

Management of the Digitalization of Municipal Services: Influence on Citizen Collective Intelligence and Social Innovation Resilience

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Abstract

Studies on the digital transformation of organizational services have clearly revealed its effectiveness. However, the link between the management of the digitization of functions, citizen mobilization and social innovation is little investigated. Even research on the effectiveness of the management of the digitalization of municipal services is almost non-existent. To shed light on this gray area, research with municipal councillors and heads of departments of municipalities in Chad was conducted. The hybrid approach has been deployed. She facilitated the production of data through 15 semi-structured interviews and 210 surveys per survey. The approach of deconstructing the management of the digitalization of services into three constructs (management of the appropriation of social media, management of the operationalization of digital platforms and management of organizational agility) was used. The results showed that the management of social media appropriation and organizational agility promote the emergence and structuring of the dynamics of citizen collective intelligence. Then, the management of the operationalization of digital platforms is a real lever for the adaptation and resistance of the social innovation system. While the dynamics of collective intelligence increase the resilience of the social innovation system. However, the management of organizational agility has little significant contribution to citizen mobilization. This concerns the management of collective citizen intelligence, considered as a factor in the pooling of know-how which generates performance in social entrepreneurial innovation. The article can be useful to municipal councillors and department heads who will use it to improve citizen mobilization practices. While the government and its partners will find new directions to build the capacity of municipal services so that they are able to develop social innovation projects.

Keywords: Digital transformation, collective intelligence, citizen mobilization, social innovation system

1. Introduction

Today, the management of the digitization of services is a posture that is now in common parlance. And it is accepted that all organizations adopt it (Dudezert, 2018). This posture, deployed to transform managerial practices, increases, in the sense of several authors (Allouche & Zerbib, 2020; Dudézert, 2018; Mignenan, 2022a, 2022d), collective dynamics and promotes social innovation. Today, the management of the digitization of services is a posture that is now in common parlance. And it is accepted that all organizations adopt it (Dudezert, 2018). This posture, deployed to transform managerial practices, increases, in the sense of several authors (Allouche & Zerbib, 2020; Dudézert, 2018; Mignenan, 2022a, 2022d), collective dynamics and promotes social innovation.

Social innovation is a concept that varies from one promoter to another. However, it is about introducing knowledge from all disciplines to bring something new to the target population. It is an essential obligation that allows the company to occupy an advantageous competitive position (Purbasari, 2021; Sataalkina and Steiner, 2020a). Social innovation is a lever that promotes the pooling of intelligence. It is a source of collective intelligence and the creation of new opportunities in the community. Indeed, social innovation is a key driver for new jobs. It is also a factor in social and economic growth. Notwithstanding its usefulness, the social innovation

system is uncertain (Barbosa, 2018; Satalkina and Steiner, 2020b). Several digitalized production, marketing and human resources activities generate fewer expected effects. Others are less tolerant of the shocks that emerge from their hostile ecosystems. Several factors come into play in this situation: inappropriate management of resources, inefficient management of digitalization and inefficiency of relational capital. Among these elements, it is digital management and effective collective intelligence that seem to be the least well known. Several studies (Chaniasa, Myersb, & Hessa, 2018; Elia, Margherita, Ciavolino, & Moustaghfir, 2021; Janati-Idrissi, 2020) on digitalization management and collective intelligence were conducted. These studies focus on the issue of innovation resilience. This research reveals that digital management, the process of applying data management methods and techniques, integrating digital technologies into the organization's activities, is essential for the dynamics of collective intelligence. It allows the organization to optimize the management of its services and improve its notoriety. According to several authors, the coherence and intelligence of an organization capable of anticipating expectations are the result of successful digitalization management. However, the results of this work relate exclusively to traditional companies. Municipal services are almost ignored. In addition, this research ignores the effectiveness of the management of the digitalization of municipal services, the resilience of the social innovation system. Thus, we do not know whether the management of the digitalization of local public institutions such as municipalities has an explanatory power on the dynamics of citizen collective intelligence and the resilience of the social innovation system. In this perspective, we will answer the following question: what is the contribution of the management of the digitization of municipal services on citizen mobilization and the resilience of the local social innovation system?

We mobilize the theory of dynamic capacities to analyze the relationship between the efficiency of the digital management of municipal services. This is the angle that has not been the subject of empirical investigation. The first part of this article is a theoretical context to propose three postulates. The second part deals with the methodological process. It serves as the semi-structured interview guide and questionnaire. The third is the presentation of the results of the model, which will be followed by discussion items. Then, the contributions of the research and the perspectives will be discussed.

2. Theoretical Context of the Research

This sequence first presents the central concepts and the theoretical model of the research. Secondly, it suggests the hypotheses that will be based on the literature and the preliminary exchanges with the field of manoeuvres of our research.

2.1 Management of Digitalization, Citizen Collective Intelligence and Resilience of the Social Innovation System

This sequence highlights the conceptual considerations of the central variables under study.

2.1.1 Management of the Digitization of Municipal Services

Municipal services involve the public sector, which includes a wide range of different activities in different geographical, political, and hierarchical levels. Often, special attention is paid to the administrative levels. Digitization concerns the innovative nature of social assistance, hygiene, sanitation, green spaces, health, and education services. Thus, according to several researchers (McCarthy, Sammon, & Alhassan, 2021; Mignenan, 2022d; Purbasari, 2021; Satalkina & Steiner, 2020a, 2020b), digitalization is based on a philosophical school of thought that is characterized by the state of mind, the change in behavior and attitudes towards. For others (Chaniasa et al., 2018; Herman, 2022; Youssef & Hicham, 2022), it is the strategy consisting of the adoption and application of digital technologies in all functions of the organization to increase the pooling of forces.

Also, some authors (Elia et al., 2021; Janati-Idrissi, 2020; Mignenan, 2021a) associate it with changes in organizational structures caused by the era of hypermodernity. These changes essentially relate to the total or partial break with traditional social models (Chaniasa et al., 2018; Vaska, Massaro, Bagarotto, & Mas, 2021). Thus, digital transformation is akin to adapting the social model of the organization to respond effectively to current needs (Herman, 2022; Mignenan, 2021a). This adaptation synchronizes dynamic capabilities and increases productivity. The effectiveness of digital transformation is based on ease of communication, shared experience, and the development of network architecture (Taqi, Moustakim, & Bouzem, 2021; Vaska et al., 2021). On the other hand, the management of the digitization of services is the application of techniques and methods mobilized to properly manage the appropriation of communication technologies, the implementation of web media and the use of social platforms to achieve goals. Considering the foregoing, three axes are highlighted for the purposes of effective management of digitalization, namely: (i) management of the appropriation of communication technologies; (ii) managing the implementation of web media and (3) managing the use of social platforms (Chaniasa et al., 2018; Elia et al., 2021). Also, the management of digital transformation is a strategy and an option to foster agile communication (Chaniasa et al., 2018; Karimi & Walter, 2021). On the operational

level, the management of digitalization results from three important levers: (1) management of the acquisition of digital communication equipment, (2) management of competitive human capital and (3) acceptance of behavior and adaptations (Satalkina & Steiner, 2020b; Vaska et al., 2021). As part of this research, the management of the digitalization of municipal services is understood as: The art of operationalizing and appropriating state-of-the-art digital tools to stimulate and unite the actors around a common vision and values in the process of offering basic services to the citizen. This definition, which puts forward the actors, their impulse, and their federation around common values, makes it possible to approach, in the following sequence, the dynamics of citizen collective intelligence.

