the new challenge to bring the firm to a higher level of efficiency, speed of response to market needs, and experience of the users who interact with it.

By looking back to previous studies, the results extend the literature on DT and DCs as well. Whereas those studies have primarily evaluated the organizational and strategic role of DCs in general [8], [17], [55], [64] and more recently in the DT era [73] but nothing seems to illustrate or explore the impact of DT on individual creativity.

The results shed light on the individual DCs in the DT era. Their focus is on “domain-specific” DT capabilities along with functional activity as creativity. Previously, scholars have discussed the DT impacts on value chain and business models [9], [20], whereas we estimate its effect on organizational creativity; especially, this article reveals individual and organizational facets of SMEs to managing digitalization and more in general DT.

In addition, the article can trigger a new research stream and fills the current gap in the literature about the responsible innovation in the digital era. As a matter of fact, previous scholars [43], [56] have argued that responsible innovation must be analyzed on the social and ethical dimensions of and DT throughout the decision-making process, in the selection of data itself and construction of technological and digital infrastructures.

Furthermore, this article provides other threefold contributions. First, digitalization requests substantive and adaptive capabilities, which mean being able to respond rapidly to the market and being flexible. Differently than those in [17] and [66], the individual action is remarked to obtain new solutions and avoid inactivity and stagnation.

We support the theoretically individual point of view [77] and, so, we underpin the consideration that those DCs reshape routines and resources by going beyond operational routines ([80], [65], [81]). In fact, digitalization goes beyond the mere routines and so the employment of substantive capabilities facilitates such digital processes (as demonstrated by the significant value of the Hpl—CDOs’ substantive capabilities drive digitalization within SMEs). According to [71], CDOs act to solve problems and cope with a complex and multidimensional position. They observe the market data to understand how to employ emerging digital technologies to get business value [63]. They also need to be comfortable with iterative experimentations and multidimensional approaches [46]. In the same line, adaptive capabilities involve an individual attitude to being flexible and cope with changes. CDOs, so, reconfigure routines and resources. They are crucial agents of changes or decision-makers who circumvent organizational inactivity and stagnation but enhance the level of companies’ engagement with progressive changes [14]. This is enforced by the positive significance of the Hp2—CDOs’
adaptive capabilities steer digitalization within SMEs that supports other studies on CDOs’ role that relies on resilience, change leadership, and change management skills [33], [57], [62]. Second, the relevant role of CDOs within SMEs is remarked upon in previous studies. In turn, the analysis extends previous studies focused on CDOs’ capabilities in large companies [37], [75] and qualitative and case-based analysis [57], [58], [62]. As already stated by [77] decision-makers assume a crucial role in the DC process. In fact, CDOs have a key role in the current DT era.

Third, the microfoundation view offers an individual and an organizational point of view by demonstrating the positive significance of Hp4—By the mediating effect of digitalization CDOs’ capabilities trigger organizational creativity. Organizational creativity represents the “right-brained intuitive” and innovative side of a company [59] by the high embracement of substantive and adaptive capabilities. We support that value creation stems from the innovative part of an organizational setting where interactions between employees’ creativity and decision-makers [15]. Surprisingly, even SMEs are moving toward creativity to be more innovative and competitive. They assume CDOs to deal with the DT challenges (79) generating new digital solutions, developing new business areas, and evolving existing business models. Furthermore, according to [41], DTs are changing the dynamics of business competitiveness, leading to a rethinking of the levels of responsible innovation driven by the creativity of employees and the organization as a whole. So, in line with the latter literature, this article supports the relevant role of CDOs’ capabilities on organizational creativity, especially when organizational creativity promotes responsible innovation processes.

A. Theoretical Implications

Contributions of this article are in line with prior, innovative, and interdisciplinary studies between the field of digitization [11], [35], [49], [69], the issue of the absorptive capacity of disruptive technologies [67], [53], the microfoundation theory [13], [54], and the business model innovation [1], [58]. By combining the theoretical framework with a quantitative research protocol about DCs on digitalization and consequently on organizational creativity, this article follows the implications of scientific research theories on disruptive topics, such as CDOs’ abilities, digital technologies, and organizational creativity. Our findings highlight theoretical implications in the field of organization management [7], [11], [29] by leveraging the theoretical lens of microfoundations, which is highly innovative and fitting with such a stream of research [54]. Specific, findings emphasize the role of individual DCs’ as a crucial foundation of processes related to the digital development of European SMEs, as well as in the mediating role between digitalization CDOs’ capabilities and organizational creativity.

This new theoretical framework we propose overcomes the limitations of previous research that considered only the processes of digitalization, DCs, and the figure of CDOs in large enterprises [37], [75]. In fact, this article theoretically investigates the role of individual DCs of CDOs within SMEs digitalization level and, at the same time, analyzes how digitalization mediates the SMEs organizational creativity in Europe. Yet, the results of the analysis validate this new theoretical and practical approach in the European context. Indeed, findings emphasize the key role of substantive and adaptive capabilities in developing digitalization approach within European SMEs. Moreover, this article highlights theoretical implications about the mediating effect of digitalization CDOs’ capabilities on organizational creativity. This implies that, through the theoretical lens of microfoundations, theories of SMEs management must also include the individual role which specific actors play in the firms’ digitalization processes [13], [53]. Furthermore, through the theory of DCs, this article reinforces the theoretical implications on processes of getting new solutions to trigger organizational creativity within SMEs. Even in this case, this article supports previous studies on organizational creativity [59], and, at the same time, exceeds the theoretical limits by providing a new theoretical framework to offer new solutions, seize new opportunities, and cope with changes in the DT era.

