

Social Media and Organizational Resilience in ICT SMEs: A Dynamic Capabilities Perspective

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Abstract:

Small and medium-sized enterprises face escalating disruptions necessitating dynamic organizational resilience (the capacity to anticipate, cope with, and adapt to crises). While social media (SM) is recognized as a strategic resource, the mechanisms through which it amplifies specific organizational resilience stages remain underspecified. Drawing on 14 organizations embedded in Guadalajara's ICT ecosystem, this study employs grounded theory to identify six functional SM dimensions: organizational communication, digital marketing, social customer relationship management, digital communities, knowledge management, and collaborative innovation, operating across three maturity levels (foundational, intermediate, advanced). Findings suggest differentiated pathways in which foundational dimensions primarily strengthen operational coping, an effect associated with the activation of seizing capabilities, while advanced dimensions appear to function as higher-order dynamic capabilities that draw on the sensing and seizing infrastructures established in prior stages to support anticipation and adaptation through institutionalized learning, suggesting a path-dependent developmental trajectory for resilience. By integrating Dynamic Capabilities Theory with established stage-based resilience frameworks, this research illustrates how SM platforms may sequentially enable sensing, seizing, and transforming capabilities across crisis phases. Finally, contextual factors such as ecosystem density and absorptive capacity may moderate these effects, delineating the boundary conditions for generalizability beyond high-density regional clusters.

Keywords: Organizational resilience; Social media; Dynamic capabilities; Digital maturity; Technology-based SMEs; Grounded theory

Submitted: March 13, 2026 / Approved: April 28, 2026

Introduction

The coronavirus disease 2019 (COVID-19) pandemic exposed fundamental vulnerabilities in organizational models designed for stability rather than turbulence. Small and medium-sized enterprises (SMEs), operating with resource constraints, faced existential threats as traditional face-to-face interactions and physical workspaces became suddenly untenable. The COVID-19 pandemic pivoted organizational resilience (OR) from theoretical construct to operational imperative, exposing the fragility of stability-oriented designs under radical environmental discontinuity. Following Duchek (2020) and Williams et al. (2017), OR is conceptualized herein as a dynamic, multi-stage process through which organizations develop, deploy, and reconfigure capabilities in response to environmental adversity. This process entails three distinct stages: proactive contingency anticipation, real-time adverse event resilience, and adaptive transformation that institutionalizes renewal of competitive advantages through innovation (Duchek, 2020; Teixeira & Werther, 2013).

Digital technologies, notably social media (SM), have emerged as strategic resources capable of fortifying OR-related organizational dimensions. SM enables direct stakeholder relationship cultivation, streamlining collaborative knowledge management, and information exchange to optimize real-time opportunity and threat detection (Matarazzo et al., 2021; Trieu et al., 2023). For SMEs, strategic digital resource reconfiguration remains critical for fostering adaptive capabilities amidst external disruptions (Parker & Ameen, 2018).

While recent scholarship acknowledges positive associations between digital technologies and OR (Xie et al., 2022; Giordani et al., 2023), the specific mechanisms through which SM dimensions activate dynamic capabilities (DC) to strengthen SME resilience across temporal stages remain underspecified. This gap is particularly pronounced within technology-intensive sectors where firms possess both advanced digital literacy and resource constraints—a paradox that makes the ICT ecosystem an ideal empirical context.

The ICT ecosystem within the Guadalajara Metropolitan Area (GMA) offers a rich empirical setting for examining OR. Termed the “Mexican Silicon Valley,” this cluster concentrates technology-based firms in software, electronics, hardware, and digital creative industries, fostering a conducive regional environment for entrepreneurship and innovation (Figueroa López, 2019).

Pandemic-induced restrictions underscored the urgency of leveraging the digital fluency and incipient adaptive capabilities that ICT-embedded SMEs had cultivated through sustained technological engagement—resources that the pandemic simultaneously stressed and activated. Consequently, ICT-based SMEs confronted operational reconfiguration challenges, remote-modality productivity maintenance, and organizational connectivity assurance amidst profound uncertainty. In response to these pressing demands, the current study explores the mechanisms through which ICT-based SMEs utilize SM platforms to strengthen OR. By doing so, it advances DC theory while offering actionable insights for effective crisis management practices.

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Specifically, this analysis addresses two central research questions (RQ): First, how do specific SM practices contribute to OR in ICT-based SMEs (RQ1)? Second, through which DC mechanisms—sensing, seizing, and transforming—do these effects operate (RQ2)? Accordingly, the primary objective is to elucidate the developmental pathways through which SM platforms may sequentially enable these DC, enabling firms to function as resilient entities during periods of extreme volatility.

Existing research establishes positive associations between digital technologies and resilience (Xie et al., 2022; Giordani et al., 2023) but treats SM as unitary constructs, obscuring functional heterogeneity and leaving mechanisms underspecified. Three contributions address these limitations. First, we move beyond treating SM as unitary construct by providing dimensional disaggregation into six functional facets. This granularity enables identification of how specific SM dimensions—ranging from basic communication to advanced innovation—differentially contribute to OR. Second, we establish temporal-capability mapping by integrating DC microfoundations (Teece, 2007) with stages of resilience (Duchek, 2020), specifying how SM practices sequentially activate sensing, seizing, and transforming across crisis phases. Third, we explicate micro-foundational mechanisms through which SM-enabled social capital (Nahapiet & Ghoshal, 1998) serves as critical substrate that triggers these capabilities. By reconciling these frameworks, we shift discourse from documenting if SM assists firms to explaining specific pathways through which it ensures organizational longevity.

The article proceeds as follows. Section 2 establishes the theoretical foundations by delimiting OR as a capability-based construct. It reviews evidence on SM as strategic resources and examines organizational size as a moderating factor. Synthesizing these contributions reveals a gap in mechanism specification, which the ensuing analysis addresses. Section 3 details the grounded theory (GT) methodology, justifying the qualitative design and explicating the systematic coding procedures that ensure rigor. Section 4 presents empirical findings: three maturity levels and six SM dimensions with stage-specific resilience contributions, grounded in interview data. Section 5 interprets results through DC lens, specifying sensing, seizing, and transforming mechanisms, and positions contributions relative to existing scholarship. Section 6 concludes by synthesizing multi-level theoretical architecture, formulating three testable propositions, and delineating research horizons emerging from boundary conditions.

Literature review

This section defines OR, reviews SM-as-strategic-resource literature, and examines SME-specific moderating factors. Originating in materials physics, resilience denotes energy absorption and shape recovery capabilities. This metaphor has migrated to psychology, ecology, and organizational studies; however, OR remains a distinct construct transcending individual-level resilience analogies and necessitating precise conceptual delimitation.

Following Duchek (2020), OR comprises three successive stages: anticipation (pre-crisis), coping (during-crisis), and adaptation (post-crisis).

This study defines ‘coping’ as the organizational capacity for maintaining operational continuity under shock, distinguishing it from passive resistance or individual-level psychological coping mechanisms. Anticipation involves proactive environmental scanning; coping encompasses the ability to manage and respond to unexpected events as they unfold; and adaptation focuses on post-crisis learning and organizational change.

OR constitutes a systemic organizational capacity arising from structures, processes, culture, and resources, facilitating rapid operational normalization or environmental adaptation amidst unexpected crises (Williams et al., 2017). Unlike psychologically-centered individual resilience, OR represents a collective property operating through DCs—defined as the capacity to integrate, build, and reconfigure internal and external competencies within volatile environments (Teece et al., 1997; Wang and Kim, 2017).