2.1.2 Dynamics of Collective Citizen Intelligence (DCCI)

According to several works, bringing together the resources of the actors requires a relevant communication device. For authors, to bring out collective skills, the stakeholders in a problem need to: 1) pool individual assets and talents; 2) share knowledge and ideas; 3) direct knowledge towards relevant objectives or issues, 4) support each other to bring out innovative solutions (Mignenan, 2021b, 2022b): this is the manifestation of citizen collective intelligence. Also, according to several works (Leimeister, 2010; Malone & Bernstein, 2015; Mulgan, 2018; Valencia, Roberto and Garcia, 2015; Woolley, Aggarwal and Malone, 2015), collective intelligence is perceived as a system but also an approach which combines the relevant collective strengths of individuals in the form of know-how, knowledge and problem-solving abilities. However, other works reveal that collective intelligence, as a determinant of social innovation, emerges from three types of integrated intelligence, namely: 1) intellectual intelligence (cognitive mental); 2) emotional intelligence coming from the mind and 3) relational and systemic intelligence (synchronized collaboration with people around) (Valencia et al., 2015; Woolley et al., 2015; Za Ćet, 2007). However, for other authors, CI modelling is based on the following three principles: the dynamic capacity of people; transparency; the integration of assets and talents and the commitment (responsibility) of the populations. The examination of these three principles made it possible to group citizen collective intelligence for social innovation into three postures: 1) entrepreneurial collective intelligence (Ānay & Zehir, 2012), 2) innovative collective intelligence (Saur-Amaral, 2010; Ānay & Zehir, 2012) and intelligence collection of execution. In the same perspective, several authors (Brulhart, Favoreu, & Loufrani-Fedida, 2019; Mulgan, 2018; Valencia et al., 2015; Woolley et al., 2015) reveal that collective intelligence fertilizes open innovation and pursues four fundamental objectives: 1) generating increased performance, 2) facilitating wiser decision-making, 3) generating new ideas, 4) co-constructing creative solutions. There are three ways to achieve this: 1) sharing/exchanging information and ideas to find resonance; 2) spreading knowledge/action towards a specific problem or objective; 3) converge and join to provide mutual support and to generate innovative solutions. It is from this perspective that L vy thinks that CI, as an “ecosystem of ideas” and cognitive collaboration, would be the greatest wealth of the living universe (Levy, 2015; L vy, 2003). Cross-referencing the above CI types, goals, and methods emerges: 1) citizen collective intelligence that manifests as (a) citizen dynamic capacity, (b) synchronized collaboration; (c) pooling of knowledge and resources (c) collective competence. Thus, in the context of this research, the dynamics of citizen collective intelligence (DCCI) is defined as: A set of postures and strategies that consist of synchronizing knowledge, experiences, and robust resources, with a view to identifying problems, seizing opportunities, and co-constructing relevant solutions. This definition clearly establishes the link with the resilience of the social innovation system. This is the subject of the following lines.

2.1.3 Resilience of the Social Innovation System (RSIS)

The innovation system is a socio-economic component, made up of institutional and social actors linked by interaction mechanisms. It includes activities related to production, awareness, mobilization, and communication for behavior change. These activities encompass social, economic, political, institutional, and environmental processes and dimensions, referred to as scales. The concept of resilience, associated with the social innovation system, has its origins in ecology. It has increasingly been adopted as an approach to understanding socio-ecological and socio-economic systems. La r flexion relative   la r silience est une philosophie plut   qu’une simple combinaison de formulations th oriques mesurables. It is characterized as a “loosely organized group of concepts, a set of ideas and a means of promoting exchanges between disciplines. Several authors define the resilience of a system in terms of resistance or adaptation to unpredictable disturbances, to continue to fulfil its functions and provide its services. Thinking about system resilience has exciting potential to contribute to social innovation. Because many authors perceive social innovation as a means of holistic collaboration between actors to build sustainable social ecosystems. Other studies consider it in the same way as the collaborative economy, the social economy, the solidarity economy, and the community economy, etc. Social innovation seeks value in the form of transformational change that will benefit disadvantaged communities and

society. Accordingly, an emphasis is placed on collaboration, interactions, synergy, etc. Its growth results from the means and strategies of citizen mobilization. It is from the same perspective that some others claim that it is possible to design a resilient system of social innovation. For these authors, it is the ability of a system to withstand disturbances and to reorganize while retaining its functions, its structure, its feedback. Other works evoke “the adaptability of the system” and sometimes even the transformability”. In the same perspective, recent studies associate resilient innovation system with “a set of adaptive capacities that focus on mobilizing resources and facilitating successful adaptation to unpredictable adversities. For these studies, the resilience of an organizational system implies, “robustness, speed, ingenuity, and redundancy. In general, this also promotes the development of instruments and emerging forces in the community that can participate in the development of new solutions to meet new needs as they arise. Based on these manifestations, we define the resilience of the social innovation system as: a collaborative approach to change driven by individuals, groups of individuals and institutions driven by a vision and social values focused on relevant and large-scale innovative initiatives to satisfy the well-being of the community (Authors, 2022). This non-exhaustive definition highlights the actors who make up the system, their motivation, and their purpose, which is based on sustainable transformational change. As a summary of the highlighting of conceptual and logical considerations, Figure 1 is expanded.

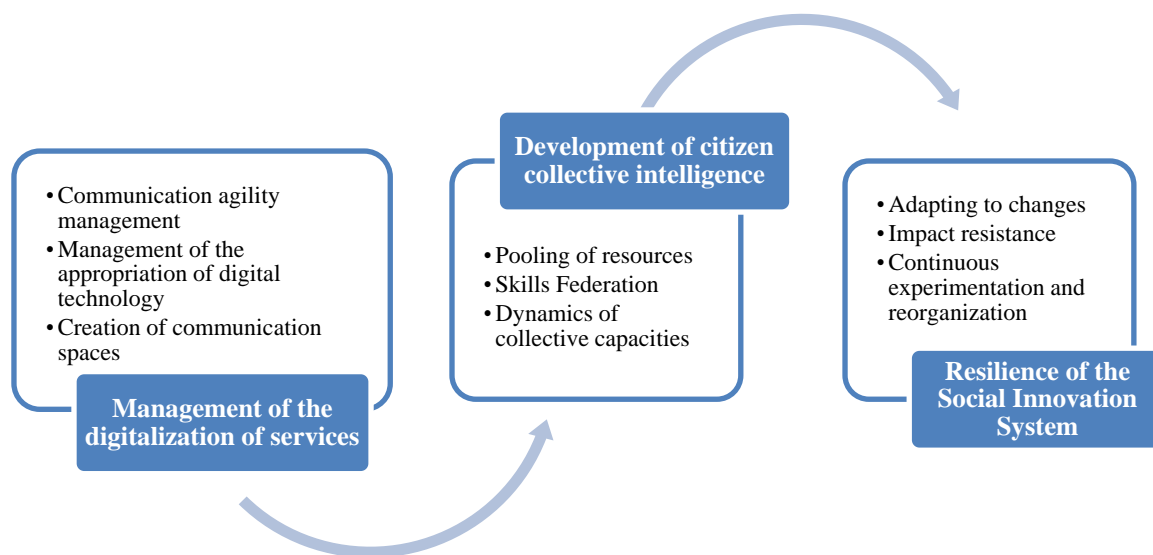


Figure 1. definitional summary

Source: author, Jan. 2024

2.2 Adoption of the Theoretical Perspective and the Conceptual Model

In agreement with previous authors (C. L. Wang & Ahmed, 2007; Zahra, Sapienza, & Davidsson, 2006), we mobilize the currents of thought of dynamic capabilities which proves specifically appropriate for formulating and evaluating the citizen mobilization and social innovation through the management of digitalisation.