B. Managerial Implications

The need of employing CDOs is becoming a key priority for business in general. In this scenario, SMEs are proactively engaging with this new role to enhance their business performance. With this background, the current research offers new insights to practitioners, managers, and entrepreneurs to assess CDO’s abilities. They are entailed to observe the diverse range of CDOs’ facets and understand the opportunities to be grasped. While organizational factors are continually evaluated, the demand for those abilities becomes a new aspect to evaluate. Such demand is relevant to undertake DT processes and so develop new digital strategies. Alongside, CDOs can be the driver for innovation and more specifically for econnovations that are becoming increasingly essential to all businesses [42], [44] and CDOs tend to cope not just with functional activities but even with general duties. They are experts in digital amenities that allow digitalization throughout the whole business journey. Hence, the matter is not having or not a CDO within the company but how to exploit his/her DCs to get a competitive advantage. Offering new solutions and seizing business opportunities are their key role along with the adaptability to changes by using the appropriate digital technologies. Given the advances in digital technologies, the key decision-makers of SMEs are demanded to:

1) avoid inactivity and stagnation;
2) promote creativity;
3) being more innovative;
4) anticipate new trends using digital technologies;
5) dedicate operational routines to technologies; and
6) exploiting DCs to build the most effective team to deal with the DT process.

In this vein, CDOs are considered the agents of the change [14] adopting iterative experimentations and offering new insights by data management.
VI. Final Remarks

A. Research Limits and New Suggestions

This article brings out several future research avenues. Indeed, in line with our insights, academic research can value the original theme of responsible innovation. According to Silva et al. [56], responsible innovation is a concept that incorporates ethical and social concerns into the innovation process from the stage of inception. It is defined as the process of democratization of innovation [4], [39], [43] by involving stakeholders and the public early in the innovation process. Moreover, following [31], the cross-functional nature of CDOs and their frequent contacts with various stakeholders place them in an advantageous position for organizational change management in the context of DT. This suggests that, in addition to acting as agents of change, CDOs may promote the democratization of innovation and transformation as viewed from the lens of responsible innovation. Although viewing CDOs through the lens of responsible innovation is an intriguing research perspective, in this article, we use a microfoundational lense to investigate how specific skills and DCs of CDOs trigger digitalization and organizational creativity [53].

Although we offered new theoretical and managerial insights, there still is the need to enlarge our study with further research that can overcome its limits. Those limits can be grouped in four categories: company size, quantitative analysis, territory constraints, and CDOs’ role.

For instance, only SMEs are examined even though the sample is large, the role of individual DCs can be explored in other company structures and dimensions. It can be interesting to explore if the new digital-born companies automatically employ CDOs to introduce their business idea in the market. Yet, the empirical analysis is quantitative and so it can be enlarged by a qualitative study to deeply understand the CDO role. We contemplate another limit that concerns territory constraints because the research examines only European SMEs. Therefore, new exploration can take into consideration emerging and other developed countries to extend the present research and provide differences and similarities country by country. In doing so, the microfoundational lens is expanded by the macro perspective. Finally, since CDOs are also equated with chief information officer or chief innovation officer, it would be interesting to map out differences and similarities among all those roles and understand if some of them are more important than others.

B. Conclusion

DT is not just about the use of certain technologies, but first and foremost involves a real cultural change within the firm, starting with the people who make it up and work for it. The greatest responsibility of a CDO remains to guide the organization through the transformation and accompany it in the adoption of the right tools and the best processes to increase efficiency and optimize business strategies. Thus, the digital era has stimulated new business models design [1], and has included in the processes the concepts of responsible innovation [56], disruptive capabilities [53], and organizational creativity [41]. In this case, applying the lens of microfoundations, the DCs of a CDO have a strategic impact both in the microlevel, i.e., the levels of digitalization of employees, and in the meso level, i.e., with respect to the whole organization.

As stated, the research provides threefold theoretical contributions and new recommendations for managers. To summarize, the DT literature is expanded by offering a microfoundation overview of CDOs’ DCs within SMEs. The key role of substantive and adaptive capabilities is also remarked by the positive effects on digitalization and consequently on organizational creativity. This is demonstrated by a quantitative analysis of a large sample composed of 2124 CDOs operating in SMEs of 39 different European countries. In turn, the study shed light on individual capabilities to cope with DT challenges and so it emphasizes the need of investing more and more on such capabilities to be more creative.

The purpose of this study was to present an innovative and integrated framework based on the interdependencies between the individual DCs of CDOs within European SMEs, the level of digitalization in the organizations, and the mediating effect of digitalization CDOs’ capabilities on organizational creativity. This article contributed to develop, both theoretically and practically, a new framework for digitalized SMEs in the European context. In addition, the contribution of this article can also be seen in the identification of the interdependencies at the microlevel of CDOs’ decision making and the DT of SMEs. Thus, by adopting the lens of microfoundation theory, this article opens up further lines of research on the theme of digitization, on the role of new figures in the firms (i.e., CDOs), on the relationship between the individual behavior and the enabling technologies, and, last but not least, on innovative organizational creativity design for digitized enterprises.

We conclude that a strengthening of the DT paradigm is needed, where individual DCs become an integral part of entrepreneurial digitization processes and organizational creativity of firms, especially for European SMEs.

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