This framework positions OR (Duchek, 2020) as a manifestation of DC unfolding across three temporal stages: pre-crisis anticipation, crisis-period coping—characterized by absorptive capacity, defined as the firm’s ability to recognize, assimilate, and apply new external knowledge (Cohen & Levinthal, 1990)—and post-crisis adaptation through recovery and transformative learning. Following Cohen and Levinthal (1990) and Zahra and George’s (2002) reconceptualization, absorptive capacity comprises four dimensions: acquisition (identifying and acquiring externally generated knowledge), assimilation (analyzing and interpreting that knowledge), transformation (internalizing and combining it with existing knowledge), and exploitation (applying it to commercial ends). To avoid analytical ambiguity, we specify the differentiated role of absorptive capacity across the maturity continuum proposed in this study. At the foundational level, absorptive capacity acts as a pre-existing threshold that determines the firm’s ability to recognize the value of external SM signals. In the intermediate stage, it functions as a strategic moderator, dictating the efficiency with which sensing infrastructures are translated into seizing actions by filtering noise from actionable knowledge. Finally, at the advanced level, advanced SM dimensions—Knowledge Management and Collaborative Innovation—feed back into the system, expanding the firm’s total absorptive capacity as a cumulative output, thereby shifting the organization’s strategic frontier for future disruptions.

Table 1’s diverse perspectives highlight that while OR is a multidimensional construct, a significant technology-based SME operational mechanism gap persists. Although current literature acknowledges digital tool importance (Xie et al., 2022) and strategic agility (Abaid et al., 2021), empirical clarity regarding specific SM-driven DC catalysis within the ICT sector remains scarce. To address this lacuna, we examine SM-enabled sensing, seizing, and transforming mechanisms foundational to OR construction.

Crisis-period OR scholarship has yielded a diverse conceptual perspective array. As summarized in Table 1, these approaches encompass territorial community capabilities (Hernández et al., 2021), strategic planning and empowerment (Varela et al., 2022), and SME

manager psychological resilience (Hadjielias et al., 2022; Mokline & Ben-Abdallah, 2021), alongside microenterprise agility-based dynamics (Abaid et al., 2021). While this multidimensionality reflects

construct complexity, it also underscores a critical requirement: elucidating how specific SM practices function as operational DC activation mechanisms in technology-based SMEs.

Table 1. Selected perspectives on Organizational Resilience and their theoretical focus

Conceptual Perspective	Description	Reference	Linkage to Dynamics Capabilities
Community resilience	Capabilities inherent to communities that mobilize during disasters, transcending dependence on external resources. Emphasizes endogenous social capital, collective action, and territorial embeddedness as resilience foundations.	Hernández et al. (2021)	Sensing through embedded local knowledge; Transforming via community resource access for organizational adaptation.
Organizational adaptation	Strategic planning coupled with empowerment culture granting employees decision-making autonomy to support adaptive responses during crises. Emphasizes cultural flexibility and employee autonomy in crisis response.	Varela et al. (2022)	Seizing through decentralized decision-making; Transforming through cultural readiness for re-configuration.
Micro-foundational resilience	Individual resilience of SME managers (Psychological Capital and stress tolerance) as a prerequisite for OR, particularly in microenterprises where agility and relational capital compensate for limited formal planning.	Hadjielias et al. (2022); Mokline and Ben Abdallah (2021); Abaid et al. (2021)	Leadership psychological resilience as a catalyst for all DCs; enables Sensing through cognitive clarity, Seizing through rapid tactical responses, and Transforming through employee commitment.

Note. Developed by the authors based on the literature review. This table provides a representative selection of theoretical perspectives aligned with the study's focus on social capital and DC, rather than an exhaustive systematic review. The frameworks prioritized—community resilience, organizational adaptation, and micro-foundational perspectives—were chosen for their direct relevance to analyzing social-media-mediated responses in the ICT sector, while other dimensions (e.g., supply chain resilience, psychological safety) fall outside this scope. Psychological Capital (PsyCap) refers to an individual's positive psychological state of development. DC: Dynamic Capabilities; ICT: Information and Communication Technology; OR: Organizational Resilience; SME: Small and Medium-sized Enterprise.

The framework integrates Duchek's (2020) temporal resilience framework with the DC microfoundations articulated by Teece and colleagues (1997). Specifically, we examine how SM practices amplify three types of DCs that correspond to distinct resilience stages: sensing capabilities enable the anticipation stage by facilitating identification and interpretation of emerging opportunities and threats; seizing capabilities enable the coping stage by accelerating resource mobilization and tactical response execution; and transforming capabilities enable the adaptation stage by supporting organizational reconfiguration and strategic renewal. This integrated theoretical framework serves as the analytical lens through which empirical findings will be interpreted in subsequent sections.

This conceptual heterogeneity (see Table 1) reflects OR's complexity and the need for integrative frameworks connecting individual, organizational, and contextual levels. While community resilience perspectives emphasize territorial embeddedness (i.e., the way organizations and practices are socially and spatially anchored in a specific territory), psychological approaches focus on managerial characteristics as prerequisites, and microenterprise studies highlight agility over formal planning. Our study bridges these perspectives by examining how technological resources (SM) enable organizational processes (DCs) producing resilience outcomes across temporal stages, integrating micro-level mechanisms with meso-level organizational capabilities.

Social Media as Strategic Resources for Organizational Resilience

Building on this empirical evidence, recent academic literature has examined the DT-OR nexus within crisis contexts. SM platforms facilitate internal and external social capital cultivation within SMEs. This process is activated by resource-absorbing and reconfiguring DC, which are vital for disruption-period OR (Ozanne et al., 2022; Santos et al., 2023). Furthermore, strategic SM leverage strengthens absorptive capacity, thereby bolstering digital platform firm resilience. Khurana et al. (2022) show that crisis-driven digital transformation enables OR to emerge as a second-order DC within entrepreneurial ecosystems. COVID-19 impact studies reveal the reconfiguration of business models (Santos et al., 2023; Legowo et al., 2021). However, the mechanisms driving SME-specific OR dimensions within the information and communication technology (ICT) sector remain underspecified.

Moderating Effects of Organizational Size on Dynamic Capabilities

While traditional literature suggests that resource-rich organizations possess higher OR, recent conceptual frameworks challenge this linear and static view by conceptualizing OR as a DC (Sevilla et al., 2023). This suggests that DC function as the underlying mechanism

through which resources—such as SM—are transformed into adaptive capabilities (Duchek, 2020; Teece et al., 1997). Thus, the effect of SM on OR is contingent upon the firm's capacity to absorb, integrate, and reconfigure these technological resources in response to changing environmental demands (Sevilla et al., 2023).

However, despite these insights, a significant empirical gap remains regarding how specific SM practices activate the sensing, seizing, and transforming capabilities in technology-based SMEs. Addressing this gap, we move beyond general digital adoption to identify the specific functional dimensions of SM that appear to correspond with the stages of OR: anticipation, coping, and adaptation. Given the complexity of these interactions within Guadalajara's ICT ecosystem, we employ GT to unravel the mechanisms through which 14 SMEs leverage SM across different maturity levels. By integrating DC Theory with Duchek's (2020) model, this research seeks to specify sequential activation of capabilities, ultimately resulting in propositions regarding path-dependent advantages and the dimensional differentiation of digital resources in high-tech clusters.