Indeed, dynamic capability is concerned with the integration and mutualization of forces, co-construct and reconfigure the skills of the organization to adapt to the exponential change in the environment (C. L. Wang & Ahmed, 2007). The dynamic capabilities approach emphasizes the structural and strategic predispositions that promote advantageous positioning an ever-changing ecosystem. Dynamic capability is made up of three main skills: (i) identify and realize opportunities and threats, (ii) seize opportunities and (iii) maintain competitiveness by reforming, pooling, protecting and, if necessary, reconfiguring the organization's intangible and tangible resources. Dynamic capacity helps to explain the relationships between the effectiveness of digitalization, citizen collective intelligence and social innovation performance.

Our general theoretical framework is represented by Figure 2. Management of digitalization-Management of social media appropriation Resilience of the - Management of the operationalization of digital social innovation media Dynamics of collective citizen intelligence system -Management of communication agility by mobilizing the central variables of the conceptual model, we will be able to develop the research hypotheses and draw up the methodological path. This is the subject of the following sequence.

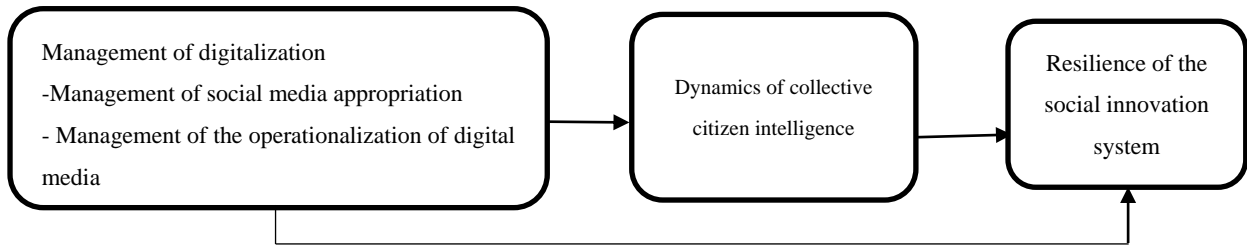


Figure 2. Model of social innovation system resilience

Source: Data compiled from the literature by the author, July 2023

By mobilizing the central variables of the conceptual model, we will be able to develop the research hypotheses and draw up the methodological path. This is the subject of the following sequence.

2.3 Development and Operationalization of Research Hypotheses

❖ Management of the digitization of services and dynamics of citizen collective intelligence

The management of the digitization of services, by promoting the operationalization of digital media, aims to increase the appropriation of social media and communication agility. Previous studies reveal that the operationalization of digital media, the appropriation of social media and communication agility are factors that play key roles in the dynamics of relational capital. On the other hand, the contribution of these factors to the dynamics of citizen collective intelligence has not been demonstrated. Therefore, we formulate the following first hypothesis: Hypothesis 1 (H1): the management of social media appropriation (H1a) and the management of communication agility (H1b) increase the dynamics of citizen collective intelligence.

❖ Management of the digitalization of services and resilience of the social innovation system.

The management of digitalization, through the operationalization of digital media, is considered as an approach that promotes innovation. However, its impact on the resilience of the social innovation system in terms of adaptation to change and resistance to shocks, etc., is little demonstrated. To help fill this gap, we formulate the following second hypothesis: Hypothesis 2 (H2): the management of the operationalization of digital media promotes the adaptability of the social innovation system (H2a) and strengthens the resistance of the said system (H2b).

❖ Dynamics of collective citizen intelligence and resilience of the social innovation system.

The dynamics of collective citizen intelligence, understood in terms of the pooling of resources, the federation of skills and the dynamics of collective capacities, constitutes a posture likely to promote social innovation. However, in terms of the resilience of the social innovation system, there is little-related work. This is why the following third hypothesis is suggested. Hypothesis 3 (H3): the dynamics of citizen collective intelligence participate in the reorganization of the social innovation system (H3a) and promotes its resistance to shock (H3b).

By way of summary, Figure 3 shows the framework of the research hypotheses.

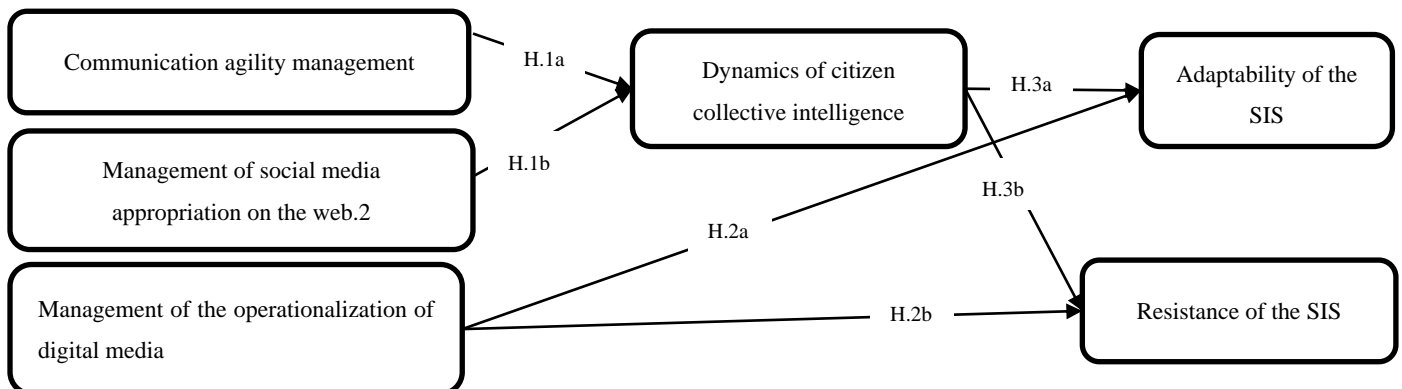


Figure 3. Framework of research hypotheses

Source: data compiled from the literature (authors, July 2023)

3. Metrological Consideration

We have adopted a mixed strategy because digital transformation, collective intelligence and the resilience of the social innovation system are multidimensional concepts. Similarly, we used the mixed approach (Creswell, 2013) which consists of simultaneously applying qualitative exploratory and quantitative explanatory approaches.

3.1 Adoption of Sample Size, Data Generation and Analysis

3.1.1 Sample Size

We applied the recommendations of Igalens and Roussel (1998) to determine the sample size. According to these authors, the size of the sample must be proportional to that of the items formulated for the purpose of research. Thus, the sample size must be 5 to 10 times greater than the number of items that described the constructs under study. We defined 22 items that allowed us to assess the six constructs. It thus emerges 5 x 22 and 10 x 22, i.e. 110 and 220. For the purposes of scientific relevance, 220 municipal councillors familiar with digitalization and local social innovation were selected.

