

Digital transformation and entrepreneurial resilience in times of crisis

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Abstract

The economic and health crisis that the world has recently experienced has had a deleterious impact on the global economy. Faced with this volatile environment, SMEs must more than ever strengthen their resilience and adaptability. However, the impact of digital transformation on the organizational resilience of SMEs remains little studied.

The objective of this article is therefore first to explain how digital transformation can improve organizational resilience in times of crisis. Second, it highlights the catalytic role that entrepreneurial resilience plays in this relationship. To conduct our research, we adopted a qualified exploratory approach based on case studies.

Our results highlight the positive impact of digital transformation on organizational resilience in times of crisis. In fact, digital transformation increases organizational resilience by affecting customer experience, business models and operational processes. Furthermore, the results of this study suggest that entrepreneurial resilience can play a leading role in increasing the impact of digital transformation on organizational resilience during times of crisis.

Keyword: Digital transformation, organizational resilience, entrepreneurial resilience, SMEs.

Introduction

The world is currently at the dawn of a new era of technological and industrial progress (Xu et al., 2021). Business models are about to be transformed by technological advances such as connected objects, artificial intelligence, Cloud computing and 3D printing, these innovations are profoundly changing the way companies create value and opening up new sources of value creation (Paola & Gebauer, 2020). From now on, companies are called upon more than ever to review their business model in order to ensure their survival.

Some companies have been able to deal with new technologies, others are still waiting and not even realizing the challenges (Ritter & Pedersen, 2020). This may be due to a lack of resources, particularly financial resources and the skills necessary to get used to this new situation. Thus, digital transformation (DT) has become omnipresent and affects all functions of the company (Ranta et al., 2021).

To deal with the emergency, several SMEs have dared to move from the stage of strategic reflection towards action. The latter have implemented short-term technological solutions, as so many palliatives (Xu et al., 2021). Indeed, today, technical solutions are very accessible.

On another note, the crisis triggered by the Covid-19 pandemic has not only represented a shock for small and large businesses, it has modified the competitive landscape and the business environment in general (Seetharaman, 2020). The values and habits of the entire world population have changed, modifying the products and services demanded as well as the way of working (Belghitar et al., 2022). Some businesses did not survive the crisis, others will have to adapt to the new landscape (Abed, 2022). Digital technologies are expected to play an essential role in adapting to the new context and, therefore, for the survival of businesses, especially small and medium-sized enterprises (Priyono et al., 2020).

Thus, during the health crisis, digital transformation has become the only alternative to continue operating during confinements, and a crucial issue for the survival of companies beyond the Covid-19 crisis (Amankwah-Amoah et al., 2021). If the organizations, which had previously undertaken this approach, were generally able to limit the damage at the height of the crisis, those, which were not ready, had faced delicate situations. Since then, companies have tried to accelerate their digital transformation, or even reinvent their economic model for the most impacted sectors. Today, even in a post-Covid 19 context, digital transformation is urgently needed (Ngoc-Vinh et al., 2022).

SMEs are particularly fragile in the face of a crisis, due to the limited availability of financial, organizational and human resources (Demyen, 2022). Faced with this turbulent environment, SMEs are more than ever called upon to develop their resilience and their capacity to adapt. Existing literature suggests that businesses are radically changing the way they work under the influence of digital technologies (Zurayk et al., 2022). Along the same lines, several studies addressing this subject suggest the importance of digitalization in the process of improving the resilience of SMEs (Miceli et al., 2021). Existing data also highlight that the adoption of digital technologies increases the resilience of businesses during disruptive events (Autio et al., 2021).

Despite the importance given to digital transformation in the context of SMEs, few studies have focused on the impact of this transformation on the organizational resilience of SMEs, particularly in the Tunisian context. Consequently, it is important to understand how digital transformation can affect the organizational resilience of SMEs. Thus, to fill this research need we will try to answer the following question: How does digital transformation promote the resilience of SMEs in times of crisis? And what role can entrepreneurial resilience play in this relationship?