Methodology

To address these theoretical gaps and elucidate the mechanisms through which SM dimensions activate specific DCs, this research employed a qualitative design to explore the research question, incorporating insights from technology-based SMEs embedded in the ICT sector in the GMA. Within the GMA—a region characterized by a high concentration of ICT ventures—the pandemic disrupted business operations (Medellín Cabrera, 2021), forcing firms to activate their OR resources and capabilities (Sanchis & Poler, 2020). Direct observation during field visits yielded firsthand evidence of pandemic-induced operational disruptions within the GMA's ICT sector, thereby corroborating participants' accounts of organizational stress and adaptive reconfiguration, as restrictions on mobility and workplace access were imposed. The ICT sector's technology-based SME ecosystem in the GMA, known as the Mexican Silicon Valley, concentrates high-tech companies in software, electronics, hardware, and digital creative industries (Merchand, 2003; Figueroa López, 2019; Rivera et al., 2021), representing one of the areas with the highest added value in Mexico's software industry (Micheli & Oliver, 2017). This area includes suburban municipalities such as Guadalajara, Zapopan, and Tlaquepaque, concentrating technology and science parks and promoting an entrepreneurial and innovative culture (Lemus Delgado et al., 2015).

The interviews were conducted between April and November 2021. Mobility restrictions and health protocols imposed during the pandemic influenced data collection. Five interviews were conducted in person at organizational premises within the ecosystem, with audio recording and direct observation of offices, workspaces, and operational dynamics; the remaining nine interviews were conducted via video calls using Microsoft Teams. During the five on-site visits, field notes documented operational context, technology use patterns, and informal staff interactions. These observations served as complemen-

tary triangulation evidence—particularly regarding embodied digital communication practices and organizational response dynamics—and informed the Discussion's interpretation of sensing-to-seizing transitions, though systematic analysis remained focused on interview content. Emergent analytical categories and their interrelations were derived inductively from interview content, consistent with GT's commitment to data-driven concept generation. The transition to video-mediated interviews—necessitated by pandemic restrictions—functioned as a form of methodological serendipity rather than a constraint. This modality ensured epistemic alignment between the research instrument and the phenomenon studied: the investigation of OR was conducted through the very platforms SMEs used to implement it. These interactions served as real-time empirical demonstrations of sectoral embodied digital competence. Field observations recorded seamless integration of platform-specific affordances—such as screen-sharing for document review and synchronized scheduling—signaling that digital communication was not merely an alternative, but a sophisticated mechanism for sustaining operational continuity under physical constraints.

We employ Informed Grounded Theory (Thornberg, 2012), using DC and Resilience as sensitizing concepts (Blumer, 1954) rather than rigid deductive frameworks. This inductive approach enables the theoretical elaboration of SM's meso-level strategic dimensions, discovering the precise mechanisms that bridge foundational micro-routines with macro-level capabilities (sensing, seizing, transforming) during crises.

GT (Strauss & Corbin, 1998) proved appropriate for three reasons. First, it enables inductive identification of SM-to-OR mechanisms without imposing a priori categories, facilitating discovery of emergent relationships. Second, constant comparison allows refining categories through iterative cycling between data collection and conceptual development, leveraging theoretical sampling toward saturation (Guest et al., 2006). Third, systematic three-phase coding (open → axial → selective) ensures a rigorous transition from empirical descriptions to theoretical propositions. The literature review, guided by Thornberg's (2012) informed GT, sensitized researchers to relevant concepts—resilience stages, DC, digital maturity—without predetermining categories, while enabling emergent findings to be situated within established frameworks.

Analysis was based on fourteen semi-structured interviews with ICT firm leaders and ecosystem stakeholders (see Table 2). A sample of fourteen participants was deemed sufficient based on the information power framework (Malterud et al., 2016). Additionally, theoretical saturation—the point at which new data no longer generate novel insights (Strauss & Corbin, 1998)—was reached during the course of the interviews, with subsequent conversations serving as confirmatory validation of emergent categories. New conceptual categories ceased to emerge by the tenth interview, with subsequent interactions (11–14) playing a confirmatory role. Furthermore, the inclusion of institutional and academic actors provided ecosystem-level triangulation, contrasting SME operational insights with expert macro-

perspectives to ensure the identified maturity levels reflect a systemic reality rather than isolated experiences. Sample robustness was supported by: (a) high study aim specificity, focusing on mechanisms linking SME practices to OR; (b) participant specificity, as all possessed direct crisis management experience during the COVID-19 pandemic; (c) application of established theoretical frameworks (Duchek, 2020; Teece et al., 1997); (d) dialogue quality; and (e) a focused analytical strategy using GT. These dimensions collectively ensured high information density, allowing recurring pattern identification and theoretical saturation.

Semi-structured interviews were designed with a flexible script of fourteen open-ended questions that allowed in-depth exploration without imposing predetermined categories. The questions explored organizational characterization and role in the ICT ecosystem; SM use and information management; innovation and development processes; organizational capabilities and collaboration; and pandemic impact on SM use and organizational management processes. Each interview lasted an average of sixty minutes, was recorded with informed consent, and was transcribed for systematic analysis.

Ethics statement. All participants provided voluntary informed consent prior to each interview and were briefed on their right to withdraw without consequence. Data were anonymized using alphanumeric codes (AET01–AET14). No formal institutional review board approval was required for this non-interventional qualitative research, consistent with national ethical guidelines in Mexico; all procedures adhered to the Academy of Management's ethical standards.

Data analysis was conducted with ATLAS.ti 23.0 running on macOS, following GT procedures (San Martín, 2014). The process was structured in three phases: open coding identified emerging concepts from transcripts through systematic reading; axial coding established relationships between categories, organizing codes into conceptual families; and selective coding integrated analysis around central categories, identifying cross-cutting patterns. This iterative process, alternating between data collection and category refinement, allowed identification of six substantive dimensions of SM use for OR and structured them into three evolutionary levels, as presented in the results section. The lead researcher maintained a detailed analytical journal and audit trail to ensure the traceability of coding decisions.

Table 2. ICT sector ecosystem actors interviewed in the GMA

Entity	Profile	Role in the ICT ecosystem
COECYTJAL	Director	State institution for the promotion of innovation and technological entrepreneurship
AdWeb Solutions / Zigatta	Company partner and director	Company
IJALTI	Chief Executive	Institution supporting the ICT sector in Jalisco
KIRE / CIAT	General Director	Company
IJALTI	Communication and Media Management	Institution supporting the ICT sector in Jalisco
Neuronalabs.com	General Director	Company
TEC Mty / PhDTalks.com	Academic and GEM Coordinator	University / Company supporting scientific entrepreneurship
Big Panda Solutions	Director	Company
Balero Ventures	Director	Institution promoting and investing in technological entrepreneurship
Vitamina Online	Director	Company
Jalisco High Technology Integration Cluster	President	ICT Sector Support Institution / Company
SICYT	Director	State institution supporting the innovation ecosystem in Jalisco
Center for Innovation and Technology Management ITESO	Coordination Directorate	University / Technological Entrepreneurship
Creeartelo.mx	Director	Company

Note. Own elaboration by the authors. ICT: Information and Communication Technology.

While the corpus includes institutional and academic actors whose experience of disruption differs from that of private firms, their inclusion was a deliberate strategic choice that enables ecosystem-level triangulation—capturing aggregate patterns of digital maturity and systemic support gaps that individual SME accounts, focused on operational survival, may not fully perceive.