3.1.2 Data Generation and Analysis

We have developed a semi-directive interview guide for borough delegates and a survey questionnaire for municipal councillors. These instruments have been transformed into many parts, following the funnel approach. The goal is to make them coherent, logical and easy to process by respondents. We carried out a pre-test with a sample of five advisers and five department heads concerned with the issue of digitalization. To measure the three components of digital transformation, we follow the continuity of previous authors (Janati-Idrissi, 2020; Mignenan, 2022d; Purbasari, 2021; Satalkina & Steiner, 2020a, 2020b; Youssef & Hicham, 2022). We followed the recommendations of several authors (Russell & Stone, 2002; Sendjaya, Sarros, & Santora, 2008) using a 5-point frequency scale (“”: from “never” to “very regularly”). We also retain the frequency of daily use of digital technologies, platforms, and media (Loonam, Zwiegelhaar, Kumar, & Booth, 2020; McCarthy et al., 2021; Satalkina & Steiner, 2020b). The measurement of the dynamics of citizen collective intelligence is based on previous work (Francesca & Rossignoli, 2015; Gréselle-Za bet, 2019a; Mignenan, 2022a; Pablos, 2004). It measures the relevance of the network and the synergy that promotes the resilience of the social innovation system (Francesca & Rossignoli, 2015; Maji & Goswami, 2017; Pablos, 2004). The resilience of the social innovation system is measured by the two indicators: adaptability of the system and resistance of the system. This resilience is measured by the scale proposed and already applied to food security and innovation systems.

Tableau 1. Comptes rendus int égraux

Variables tested	Full reports	Emerging variables
Organizational agility management	<ul style="list-style-type: none"> -For example, our collection teams are autonomous and empowered thanks to the digitalization of our services -Thanks to digitization, we have implemented management principles that will evolve. -We have, thanks to digitalization, several departments and employees who collaborate with a lot of synchronization and supported by openness and trust -Digitalization means that servant and transformational leaders are emerging within our municipality, capable of mobilizing citizens around common causes. 	Autonomy
Web-Based Social Media Ownership Management.2	<ul style="list-style-type: none"> -Our services make use of the tools and various functionalities of social media which now contribute to mobilizing several citizens who participate in the exchange of knowledge, experience and therefore interact. -Our municipality is one of the first to initiate the use of social media based on web 2.0, which has facilitated the implementation of the “green space” project. -A department is dedicated to the management of our website -Because of its importance in stakeholder management, web-based social media facilitators 2 work to energize citizens to develop communities of interest “contacts”. 	Social Media Features Web 2.0
Management of the operationalization of digital media	<ul style="list-style-type: none"> -Most of our agents conceptually use new communication technologies -All our services are computerized and make use of digital 	Strengthening links between actors

	<p><i>instruments for citizen mobilization, this has favoured the strengthening of links between the various actors involved in municipal development.</i></p> <p><i>-Our departments regularly make strategic use of new technologies in raising citizen awareness.</i></p> <p><i>-Our municipality improves its communication through the use of new technologies, this promotes the collaborative work system and fertilizes ideas.</i></p> <p><i>-During the last two years when the digital culture is developed in our services, we have been able to create new content based on the philosophy and technology of web 2.0. This increases the creation and exchange of citizen-generated content. For example, the publication of content via our website thus offers citizens the possibility of writing comments on our way of managing basic services.</i></p>	<p>Teamwork</p> <p>Content creation</p> <p>Creativity</p>
<i>Dynamics of citizen collective intelligence</i>	<p><i>-Collective intelligence as well as managerial practices constitute new levers of social and agile innovation to transform municipal services in the long term.</i></p> <p><i>-The dynamic of citizen collective intelligence is plural and is evident within our services and is reflected in the mobilization of actors around projects carried out in the boroughs. It is an phenomenon that requires the improvement of communication networks for behavior change and the establishment of specific conditions that are more favourable to it.</i></p> <p><i>-The emergence of collective intelligence is a major stage of adaptation, resistance, sharing of experience of the stakeholders of the communal system of social innovation.</i></p>	<p>Managerial practices</p> <p>Sharing experiences</p>

Source: Extract from the results of the interviews (author, August 2023)

The correlational analysis made it possible to highlight the mean and standard deviation (SD) parameters. This is the subject of Table 3. Thus, in general, the respondents (municipal councillors and department heads) perceive the digital transformation of municipal services as being an effective action to boost citizen collective intelligence and make them resilient. The municipal system of social innovation. In fact, they report that their municipality develops organisational agility, thus promoting citizen collaborative dynamics with an average of 4.1 out of 5 (SD = 1.77). They underline a strong appropriation of social media based on web 2.0, thus contributing to positively impacting citizen collective intelligence and making the municipal system of social innovation resistant, with an average of 3.8 out of 5 (Ec.T.= 1 ,73). Then, they declare that their municipality operationalizes digital media in order to streamline internal and external communication, and this, in all services to citizens, with an average of 3.7 (Ec.T.= 1.55). Similarly, the respondents reveal that the dynamics of citizen collective intelligence that has emerged among citizens over the past three years is the result of the digitization projects implemented; this posture of collective intelligence has favoured a renewed strategic watch within the actors of the municipal system of social innovation, with an average of 3.6 (Ec.T.= 1.54). Finally, respondents point out that, thanks to the digitization of services and the dynamics of collective citizen intelligence, their municipality has a resilient social innovation system, with an average of 4.8 (E.T.= 1 ,65). In short, the respondents consider their municipality to be more inclined to digitization, including the philosophy, attitude and behaviour of all its staff. Finally, Table 2 also presents the strong correlational results between the variables. These results converge with most of the full accounts from the semi-structured interviews in Table 1.

Table 2. Means, standard deviations and correlations between variables

Variables	Moyenn e (É.T)	1	2	3	4	5
<i>Organizational management agility</i>	4.1 (1.77)	1				
<i>Web-Based Social Media Ownership Management.2</i>	3.8 (1.73)	0.89**	1			
<i>Management of the operationalization of digital media</i>	3.7 (1.55)	0.91**	0.74**	1		
<i>Dynamics of citizen collective intelligence</i>	3.6 (1.54)	0.83**	0.67**	0.88**	1	
<i>Resilience of the social innovation system</i>	4.8 (1.65)	0.96**	0.81**	0.56**	0.78**	1

**p < ,01

Source: IMB SPSS 23 analysis (author, jan.2024)

Hypothesis testing, we used the method of structural equations. The determination of the indices of fidelity and convergent validity of the measurements are the first parameters analysed. Table 3 reports the results.

Table 3. Fidelity and convergent validity index of the measurements

Constructs and indicators	Factor contributions	Cronbach's Alpa	Reliability index
Web-Based Social Media Ownership Management.2			
(Ams.1) Integration of technologies	.83	.79	.78
(Atn.2) Assimilation of technologies	.80		
(Atn.3) Structured exchanges due to technologies	.76		
	.74		
Management of digital media operationalization			
(Aor.1) Implementation of web media	.73	.88	.798
(Aor.2) Updating of	.86		
(Aor.3) Web media management	.83		
	.78		
Management of digital media operationalization			
(Omn.1) Conceptual Use of Technology	.73	.76	.79
(Omn.2) Instrumental use			
(Omn.3) Strategic Use	.83		
	.84		
Management of the dynamics of citizen collective intelligence			
(Dic.1) Dynamics of business networks	.86	.74	.72
(Dic.2) Diversity of business networks	.83		
(Dic.3) Use of social media	-		
(Dic.4) Customer relationship management	-		
Management of the adaptability of the social innovation system			
(Asn.1) Ability to change	.88	.86	.87
(Asn.2) Ability to rebound	.90		
(Asn.3) Flexibility	.83		
(Asn.4) Flexibility	-		
Resistance of the social innovation system			
(Rsi.1) Sustainability	.88	.86	.87
(Rsi.2) Notoriety	.90		
(Rsi.3) rebound	.83		

3. Reliability and Validity of Measurements

We used SPSS 24 and AMOS to analyze the data. The use of the factor analysis method made it possible to remove items whose communality values are less than 0.5. We removed all the items presenting factorial contributions lower than 0.5 or those whose distributions are done on several axes (at least 0.3 on the second axis). Ultimately, it emerges from the factor structure exhibiting scales that mirror Kaiser, Meyer, and Olkin's Measure of Sampling Adequacy (KMO) test of .79 and Bartlett's test of sphericity significant (.00). This result fully explains 76.81% of the variance. It should be noted that the factorial contributions are all greater than .71. On the other hand, the values of Cronbach's alphas and the reliability values obtained are very satisfactory (from 0.74 to 0.93) as indicated by the data in Table 4. In addition, all the values are above the expected minimums. In

conclusion, the coherence of the scales is thus demonstrated. Furthermore, the results of Table 4 show that convergent validity is assured, with an Average Variance Extracted (AVE) greater than .500 (Bagozzi & Yi, 1988). Only the “appropriation of digital platforms” scale has an AVE lower than the floor threshold but comes very close to it (.49). Nevertheless, its Maximum Shared Variance (MSV) and its Averaged Shared Variance (ASV) are below the value of the AVE, thus justifying the discriminant validity (Fornell & Larcker, 1981). Having thus had better psychometric qualities on most of the criteria, it seems relevant to keep the scale of creation of social media based on web 2.0 as it is while keeping in mind that the relationships involving this variable will have to be interpreted. With more caution, particularly in the event of significance at the limit of acceptable thresholds. Overall, the model meets the criteria required to proceed with its evaluation.

Table 4. Convergence validity and discriminant validity

	AVE	MSV	ASV	1	2	3	4	5	6
1. Adaptability of the social innovation system	.71	.08	.035	.83					
2. Resistance of the social innovation system	.69	.26	.109	.12					
3. Dynamics of collective intelligence	.65	.23	.108	.164	.74				
4. Appropriation of web-based social media.2	.54	.23	.134	.05	.48	.74			
5. Operationalization of digital media	.59	.19	.118	.19	.38	.43	.700		
6. Organizational agility	.75	.11	.081	.27	.17	.34	.33	.79	.87

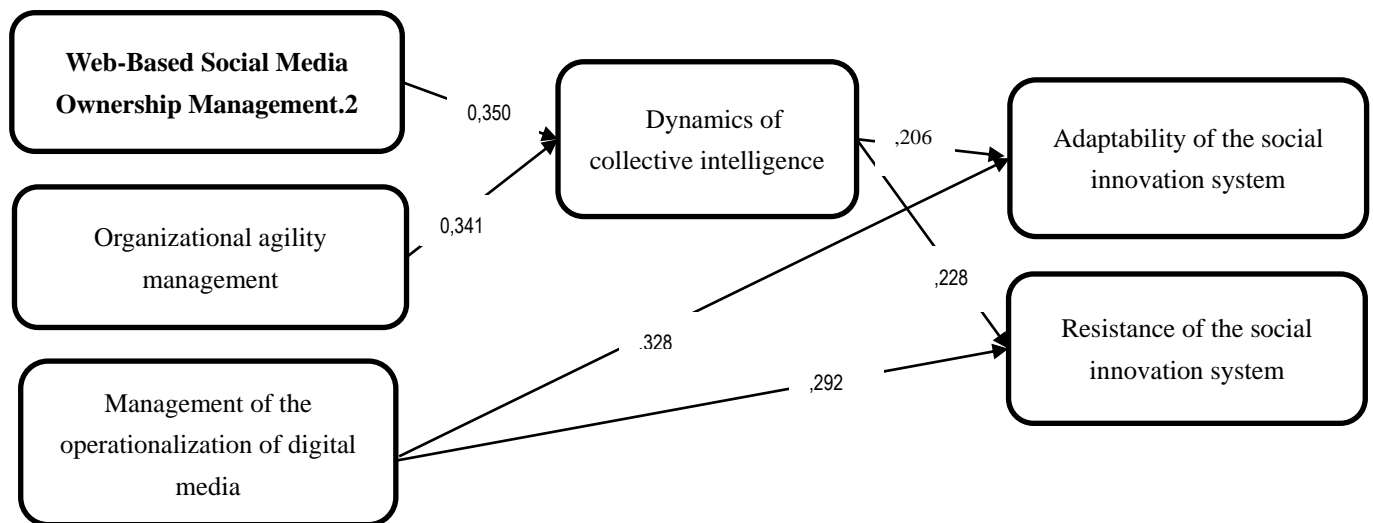


Figure 4. Main factors of collective intelligence and social innovation resilience

Considering the above results, the hypotheses that postulate the links between the management of digitalization and the dynamics of citizen collective intelligence are all approved (H1a; $\beta = .350^{**}$; $p < .01$; H1b; $\beta = .341^*$; $p < .05$). In other words, the management of digitalization is effective in achieving dynamic and therefore effective citizen collective intelligence. Hypotheses H2a and H2b which postulate the links between the operationalization of digital media and the resilience of the social innovation system (adaptation and resistance) are all statistically approved (H2a; $\beta = .328^{**}$; $p < .01$ and H2b; $\beta = .292^*$; $p < .05$). In other words, the operationalization of digital platforms constitutes appropriate trajectories to increase the resilience of the innovation system in terms of adaptation and resistance to the adversities of the innovation ecosystem. Hypotheses H3a and H3b linking the dynamics of citizen collective intelligence to the two aspects of the resilience of the social innovation system are both validated (H3a; $\beta = .206^{**}$; $p < .01$ and H3b; $\beta = .228^*$; $p < .05$). Thus, dynamic collective intelligence plays the role of mediator between digital transformation and the resilience of the social innovation system. This is, in fact, what the mediation tests that we have conducted (Sobel test) demonstrate, both for adaptability (critical ratio: 2.06*; $p = .022$) and for resistance (critical ratio: 2.28*; $p = .043$). In other words, digital transformation contributes to the resilience of the system by making collective citizen intelligence dynamic. The latter increases significantly, but less strongly, the adaptability of the system. On the other hand, it exercises significantly and strongly the influence of the resistance of the system in the face of mutations and environmental adversity. Based on these results, we can undertake the discussion and highlight the implications.

This is the subject of the sequence below.

4. Discussion, Implication and Limits

Qualitative and structural equation analyzes demonstrate the effectiveness of the management of the digitalization of municipal services on citizen collective intelligence and the resilience of the social innovation system. More specifically, organisational agility, the appropriation of web.2-based social media and the operationalization of digital media exert a significant direct influence on the dynamics of citizen collective intelligence. Likewise, the operationalization of digital media has a strong explanatory power on the adaptation and resistance of the social innovation system. These results corroborate most previous research (Barbosa, 2018; Bezerra, 2015; Francesca & Rossignoli, 2015; Mignenan, 2022a, 2022d; Satalkina & Steiner, 2020b; Vaska et al., 2021) and are in line with the theory of dynamic capacities (C. L. Wang & Ahmed, 2007; Zahra et al., 2006) mentioned in previous literature. Because of the main tendencies of the discussion which emerge, one can consider theoretical, methodological and managerial implications, underline the limits and suggest avenues.