Defining the ICT company universe within the GMA posed methodological challenges, as prior studies have yielded divergent findings (Navarrete & Sánchez, 2018; Silva & Pedroza, 2015; Rivera et al., 2021; Alarcón, 2018). The sampling strategy focused on

companies in the consolidation stage, which were more accessible for obtaining information. Mobility restrictions constrained the data collection process. Most interviews were conducted via video calls, a modality that, although restricting direct observation of organizational context, aligned with the phenomenon studied by empirically demonstrating the adoption of digital technologies to sustain professional interaction.

Participant recruitment followed purposive snowball sampling (Strauss & Corbin, 1998), a strategy particularly well-suited to bounded ecosystems where institutional actors serve as gatekeepers to spe-

cialist knowledge communities. Initial access was established through COECYTJAL (Jalisco State Science and Technology Council) and IJALTI (Jalisco IT Industries Association); subsequent participants were recruited via chain referrals until theoretical saturation was reached.

The methodological design assessed SM impact on SMEs' OR by articulating three conceptual elements. First, SM platforms served as the independent variable, operationalized through six functional dimensions: organizational communication, digital marketing, social customer relationship management (S-CRM), digital communities and collaboration networks, knowledge management, and collaborative innovation. Furthermore, usage intensity is categorized into three levels: foundational, intermediate, and advanced. Second, OR served as the dependent variable, conceptualized according to Duchek's (2020) framework as comprising three temporal stages: anticipation, coping, and adaptation. This variable was operationalized by analyzing organizational practices that demonstrated capabilities for preparing for disruptions, maintaining continuity during restrictions, and fostering subsequent adaptive transformation. Third, the ICT sector context operated as a moderating variable that conditioned both the availability of technological resources for SM use and the specific OR demands derived from characteristics of smaller companies in high-tech sectors, including resource constraints, dependence on collaboration networks, and vulnerability to disruptions. The analysis uncovered causal mechanisms through which specific SM practices fostered organizational capabilities, strengthened resilience dimensions, and revealed how contextual characteristics of technology SMEs amplified or moderated these effects.

The maturity framework was applied across all 14 participants, including both ICT firms and institutional support organizations. This decision reflects the empirical observation that ecosystem actors—including government agencies, cluster associations, and academic institutions—deploy SM as an operational resource for managing information flows and stakeholder engagement, exhibiting discernible patterns of digital sophistication that are analytically relevant to the framework's scope.

Results

Through a thematic analysis of fourteen semi-structured interviews (coded AET01–AET14) guided by GT procedures, six substantive dimensions emerged through which SM contributed to OR in SMEs embedded in the Guadalajara ICT ecosystem. The analysis revealed three distinct levels of sophistication in the use of digital resources. At the foundational level, firms adopted SM reactively to address operational communication needs. At the intermediate level, firms used platforms proactively for commercial outreach and to access external contacts. At the advanced level, SM became integrated into processes of knowledge retention and collaborative problem-solving. Each level is characterized empirically below, with direct evidence from the interviews.

Stages of Evolution in Social Media Use

Foundational Level: Communication and Platform Diversification

A foundational level emerged in five of the 14 organizations (35.7%), primarily among firms whose SM use remained reactive and operationally driven. This level centered on SM adoption for internal communication with employees and external communication with customers, suppliers, and partners. Predominant platforms included WhatsApp for informal messaging, Zoom and Microsoft Teams for video calls, and Facebook for external communication. Telegram channels and groups were used for real-time coordination and broad content distribution, complementing WhatsApp's role in maintaining operational continuity during the crisis.

Intermediate Level: Marketing and Relationship Management Strategies

An intermediate level emerged in seven of the 14 organizations (50%), characterized by greater strategic intentionality in deploying SM for digital marketing, S-CRM, and community building. Key platforms included LinkedIn for professional networking, Instagram for visual brand communication, and Twitter for direct customer interaction. Telegram was used for structured community engagement and large-scale content distribution, extending its role beyond basic messaging. Firms at this level adapted their business strategies by shifting promotional efforts to digital channels and maintaining customer proximity during the crisis.

Advanced Level: Knowledge Management and Innovation

An advanced level emerged in two of the 14 organizations (14.3%), both characterized by a culture of experimentation, systematic documentation, and full integration of SM into knowledge management and collaborative innovation. Key platforms included Slack for internal collaboration, Google Workspace and Microsoft Teams for shared document management, and specialized LinkedIn groups for knowledge exchange. These organizations used SM to access external expertise, coordinate agile responses, and capture lessons learned. Platforms varied by purpose: LinkedIn groups for professional networking, Discord servers for technical collaboration, and sector-specific forums for regulatory updates.

Framework for Organizational Resilience Dimensions

Thematic analysis identified six functional dimensions through which SM platforms contributed to OR. These dimensions did not operate in isolation; they were deployed in varying combinations depending on the firm's level of sophistication. Table 3 provides an overview of these dimensions, their associated platforms, and the observed contributions. The following sections present empirical evidence for each dimension, drawing on interview excerpts.

All interviews were conducted in Spanish (coded AET01–AET14) and subsequently translated by the authors. To ensure translation accuracy, excerpts underwent iterative review prioritizing preservation of original semantic content, idiomatic specificity, and contextual meaning over literal correspondence—a procedure aligned with esta-

blished practices in qualitative cross-linguistic research. The next section presents the key themes identified, illustrated with participants' verbatim accounts.

Organizational Communication

Beyond marketing, organizations reported intensive reliance on SM platforms to replicate—and in many cases, optimize—traditional face-to-face dynamics. This shift represented not merely a substitute for physical presence but a fundamental reconfiguration of collaborative workflows. As one institutional manager reflected: “Meetings, collaborative decision-making—everything required adaptation. Previously, voting meant simply raising hands. Now we needed digital alternatives for these interactions and consensus-building. Interestingly, the process became more efficient” (AET05, Manager, Institution).

This excerpt illustrates how basic-level SM adoption, initially a reactive response to operational necessity, generated unexpected efficiency gains. The transition from synchronous physical presence to hybrid digital interaction (integrating video conferencing with persistent messaging threads) created documented decision trails and improved information flow across teams. This pattern was observed across multiple cases, suggesting that even foundational tools can foster new work routines when deployed during crisis-induced experimentation.

Digital Marketing

Open coding revealed digital marketing as a prominent dimension, reflecting the accelerated migration of promotional activities from physical channels to digital platforms. This pattern emerged most clearly in organizations at the foundational level, which recognized the crisis as a catalyst to strengthen their digital presence. Participants described a deliberate evolution in their outreach strategies as they observed shifts in user behavior; for instance, one Director noted:

Particularly on Facebook, reaching the target market has become increasingly difficult. I believe [the organization] recognized this shift, which is why they have scaled back on those networks. Instead, they are pivoting toward other digital tools and platforms that [...] are gaining traction elsewhere (AET09, Director, Institution).

Following this pivot, organizations implemented targeted campaigns on platforms such as Instagram and LinkedIn to maintain brand visibility and facilitate B2B communication. By generating high-value content—including tutorials, success stories, and webinars—firms that previously relied on in-person trade shows transitioned to virtual events, often achieving broader geographic reach and significant cost reductions. Campaigns were deployed across multiple platforms: Facebook and Instagram for brand visibility, LinkedIn for business to business (B2B) communication and client acquisition, and Twitter/X for real-time engagement. This dimension contributed to maintaining commercial activity and identifying new market opportunities, ultimately establishing sustainable post-pandemic communication channels.