First, thanks to its focus on the management of the digitalization of municipal services, our study complements most previous studies (Elia et al., 2021; Francesca & Rossignoli, 2015; Janati-Idrissi, 2020; McCarthy et al., 2021; Pablos, 2004; Purbasari, 2021; Satalkina & Steiner, 2020a) focused solely on the digital transformation of traditional and often large companies. However, our results demonstrate the interest for future research to focus on the creation, management of the use of digital platforms to identify, if it exerts a direct influence on the resilience of the social innovation system and, to allow finer recommendations to the actors and promoters of the social and solidarity economy. Then, our study highlights the role of citizen collective intelligence (CCI) in the study of the resilience of the municipal social innovation system. Indeed, while a few exploratory studies (Karimi & Walter, 2021; Loonam et al., 2020; Youssef & Hicham, 2022) have examined the role of digital transformation in revitalizing the relational capital of start-ups in the digital economy, no study on citizen collective intelligence and the resilience of the social innovation system has been conducted to date, to our knowledge. Our study demonstrates that digital transformation practices can help municipal development actors to be dynamic and resilient, thus validating some previous proposals and studies (Barbosa, 2018; Chaniasa et al., 2018; Elia et al., 2021). Our results thus confirm, as several studies have shown (Francesca & Rossignoli, 2015; Herman, 2022; Janati-Idrissi, 2020; Karimi & Walter, 2021) on digitized companies, that the digital transformation of the main functions of the company strengthens dynamic capacities and promotes collective intelligence including relational capital (Gréelle-Zařet, 2019b; Mignenan, 2022a, 2022d; Morel, Dupont, & Boudarel, 2019). This is why it would be relevant to take digital relational capital into account in future modelling of the social innovation system in the process that can lead to viability and sustainability. More specifically, our results show that digital transformation is effective in exerting a positive influence on citizen collective intelligence and the resilience of the innovation system. In other words, the digitization of municipal services allows the administration to mobilize citizens in the process of identifying, designing and implementing projects that pursue the objectives of organisational, behavioural, but also "innovative". However, the operationalization of digital platforms has little impact on the adaptation of the system. The same is true for the dynamics of collective intelligence. These results are not very similar to the opinion of several authors who consider that the use of digital platforms constitutes a factor of resilience (Barbosa, 2018; Khaliq, 2015; Loonam et al., 2020; Pablos, 2004; Purbasari, 2021). Our result, which is somewhat opposite, could be explained by the specificity of our sample made up of municipal councillors, whereas previous studies have focused on businesses. For example, having a dense communication platform is not enough for municipal services to adapt to the adversities of the ecosystem.

Finally, another implication of this study is related to organisational agility, the adoption and appropriation of web 2.0-based social media and their influence on the resilience of the social innovation system. Previous studies on fewer digitized town halls have found contradictory results, some showing a positive and significant impact of web media appropriation and organisational agility on system resilience (Francesca & Rossignoli, 2015; Herman, 2022; Janati-Idrissi, 2020), and others not (Barbosa, 2018; Bezerra, 2015; Chaniasa et al., 2018). However, these studies have exclusively focused on the adaptation aspect of system resilience. Our modelling allows a better understanding of this relationship through a distinction between resilience in terms of adaptation and resilience in terms of resistance. To our knowledge, distinguishing between the two is a significant contribution compared to previous studies. In addition, and therefore, we show that the dynamics of citizen collective intelligence more significantly influence the resistance aspect against the adaptation aspect. Our results indicate that future studies on the influence of citizen collective intelligence could benefit from a more precise measure of the resilience of social innovation.

This study has several implications for municipal actors and promoters of the digital economy, public

decision-makers and citizen organizations. It emphasizes the effectiveness of the digital transformation of municipal services in mobilizing citizen collective intelligence and the resilience of the social innovation system. This study can also help in the development of digital economic development programs in municipalities. In a way, this study responds positively to the question posed by several authors: does the digitization of services deserve to be integrated into the socio-economic development strategy? How can a digitized municipality mobilize the dynamic citizen capacity and make its social innovation resilient? In addition, our results show that municipalities that adopt social media based on Web 2.0, that operationalize digital media and that develop organisational agility, effectively mobilize citizen collective intelligence and, consequently, increase the resilience of their social innovation system.

From the point of view of public decision-makers, politicians and citizen organizations, our study can help formulate policies, programs and strategies for the promotion and development of social innovation projects. It also demonstrates that investments in digitalization projects can be prioritized. Our results encourage the design of new municipal capacity-building projects. More specifically, our results shed light on how a municipality can be effective through new communication technologies. As a result, public decision-makers could adapt their digital economic development program to strengthen the digital capacities of municipalities, a guarantee of citizen mobilization and the resilience of social innovation.

Our results will enable political and institutional leaders to further integrate and improve the practices of digital transformation of public services, borrowed from cutting-edge technologies and carrying the values of mobilization and strengthening of the social innovation system. Certain specificities of the municipalities in our sample, related to their size and their digital transformation process, constitute limitations, but also interesting future research perspectives. In this study, we have chosen to focus on municipalities that have digitized their services, because they are able to easily mobilize citizens. We are therefore unable to generalize our results and state that they apply to all municipalities. Therefore, some questions deserve to be explored in future research, particularly since previous models have not integrated dynamic human capital: can digital transformation practices allow digitized municipalities to boost their relationship capital? Would the appropriation-oriented posture of social media based on web 2.0, organisational agility, the operationalization of digital media be effective in making the social innovation system efficient? In the same vein, comparable questions arise for municipalities and citizen organizations in relation to the digital economy. Do they benefit, like traditional companies, from a strengthening of their social innovation system thanks to digitization practices? Are the appropriation of digital media and organisational agility effective for the development of municipal social innovation? Finally, a line of future research could focus on a comparison between municipality and NGO: are digitalisation management practices perceived in the same way by both entities?

Another limitation of our model relates to the focus on the dynamics of citizen collective intelligence to the detriment of other strategic resources of municipalities, including human capital, relational capital and structural capital (Divya & Suganthi, 2010; P. Wang & Rode, 2010). The integration of these strategic resources, more particularly human capital and structural capital, could, perhaps, make it possible to identify new influences of the management of digitalization on the dynamics of citizen collective intelligence and the resilience of the social innovation system. To go further, we think it would be interesting to study the influence that the management of digitization can have on the well-being of municipal staff, the dynamic capacities of citizen organizations, i.e. on the capacity of local associations, cooperatives and NGOs to be agile, to co-construct and change their behaviour in order to align themselves with common values favourable to socio-economic development (Barbosa, 2018; Gréselle-Zařet, 2019b; Khaliq, 2015; Loonam et al., 2020; Mignenan, 2022a, 2022d; Morel et al., 2019). In other words, how can a civic organization or a local NGO optimize social media, its digital platform, and its website? Finally, a more ambitious research perspective would consist of conducting new empirical studies in several other municipalities, to establish comparisons. We could then come closer to a consensus on the question of the influence of digitalization management on collective citizen intelligence and the resilience of the social innovation system.