Social Customer Relationship Management

Analysis identified a transition from unidirectional broadcasting to S-CRM, characterized by bidirectional interactions that enabled a more detailed understanding of customer needs and behaviors. This

pattern distinguished organizations that began to treat customer input as a source of information for product adjustments. As one director explained:

We don't have a [standard] CRM combined with a task manager, so we customize our own. This is crucial because it allows for precise customer tracking. We receive a high volume of requests via SM, and this system enables systematic follow-up (AET08, Director, Company).

This narrative reflects how firms used SM-integrated systems to consolidate fragmented communication—from WhatsApp, Facebook, and Instagram—into unified workflows. During the pandemic, increased demand for rapid digital responses pressured firms to professionalize these interactions, moving them beyond ad-hoc replies toward systematic relationship management. By maintaining customer proximity through digital channels when physical touchpoints were disrupted, firms using S-CRM were able to sustain commercial activity during the crisis.

Digital Communities and Collaboration Networks

A distinctive dimension emerged in the use of SM to cultivate digital communities and collaborative networks. These networks included partners, suppliers, and even competitors in joint initiatives. This pattern was particularly evident among firms that viewed business networks as sources of complementary resources. As one director noted:

There are groups that coalesce in a sort of virtual [private enclave], and through them, new knowledge, relationships, and customer leads are generated. This is the current shift in the sector; organizations are opening up to intense interaction through these digital networks (AET04, Director, Company).

During the pandemic, this collaborative dynamic materialized in specialized communities on platforms such as Slack and LinkedIn. A recurring observation was the ICT cluster's transition to virtual meetings, which increased participation rates compared to previous face-to-face gatherings and enabled more inclusive exchange of experiences. Platform use varied by purpose: LinkedIn groups supported professional networking and business development; Discord servers facilitated technical discussions and informal knowledge exchange; Twitter/X enabled real-time industry conversations; and sector-specific forums provided regulatory updates and market intelligence.

Knowledge Management

Analysis identified an advanced pattern of SM use for knowledge management, characterized by systematic capture, codification, and storage of both explicit and tacit knowledge. This pattern was observed in organizations that had developed routines for continuous learning and formal documentation practices. As one director described:

Social networks serve as a conduit for hosting events and generating an information database that can be consulted later. Ultimately, this creates a repository of learning and knowledge that becomes a strategic asset for the organization (AET09, Director, Institution).

Beyond simple communication, organizations implemented internal wikis and structured repositories (e.g., within Slack or Microsoft Teams) to document technical solutions and “lessons learned.” The pandemic-induced shift to remote work accelerated this formalization; processes previously transmitted through informal, in-person interactions were transformed into documented digital trails. This dimension contributed to OR by enabling rapid access to problem-solving data and by converting individual experience into collective knowledge assets that could be consulted in future disruptions.

Collaborative Innovation

The most advanced dimension to emerge was the use of SM for collaborative development and experimentation with external actors. This pattern involved co-creating solutions and iterating business models in partnership with customers, suppliers, and even competitors. Observed in organizations with a culture of openness to external input, this dimension was exemplified by one institutional leader:

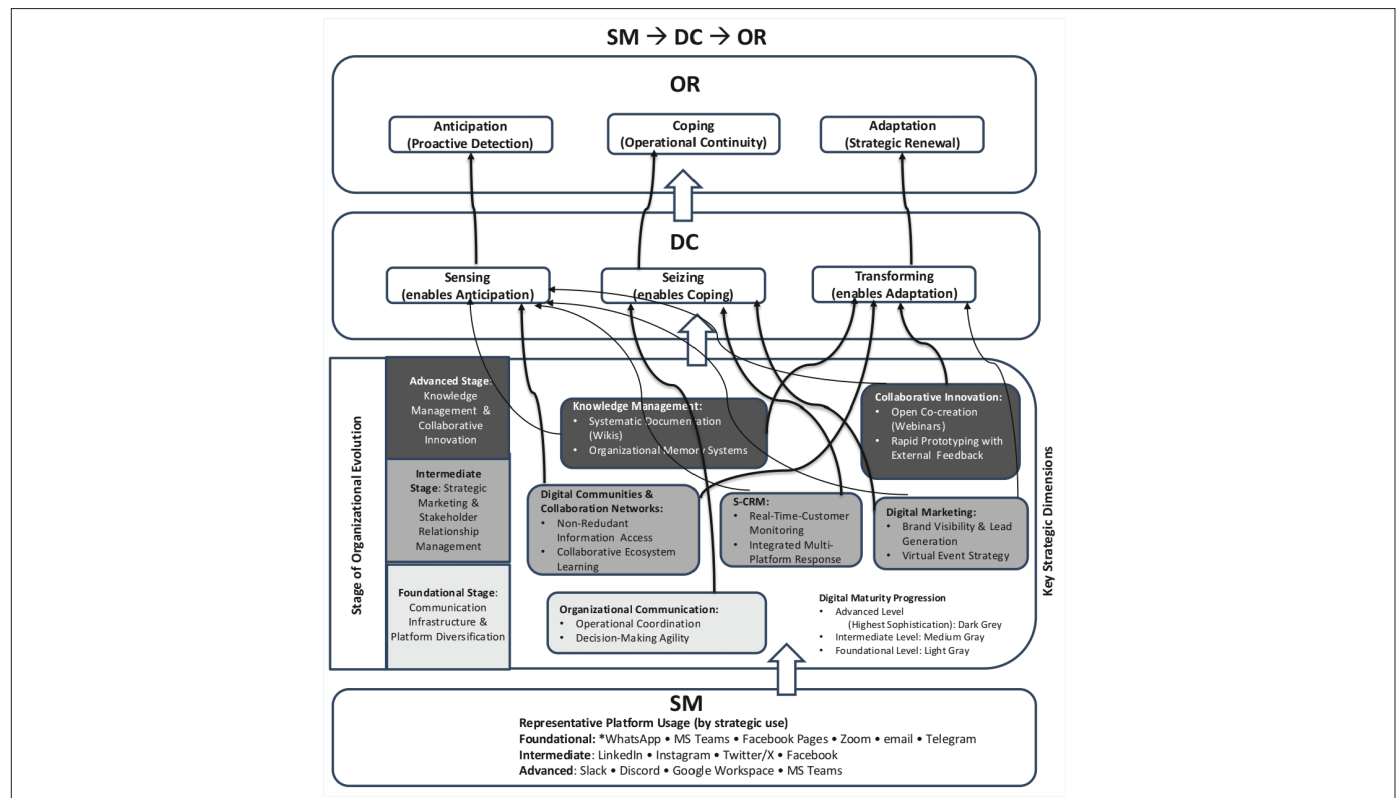
We listen intensely to social networks to drive development. For instance, we have an ERP for SMEs, and we have already engineered new products based on [insights gathered from] social networks. We developed applications for our ERP to ‘catch’ ads: when a user posts ‘I need a sales system,’ the system identifies the lead and notifies the relevant parties (AET11, President, Institution).

Beyond lead generation, this proactive engagement materialized in open webinars and digital hackathons where organizations invited both customers and non-customers to discuss pain points, effectively validating service demand before full-scale development. Tech start-ups, in particular, used dedicated groups on Facebook and Instagram as low-fidelity prototyping environments, gathering real-time feedback that accelerated product adjustments.

With respect to resilience outcomes, Collaborative Innovation constituted the hallmark of the advanced level. It appeared to support adaptive transformation by facilitating the continuous renewal of value propositions and the exploration of emerging opportunities. By leveraging ecosystem for co-creation, firms moved beyond mere survival and utilized crisis as springboard for business model innovation and long-term competitive evolution. After identifying and describing the operational mechanisms through which SM contributed to OR, selective coding consolidated the emerging theory into a proposed conceptual framework.

Figure 1 represents digital evolution model for OR (SM → DC → OR), illustrating how six dimensions of strategic use of SM operate as enablers of DC that strengthen three stages of OR process. Dotted lines indicate specific causal connections between dimensions and DC, and critical connections are highlighted with thick lines. Sidebar represents three empirically identified levels of organizational evolution.

Figure 1. Digital evolution model for organizational resilience through social media and dynamic capabilities (SM-DC-OR model).



Note. Authors' own elaboration, integrating Duchek's (2020) resilience stages and Teece et al.'s (1997) DC framework based on the thematic analysis. DC: Dynamic Capabilities; OR: Organizational Resilience; SM: Social Media; S-CRM: Social Customer Relationship Management. The figure presents six SM dimensions (left), three DC (center), and three resilience stages (right) across three empirically observed maturity levels (sidebar). Solid arrows indicate relationships consistently identified across all levels; dashed arrows represent patterns observed primarily in advanced-level organizations. Platform assignment to maturity levels reflects strategic use patterns, not inherent platform features (see Table 2 for detailed mappings). The asterisk (*) next to WhatsApp highlights its observed use across multiple levels—from foundational communication to advanced crisis coordination—illustrating how widely adopted platforms can support different functions depending on organizational practices. For detailed platform-dimension mappings, see Tables 3 and 3A.

Overview of Identified Dimensions

Table 3 summarizes six identified dimensions of SM use for OR, organized according to level of organizational evolution, predominant

digital platforms, and specific contribution to temporal stages of OR (see Figure 1).

Table 3. Social Media use in Organizational Resilience: Dimensions of evolution, platforms, and stage contributions

Dimension	Level of Evolution	Identified Platforms	Contribution to OR Stages
Organizational communication	Foundational, Intermediate, Advanced	WhatsApp, email, Microsoft Teams, Slack (intra-organizational), Telegram	Primary coping (Absorption); Secondary Anticipation
Digital marketing	Intermediate, Advanced	LinkedIn, Facebook, Instagram, content strategies	Primary coping (Absorption); Secondary adaptation
S-CRM	Intermediate, Advanced	WhatsApp, LinkedIn, integrated CRM platforms	Primary coping (Absorption); Secondary anticipation
Digital communities	Intermediate, Advanced	LinkedIn groups, Telegram, Discord (inter-organizational), industry forums	Primary anticipation; Secondary adaptation
Knowledge management	Advanced	Organizational wikis, shared repositories	Primarily Adaptation
Collaborative innovation	Advanced	Co-creation platforms, agile tools, Slack	Primarily Adaptation

Note. Own elaboration based on thematic analysis of interviews. Examples of each contribution are discussed in the text. OR: Organizational Resilience; CRM: Customer Relationship Management; S-CRM: Social Customer Relationship Management.

In addition, platform examples showed predominant uses per maturity level; detailed platform-dimension mappings are provided in Table 3A.

Table 3A. Social Media platforms by primary dimension and maturity level

Platform	Primary Function	SM Dimensions	Maturity Level
WhatsApp	Informal messaging, rapid coordination	Communication (primary), S-CRM (secondary)	Foundational
Zoom	Video conferencing	Communication	Foundational
Email	Formal communication	Communication	Foundational
Facebook	Basic brand presence	Digital Marketing	Foundational
Telegram	Informal messaging, rapid coordination (groups and channels)	Communication (primary), S-CRM (secondary)	Foundational
LinkedIn	Professional networking, B2B marketing	Digital Marketing (primary), S-CRM (secondary), Communities (secondary)	Intermediate
Instagram	Visual storytelling, brand engagement	Digital Marketing	Intermediate
Twitter / X	Real-time engagement, public communication	Digital Marketing, S-CRM	Intermediate
WhatsApp	Integrated customer service, business messaging	S-CRM (primary), Communication (secondary)	Intermediate
Telegram	Community coordination, real-time updates	Communities (primary), Communication (secondary)	Intermediate
Slack	Structured collaboration, knowledge sharing (intra-organizational)	Communication (primary), Knowledge Mgmt. (primary), Innovation (secondary)	Advanced
Discord	Technical discussions, open-source collaboration (inter-organizational)	Communities (primary), Innovation (secondary), Knowledge Mgmt. (secondary)	Advanced
Google Workspace	Document co-creation, shared repositories	Knowledge Mgmt.	Advanced
Microsoft Teams	Integrated collaboration, document management, and workflow automation	Communication, Knowledge Mgmt.	Advanced

Note. Own elaboration based on interviews (see Table 3). Platform maturity reflects predominant strategic use; multi-level platforms (e.g., WhatsApp, Teams) indicate adaptability. “Primary/secondary” denotes dimension salience. B2B: Business-to-business; S-CRM: Social Customer Relationship Management; SM: Social Media.

Across the six dimensions, three cross-cutting patterns emerged: synergistic integration of dimensions, sequential digital maturity progression,

and superior resilience outcomes in advanced-level organizations — patterns that the following section interprets through the DC lens.

Discussion

The findings extend social capital theory (Nahapiet & Ghoshal, 1998) by specifying the differential roles of its dimensions in SM-facilitated resilience. While structural social capital—the digital connections themselves—provides the architecture for information flow, cognitive social capital—shared languages, codes, and interpretative frameworks—emerges as the critical substrate that translates connectivity into actionable seizing capacity. In its absence, even dense digital networks remain inert for resilience purposes, explaining why some digitally connected SMEs failed to convert information into adaptive action during the crisis.

Interpreting Evolutionary Levels as Indicators of Digital Maturity

The factors that explain the different levels of organizational digital maturity in the strategic use of SM for OR include available technological and human resources, prior digital skills, an innovation-oriented organizational culture, and accumulated experience. In this context, the Guadalajara ICT ecosystem facilitated the attainment of intermediate sophistication by leveraging concentrated digital talent and a favorable sectoral culture. Advancing through these maturity levels requires strategic intent, investment in capabilities, and leadership that recognizes the transformative potential of digital technologies. While the path-dependent nature of SM-resilience maturity imposes a structural sequence, this does not entail strategic fatalism. On the contrary, it defines the strategic frontier: managers must identify their firm's current maturity threshold and prioritize investments that resolve foundational bottlenecks—such as S-CRM sensing capabilities—thereby accelerating progress toward higher-order resilience without attempting leaps that outpace the firm's absorptive capacity (see Literature Review).

Causal Mechanisms: Social Media as Enablers of Dynamic Capabilities

Sensing: Amplifying Anticipatory Capabilities

As established in the literature review, sensing capabilities enable anticipation through the identification and interpretation of environmental signals. SM platforms facilitate the cultivation of social capital across three dimensions that converge to activate sensing.