5. Conclusion

This research highlights the importance of considering the management of the digitalization of services as an approach that involves three strategic axes: the first axis concerns the logic of the management of communication agility resulting in an increase in notoriety. The second axis concerns the ease of collective citizen mobilization around a common vision, missions, and values. The third axis refers to the strengthening of relations between actors around the issue and local issues. On the other hand, the effectiveness of the management of digitalization is manifested according to three main levers: the first lever concerns the management of equipment (technology) resulting in visible investments; the second lever concerns the

mobilization of people in a posture of synchronized collaboration (exchanges) and the third lever is carried by the management of the appropriation and optimization of social media based on web media and digital platforms.

Thus, thanks to the theoretical anchoring of dynamic capacities, the management of the digitization of municipal services has a positive contribution to citizen collective intelligence and to the resilience of the social innovation system. More specifically, the results demonstrate a positive influence on the management of social media appropriation, the management of the operationalization of digital platforms on the emergence of citizen collective intelligence and, indirectly, a strong explanatory power on the resilience of the social innovation system. In other words, the dynamics of citizen collective intelligence, when built by the management of effective digitalization, exert a positive influence on the resilience of the municipal social innovation system. On the other hand, the management of organisational agility appears less effective, but statistically significant for the adaptation of the social innovation system. Our results partially contrast with previous studies focused on traditional companies.

In terms of practical implications, our results will help improve strategies for citizen mobilization and revitalization of the municipal system of social innovation. In addition, the highlighting of the three levers (appropriation, agility, operationalization) of the effectiveness of the management of digitalization constitutes the relevant trajectory to allow the actors to reinvent the municipal development model. By emphasizing the mobilization of collective citizen intelligence and the resilience of the local social innovation system, this research thus opens a great trajectory for municipalities still lagging in engaging in the digitalization process in order to successfully carry out their social innovation project.

In short, our research makes a unique contribution to research on the effectiveness of the management of digitalization by proving the decisive role played by its constituents, in particular the management of the appropriation of social media, the management of the operationalization of media and the management of organisational agility in the process of the resilience of the social innovation system. Consequently, let no municipality fear for citizen mobilization and the resilience of its social innovation system. If it transforms its managerial practices by effectively introducing communication technologies, it does not have to worry about the result of social innovation. It could be among the municipalities with a strong capacity for citizen mobilization for social innovation projects.

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Data Sharing Statement

No additional data are available.

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Références

- Allouche, J., & Zerbib, R. (2020). La transformation digitale: enjeux et perspectives *Revue des Sciences de Gestion*, 1-2(301-302), 75-86. <https://doi.org/10.3917/rsg.300.0076>
- Bagozzi, R., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16, 74-94. <https://doi.org/10.1007/BF02723327>
- Barbosa, S. D. (2018). Building the resilience of entrepreneurial ecosystems. *Entreprendre & Innover*, 39(4), 10-19. <https://doi.org/10.3917/entin.039.0010>
- Bezerra, M. A. (2015). The impact of social and relational contexts on innovation transfer in foreign subsidiaries. *International Journal Learning and Intellectual Capital*, 1(1), 16-31. <https://doi.org/10.1504/IJLIC.2015.067823>
- Brulhart, F., Favoreu, C., & Loufrani-Fedida, S. (2019). L'influence de la compétence collective sur la performance d'équipe : analyse du rôle modérateur du leadership partagé et du coaching. *Management international*, 23(4), 150-164. <https://doi.org/10.7202/1066076ar>
- Chaniasa, S., Myersb, M. D., & Hessa, T. (2018). Digital transformation strategy making in pre-digital organizations: The case of a financial services provider. *Journal of Strategic Information Systems*, 2018, 1-17. <https://doi.org/10.1016/j.jsis.2018.11.003>
- Creswell, J. (2013). *Research Design: Qualitative, Quantitative, and Mixed Method Approaches*, 4th. Sage, 4(2013), 1-285.
- Divya, S., & Suganthi, L. (2010). Influence of transformational-servant leadership styles and justice perceptions on employee burnout: a moderated mediation model. *International Journal of Business Innovation and Research*, 15(1), 119-135. <https://doi.org/10.1504/IJBIR.2018.088475>
- Dudezert, A. (2018). *La transformation digitale des entreprises*. <https://doi.org/10.3917/dec.dudez.2018.01>
- Dudézert, A. (2018). La transformation digitale des entreprises. *La découverte*, 128 p. <https://doi.org/10.3917/dec.dudez.2018.01>
- Elia, G., Margherita, A., Ciavolino, E., & Moustaghfir, K. (2021). Digital Society Incubator: Combining Exponential Technology and Human Potential to Build Resilient Entrepreneurial Ecosystems. *Administrative Sciences*, 11(96), 1-16. <https://doi.org/10.3390/admsci11030096>
- Fornell, C., & Larcker, D. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
- Francesca, A. Z., & Rossignoli, R. C. (2015). The relational capital of the IT department: Measuring a key resource for creating strategic value. *Journal of Intellectual Capital*, 16(4), 835-859. <https://doi.org/10.1108/JIC-12-2014-0132>
- Gréselle-Zaïbet, O. (2019a). Mobiliser l'intelligence collective des équipes au travail: un levier d'innovation agile pour transformer durablement les organisations. *Innovation*, 58(2019), 23. <https://doi.org/10.3917/inno.058.0219>
- Gréselle-Zaïbet, O. (2019b). Mobiliser l'intelligence collective des équipes au travail : un levier d'innovation agile pour transformer durablement les organisations. *Innovation*, 1(58), 219-241. <https://doi.org/10.3917/inno.058.0219>
- Herman, E. (2022). The Interplay between Digital Entrepreneurship and Sustainable Development in the Context of the EU Digital Economy: A Multivariate Analysis. *mathematics*, 10(1682), 1-28. <https://doi.org/10.3390/math10101682>
- Janati-Idrissi, F. (2020). La transformation digitale des PME au Maroc : enjeux et perspectives. *Revue "Repères*