Digital communities function as distributed intelligence networks that enhance structural and cognitive capital. By participating in industry-specific LinkedIn groups and Slack channels, SMEs gain access to non-redundant information—novel knowledge unavailable through internal teams. Our findings revealed that ICT cluster participants actively engaged in these communities detected pandemic-related market shifts earlier than isolated peers. Field observations and informal conversations during site visits suggested that digitally embedded firms notably shortened the latency between sensing a disruption and seizing adaptive opportunities—a pattern consistently noted across multiple firms. This temporal advantage illustrates how digital communities compress detection windows, transforming SM from a passive information channel into an active sensing infrastructure.

S-CRM strengthens relational capital by enabling continuous monitoring of customer needs. Unlike periodic surveys, SM-facilitated interactions generate real-time feedback; this allowed firms to detect demand shifts for remote collaboration tools within days of lockdown announcements. By professionalizing digital listening, organizations institutionalize the detection of weak market signals, transforming customer relationships into strategic sensing assets. This mechanism explains how resource-constrained SMEs can achieve environmental scanning capabilities that rival those of larger corporations.

Knowledge Management facilitates the absorption of external knowledge to bolster cognitive capital. Advanced organizations curated specialized sources through RSS feeds and Slack integrations, transforming raw information into strategic intelligence necessary for identifying disruptive signals. The causal mechanism appears to operate by reducing information access costs and compressing detection windows. Crucially, SM-enabled social capital appeared to function as a critical bridging mechanism for resource-constrained SMEs, providing structural ties to reach information, cognitive resources to interpret it, and relational trust to act upon it.

The activation of sensing capabilities through SM is contingent upon the conversion of social capital into strategic assets. While structural capital (connectivity) facilitates the detection of environmental signals, it is the cognitive dimension—manifested through shared digital narratives and common interpretative frameworks—that enables effective interpretation. Within digital communities, this cognitive capital acts as a sense-making mechanism that reduces ambiguity, allowing SMEs to synchronize collective responses. Thus, SM dimensions do not automatically generate sensing capabilities; they appear to do so when cognitive social capital translates raw connectivity into actionable intelligence.

Seizing: Orchestrating Resources Under Pressure

The transition from sensing to seizing—mobilizing resources to address detected opportunities or threats—was supported by SM dimensions that facilitated rapid coordination and decision-making.

Organizational communication platforms (WhatsApp, Microsoft Teams) exemplified this mechanism. As documented in the findings, the shift from synchronous physical presence to hybrid digital interaction created documented decision trails and improved information flow. This seemingly basic adaptation represents the activation of seizing capabilities: the ability to rapidly reconfigure coordination routines in response to environmental shocks.

Digital communities also contributed to seizing by providing access to complementary resources. When physical supply chains were disrupted, firms used sector-specific forums and Slack channels to identify alternative suppliers, share logistical solutions, and coordinate joint responses. This peer-to-peer resource orchestration illustrates how relational capital—trust-based digital networks—lowers the friction inherent in rapid resource mobilization during crises.

The intermediate-level practices documented in S-CRM and digital marketing further illustrate seizing activation. By maintaining

customer proximity through digital channels when physical touch-points were severed, firms preserved commercial flows and adapted their value propositions. This required not only detecting changing customer needs (sensing) but also rapidly reconfiguring marketing and sales processes to address them—a clear manifestation of seizing capabilities.

Transforming: Institutionalizing Learning for Renewal

The transforming capability—reconfiguring organizational structures and routines for long-term adaptation—was activated primarily by advanced dimensions: knowledge management and collaborative innovation.

Knowledge management practices appeared to transform individual expertise into collective assets. Organizations that implemented internal wikis, structured repositories, and systematic documentation of “lessons learned” appeared to convert crisis-induced adaptations into organizational memory. This process suggests that effective crisis responses need not remain isolated events but may become progressively embedded in the firm’s long-term operational routines. The pandemic-induced shift to remote work catalyzed this formalization, as processes previously transmitted through informal, in-person interactions were transformed into documented digital trails. This represents the essence of transforming: converting temporary adaptations into permanent capabilities.

Collaborative innovation enabled experimentation and co-creation with external actors. By leveraging SM platforms for virtual hackathons and open webinars, organizations co-designed service adaptations with customers. Tech start-ups used dedicated SM groups as low-fidelity prototyping environments, gathering real-time feedback that accelerated product iterations. This mechanism appears to reduce barriers to open innovation and may accelerate learning cycles, potentially creating opportunities for firms to adapt or pivot their business models and to establish innovation routines that persist beyond the crisis.

Our findings reveal a clear “maturity gap”: advanced-level organizations utilized these SM-enabled assets for structural reconfiguration, whereas foundational-level organizations remained limited to incremental, tactical adjustments. This gap illustrates that transforming capacity is not automatically conferred by technology adoption; it requires prior investment in sensing and seizing infrastructures, as well as a culture that values systematic learning.

The Moderating Role of Context: Insights from Field Observations

While not the central analytical focus, field observations during site visits reinforced interviewees’ accounts of operational disruption and highlighted the relevance of technological developments in enabling continuity throughout the crisis. The identified SME-resilience relationship is shaped by contextual factors. Organizational size has ambivalent effects: SMEs face resource constraints that shape investment priorities, yet their structural agility—flatter hierarchies and greater flexibility for experimentation—confers distinct advantages.

SM platforms function as leveling mechanisms that mitigate the structural disadvantages of resource-constrained SMEs. By providing enterprise-grade communication and marketing tools at marginal costs, these platforms dissolve entry barriers historically favoring capital-intensive corporations. This democratization allows SMEs to achieve ‘scale without mass,’ leveraging cloud-based architectures to build complex capabilities without substantial investment.

Within the Guadalajara ICT ecosystem, these effects are magnified by the concentration of firms, a culture conducive to digital adoption, the availability of digitally skilled talent, and institutions that deliver complementary resources. This environment allowed SMEs in this sector to demonstrate greater sophistication in their resilience compared to firms in traditional sectors or less developed regions. Consequently, SM-facilitated resilience acts as a strategic equalizer, enabling smaller firms to orchestrate resources and respond to shocks with operational agility that rivals larger competitors—provided the organization possesses the necessary absorptive capacity (see Literature Review). Viewed through the lens of these contextual moderators, the theoretical contributions come into sharper relief, suggesting that while technology is accessible, the ecosystemic and internal capacities remain the ultimate boundary conditions for generalizability.

Theoretical Contributions: Bridging the Causal Mechanism Gap

Prior research has established that SM matters for OR but has largely left unexplained how and when it matters. Addressing this gap, we transition from correlational accounts to a mechanism-based explanation, advancing OR research across three critical frontiers.

First, we move beyond dimensional aggregation. While prior research often treats SM as a unitary construct (Giordani et al., 2023) or bundles it with broader ICT indices (Xie et al., 2022), we provide functional granularity. By disaggregating SM into six dimensions—Organizational Communication, Digital Marketing, S-CRM, Digital Communities, Knowledge Management, and Collaborative Innovation—we specify that foundational dimensions were primarily associated with the activation of sensing and seizing capabilities—supporting anticipation and operational coping—while advanced dimensions appeared to function as higher-order DC, facilitating transforming processes oriented toward long-term adaptation through institutionalized learning.

Second, we provide temporal-capability mapping. Unlike cross-sectional studies that treat resilience as a static outcome, our integration of Ducheck’s (2020) framework reveals how SM practices unfold sequentially. We observe that SM-activated sensing appears to enable the anticipation stage, seizing seems to facilitate the coping stage, and transforming appears associated with adaptation as the terminal resilience stage. This addresses the long-standing call for process-oriented research that captures how DC activate across specific crisis phases (Williams et al., 2017).

Third, we open the micro-foundational ‘black box’ of OR by specifying how social capital activates sensing, seizing, and transforming capabilities. While existing literature identifies social capital as a mediator (Ozanne et al., 2022), it often leaves the transition from ‘social ties’ to specific resilience stages underspecified. Our model bridges this gap by proposing that SM-enabled social capital functions, within this empirical context, as the substrate through which sensing, seizing, and transforming DC are progressively activated.

By reconciling DC with temporal resilience, this study shifts the discourse from documenting if SM helps to explaining how, when, and through which specific pathways it fosters organizational longevity and adaptive capacity.

Conclusions

A Multi-Level Architecture of Organizational Resilience

The following propositions synthesize both the functional contributions of SM practices (RQ1) and the sequential activation of sensing, seizing, and transforming capabilities (RQ2), formalizing the link between digital dimensions and resilience stages.

Proposition on Functional Heterogeneity of SM Dimensions

The contribution of SM to OR operates through six functionally distinct dimensions that appear to activate specific DC across the resilience cycle. These effects reflect an observed three-fold pattern: (1) sensing capabilities are associated with relational and market-intelligence dimensions (e.g., S-CRM) in enabling anticipation; (2) seizing capabilities are linked to organizational communication (foundational level) in sustaining operational coping; and (3) transforming capabilities are associated with advanced knowledge-integration dimensions (advanced level) in facilitating adaptive renewal. Strategies that bypass foundational maturity to invest directly in advanced dimensions may yield suboptimal resilience returns, as higher-order transforming appears to depend on the cumulative nature of the absorptive capacity built in earlier stages.

Proposition on Digital Maturity as a Conditioning Trajectory

The relationship between SM and OR appears to follow a nonlinear, path-dependent trajectory moderated by accumulated digital maturity. Advanced adopters demonstrate superior anticipation and adaptation, consistent with the observation that prior investments institutionalize the absorptive capacity needed to process complex environmental signals. This cumulative advantage suggests a strategic gap: foundational-level firms—particularly those in ecosystems with low institutional support—may not replicate resilience outcomes through technology adoption alone without first internalizing the intermediate sensing substrates provided by S-CRM and digital community-building.

Proposition on Sequential Patterning of DC Activation

Within the observed sample, the relationship between SM and OR followed a consistent sequential pattern in which sensing infrastructures appeared to precede seizing mobilization, which in turn appeared to function as a precondition for effective transforming reconfiguration. This observed sequentiality may constitute a characteristic

pathway under conditions of high environmental uncertainty, as advanced SM dimensions were observationally associated with limited transforming outcomes in the absence of consolidated sensing mechanisms. This pattern suggests a potential ‘maturity threshold’ where incremental technological investment may not translate into enhanced resilience in cases where the underlying sequential development of DC is not observed. Future research employing longitudinal and cross-sectional designs is warranted to assess whether this sequence constitutes a generalizable structural condition or a context-specific trajectory.

These six functionally distinct dimensions constitute a meso-level construct that integrates sensing, seizing, and transforming processes across the resilience cycle, bridging micro-level routines with organizational-level resilience capabilities—and providing the framework’s operational foundation for the practical implications developed in the following section.

Implications for SME Managers, Policymakers, and Platform Providers

This framework offers actionable pathways for strategic decision-making. Operationally, SME managers should prioritize investment in S-CRM platforms and digital community engagement to establish the sensing substrate necessary before committing to complex knowledge management infrastructure.

A key implication for SMEs operating within high-density ICT ecosystems comparable to Guadalajara—and, by cautious extension, for ecosystems in early consolidation stages seeking to develop analogous institutional infrastructure—concerns the deliberate cultivation of ecosystem density through active participation in virtual cross-regional communities. Where proximate institutional intermediaries are absent or underdeveloped, platform-mediated collaboration may partially compensate by constructing the relational infrastructure that mature clusters possess organically, though the effectiveness of this mechanism under conditions of lower absorptive capacity remains an empirical question requiring systematic investigation. The path-dependent nature of SM-OR maturity defines a strategic frontier rather than a deterministic constraint: managers should identify their firm’s current maturity threshold and prioritize investments that resolve foundational bottlenecks before advancing to higher-order capability development.

For policymakers – particularly in high-density, institutionally supported Latin American high-tech ecosystems that exhibit conditions analogous to Guadalajara’s GMA (e.g., concentration of digital talent, active intermediary institutions, and pre-existing absorptive capacity) – this implies redirecting support from hardware infrastructure toward capability-building programs that foster digital community formation, peer learning networks, and strategic technology integration. In the Guadalajara context, this would mean strengthening the bridging roles already played by institutions such as IJALTI and COECYTJAL, scaling their intermediation capacity beyond their current reach. For similar ecosystems in early consolidation stages that already show signs of emerging institutional density (e.g., the presence of sectoral associations, initial digital talent pools, or nascent intermediary support), this implication applies only by cautious

extension – acknowledging that the effectiveness of synthetic density mechanisms in lower-absorptive-capacity contexts remains an empirical question.

Platform providers and ecosystem managers should focus on engineering modular, interoperable environments that minimize coordination overhead and facilitate shared access to complementary resources for resource-constrained firms. Implementing these targeted interventions ensures that digital adoption transcends basic functional use to become an institutionalized driver of organizational endurance.

Boundary Conditions and Future Research Directions

While the framework provides a robust theoretical architecture for OR, its boundary conditions delineate fertile ground for future inquiry. First, as a GT study, our findings prioritize analytical over statistical generalization. Future research should employ longitudinal designs and structural equation modeling to test the proposed causal pathways across representative samples, mitigating concerns of reverse causality and selection effects.

Second, the framework's scope is bounded by ecosystem characteristics. The specific context of Guadalajara's high-tech ecosystem—a high-density environment with active institutional intermediaries—suggests that digital literacy and ecosystem density may act as key moderators. Systematic replications are needed to assess their operation in traditional sectors (e.g., manufacturing, retail) and in geographically isolated firms with lower absorptive capacity. Extending the framework across Latin America's polycentric innovation landscape—from Brazil's São Paulo to Mexico's Monterrey and to smaller emerging ecosystems—will require accounting for heterogeneity in institutional support intensity and digital maturity, factors that may recalibrate the thresholds for institutionalizing SM dimensions as higher-order DC.

Crucially, the model's validity is also bounded by the nature of the crisis itself. Constructed from pandemic-induced disruptions—characterized by abrupt onset, universal scope, and high ambiguity—the framework's sequential logic of sensing, seizing, and transforming may not generalize to crises with different temporal or structural profiles. Future research should test whether the same capability ordering holds for slow-onset disruptions such as financial recessions, or for technically specific shocks such as cyberattacks, where the locus of sensing and seizing may differ substantively.

Third, the model's organizational-level focus constitutes a boundary condition that brackets individual agency. Future research should bridge micro and macro levels by adopting a multilevel lens to examine micro-foundations—including leadership styles, employee technology anxiety, and individual digital competencies—and their role in shaping advanced practices. Investigating these human-technological interfaces would provide a more holistic understanding of crisis management.

Finally, while the coding process followed a rigorous three-phase GT approach, it did not include inter-coder reliability metrics or formal member checking. To mitigate this limitation, an audit trail was maintained throughout the ATLAS.ti analysis to ensure internal consistency and reflexive alignment between the empirical data and the emerging conceptual categories.

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