- et Perspectives Economiques*", 4(2), 198-211.
- Karimi, J., & Walter, Z. (2021). The Role of Entrepreneurial Agility in Digital Entrepreneurship and Creating Value in Response to Digital Disruption in the Newspaper Industry. *Sustainability*, 13(2741), 1-26. <https://doi.org/10.3390/su13052741>
- Khalique, M. (2015). Intellectual capital and performance of electrical and electronics SMEs in Malaysia. *International Journal Learning and Intellectual Capital*, 12(3), 251-269. <https://doi.org/10.1504/IJLIC.2015.070166>
- Leimeister, J. M. (2010). Collective Intelligence. *Business & Information Systems Engineering*, 4(2010), 245-248. <https://doi.org/10.1007/s12599-010-0114-8>
- Levy, P. (2015). Collective Intelligence for Educators. *Educational Philosophy and Theory*, 47(8), 749-754. <https://doi.org/10.1080/00131857.2015.1053734>
- L'évy, P. (2003). Le jeu de l'intelligence collective. *Sociétés*, 1(79), 105-122. <https://doi.org/10.3917/soc.079.0105>
- Loonam, J., Zwiendelaar, J., Kumar, V., & Booth, C. (2020). Cyber-Resiliency for Digital Enterprises: A Strategic Leadership Perspective. *IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT*, 2020, 1-14.
- Maji, S. G., & Goswami, M. (2017). Intellectual capital and firm performance in India: a comparative study between original and modified value added intellectual coefficient model *International Journal Learning and Intellectual Capital*, 14(1), 76-89. <https://doi.org/10.1504/IJLIC.2017.080645>
- Malone, T., & Bernstein, M. (2015). Handbook of Collective Intelligence. *Massachusetts Institute of Technology*, 2015, 1-230.
- McCarthy, P., Sammon, D., & Alhassan, I. (2021). Digital Transformation Leadership Characteristics: A Literature Analysis. *Journal of Decision Systems*, 2021, 1-23. <https://doi.org/10.1080/12460125.2021.1908934>
- Mignenan, V. (2021a). Chapitre 2 Proposition d'un modèle de succès de la transformation digitale de l'entreprise à l'ère imprévisible dans Ouvrage collectif : « Transformation Digitale : Quels défis pour quels enjeux ? ». *Revue Française de l'Économie et de Gestion*(2021), 15-45.
- Mignenan, V. (2021b). Collective Intelligence and Entrepreneurial Resilience in the Context of Covid-19. *International Business Research*, 14(9), 1-20. <https://doi.org/10.5539/ibr.v14n9p1>
- Mignenan, V. (2021c). Collective Intelligence and Entrepreneurial Resilience in the Context of Covid-19. *International Business Research*, 14(9), 1-20. <https://doi.org/10.5539/ibr.v14n9p1>
- Mignenan, V. (2021d). Collective Intelligence and University Entrepreneurial Performance: An Exploratory Study Among Teacher Researchers and Students from Chadian Universities *Science Journal of Business and Management*, 9(2), 103-118. <https://doi.org/10.11648/j.sjbm.20210902.17>
- Mignenan, V. (2022a). Influence of Digital Transformation on Relational Capital and Digital Entrepreneurial Resilience. *International Business Research*, 15(10), 1-16. <https://doi.org/10.5539/ibr.v15n10p16>
- Mignenan, V. (2022b). Intelligence collective et résilience entrepreneuriale à l'ère de la Covid-19. *Revue Management & Innovation*, 1(5), 93-116. <https://doi.org/10.3917/rmi.205.0093>
- Mignenan, V. (2022c). Intelligence collective et résilience entrepreneuriale à l'ère de la Covid-19. *Revue Management & Innovation* 1(5), 93-116. <https://doi.org/10.3917/rmi.205.0093>
- Mignenan, V. (2022d). Proposition d'un modèle de succès de la transformation digitale de l'entreprise à l'ère imprévisible dans "Transformation Digitale : Quels défis pour quels enjeux". *Revue française d'économie et de gestion*(2022), 15-45.
- Morel, L., Dupont, L., & Boudarel, M.-R. (2019). Espace d'innovation : de nouveaux lieux pour l'intelligence collective ? Innovation spaces: new places for collective intelligence? *Laboratoire ERPI*(2019), 1-13. <https://doi.org/10.1002/9781119557883.ch5>
- Mulgan, G. (2018). How Collective intelligence can change our world. *Princeton University Press, New Jersey, United States of America*, 283 p.
- Pablos, P. O. D. (2004). The importance of relational capital in service industry: the case of the Spanish banking sector *International Journal Learning and Intellectual Capital*, 1(4), 431-441. <https://doi.org/10.1504/IJLIC.2004.005993>

- Purbasari, R. (2021). Digital Entrepreneurship in Pandemic Covid 19 Era: The Digital Entrepreneurial Ecosystem Framework. *Review of Integrative Business and Economics Research.*, 10(1), 114-135.
- Russell, R., & Stone, G. (2002). A review of servant leadership attributes: developing a practical model. *Leadership & Organization Development Journal*, 23(3), 145-157. <https://doi.org/10.1108/01437730210424>
- Satalkina, L., & Steiner, G. (2020a). Digital Entrepreneurship and its Role in Innovation Systems: A Systematic Literature Review as a Basis for Future Research Avenues for Sustainable Transitions. *Sustainability*, 12(2764), 1-27. <https://doi.org/10.3390/su12072764>
- Satalkina, L., & Steiner, G. (2020b). Digital Entrepreneurship: A Theory-Based Systematization of Core Performance Indicators. *Sustainability*, 12(4018), 1-22. <https://doi.org/10.3390/su12104018>
- Saur-Amaral, I. (2010). Innovation intelligence: crowdsourcing in a social network *Int. J. Technology Intelligence and Planning.*, 6(3), 288-299. <https://doi.org/10.1504/IJTIP.2010.035780>
- Sendjaya, S., Sarros, J., & Santora, J. (2008). Defining and Measuring Servant Leadership Behaviour in Organizations. *Journal of management studies*, 45(2), 402-424. <https://doi.org/10.1111/j.1467-6486.2007.00761.x>
- Taqi, A., Moustakim, O., & Bouzem, M. (2021). Les avantages et les inconvénients des progiciels de gestion intégré (ERP) à l'ère de la transformation digitale : enquête auprès des entreprises au maroc. *Revue D'Etudes en Management et Finance D'Organisation*, 13, 1-17.
- Ünay, F. G., & Zehir, C. (2012). Innovation intelligence and entrepreneurship in the fashion industry. *Procedia - Social and Behavioral Sciences*, 41(2012), 315-321. <https://doi.org/10.1016/j.sbspro.2012.04.036>
- Valencia, E. S., Roberto, V. B., & Garcia, Z. Á. (2015). Collective intelligence: analysis and modelling. *Kybernetes*, 44(6/7), 1122-1133. <https://doi.org/10.1108/K-11-2014-0245>
- Vaska, S., Massaro, M., Bagarotto, E. M., & Mas, F. D. (2021). The Digital Transformation of Business Model Innovation: A Structured Literature Review. *Frontiers in Psychology*, 11(2021), 1-18. <https://doi.org/10.3389/fpsyg.2020.539363>
- Wang, C. L., & Ahmed, P. K. (2007). Dynamic capabilities: A review and research agenda. *International Journal of Management Reviews*, 9(1), 31-51. <https://doi.org/10.1111/j.1468-2370.2007.00201.x>
- Wang, P., & Rode, J. (2010). Transformational leadership and follower creativity: the moderating effects of identification with leader and organisational climate. *Human Relations*, 63(8), 1105-1128. <https://doi.org/10.1177/0018726709354132>
- Woolley, A. W., Aggarwal, I., & Malone, T. (2015). Collective Intelligence and Group Performance. *Psychological science*, 6(24), 420-424. <https://doi.org/10.1177/0963721415599543>
- Youssef, E. Y., & Hicham, B. (2022). La transformation digitale au service de la résilience bancaire à l'ère du Covid 19. *Revue Internationale du Chercheur*, 12(2764), 1-27.
- Zahra, S. A., Sapienza, H. J., & Davidsson, P. (2006). Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda *Journal of Management Studies*, 43(4), 917-955. <https://doi.org/10.1111/j.1467-6486.2006.00616.x>
- Zařet, G. O. (2007). VERS L'INTELLIGENCE COLLECTIVE DES ÉQUIPES DE TRAVAIL: UNE ÉTUDE DE CAS. *management & avenir*, 4(14), 41-59. <https://doi.org/10.3917/mav.014.0041>