To respond to this problem, we will structure our research work as follows: The first part will be devoted to the literature review to clearly understand the definition of key concepts and the state of play of DT in Tunisia. The second part will be reserved for literature discussing the relationship between digital transformation and organizational resilience and which will serve as a theoretical framework for our qualitative exploration of this relationship. The third part will present the main hypotheses, on which our exploration and the methodological approach adopted are based. Finally, the fourth part will be reserved for the discussion of the results and the conclusion.

1. Literature review

Before responding to the objective of our research, we will first begin with a literature review of the central concepts of our research. The objective is to clearly define the contours of each concept.

Digital transformation (DT)

Etymologically the adjective digital draws its roots from the Latin *digitalis*, "which has the thickness of a finger", itself derived from *digits*, "finger" (Torrent-Sellens, 2023). In English, *digit* means "number", while *digital* means "which uses numbers" (Owoseni, 2023). The two terms also have the same Latin origins. For the French language, *Digital* refers to what relates to the fingers, which belongs to or is related to the fingers. On the other hand, the word *numerical* refers to the number, which is done using numbers, which is evaluated in number (Owoseni, 2023).

Looking through the literature on DT, we see that there is no unanimous definition. The concept has been treated from different angles, which obviously gave rise to several definitions. This notion reflects a reality that is not clear enough in the eyes of academicians and professionals. Indeed, the latter point out the impossibility of providing a clear and concise definition of the concept of DT (Gong & Ribiere, 2021).

To define DT, some start from the impact that DT produces on businesses and organizations because the different components are interconnected. Others prefer to assess digital transformation based on the ability to integrate as many new technologies as possible into a work organization adapted to boost business and ensure business continuity (Gong & Ribiere, 2021). According to Kraus et al. (2021), DT results in the integration and intensive use of digital technologies in all the different activities of an organization. This transformation will have a direct effect on corporate culture, customer relations, operational processes and the business model. In the same extension Chapco, Stolterman and Fors (2004) define digital transformation as the changes brought about by digital technologies in all aspects of human life (Amghar et al., 2023).

Taking a functional approach, Terrar (2015) adds that digital transformation can be presented as the process of moving an organization from a traditional approach to new ways of working and thinking using digital technologies, social, mobile and emerging (Kouřil, 2022).

It involves a change in leadership, thinking differently, driving innovation and new business models, incorporating the digitalization of assets and increased use of technology to improve the experience of employees, customers, suppliers, partners and stakeholders of your organization (Kouřil, 2022).

Recent changes in the business world, notably the massive integration of digitalization into various business processes, have opened up numerous opportunities for a new generation of entrepreneurs in different sectors of activity (Schiuma et al., 2022). Digital entrepreneurship has thus emerged. The latter embodies a new form of entrepreneurship marked by the fundamental use of the Internet, Information, and Communication Technologies in already existing businesses or for the creation of new startups (Paul et al., 2023).

Referring to the literature, one of the reasons, which explains this enthusiasm towards the digital transformation of most of the company's functions (main functions and support functions), is the search for improving organizational resilience, especially in a marked context by uncertainty and the succession of crises (Autio et al., 2021). Therefore, we will try, in the following section, to clarify the notion of organizational resilience.

Organizational resilience

According to the Dictionary of the French Academy (2021) the word resilience comes from the English "resilience" which itself comes from the Latin "resiliens" and which has the meaning: jump or backward movement, withdraw, or even to liberate oneself (Smith et al., 2022). Alongside this French definition, the English language has added the notion of "rebound" and which gives a new dimension to this term, that of stepping back to jump better (Liu & Song, 2020).

Initially, the concept of resilience was used in the field of physics and medicine. Over time, the concept of resilience has seen its use extend to other fields. Initially, the concept invaded the field of Psychology in the 1950s with the first work of Emmy Werner and her publications in 1971 (Schechter & Halevi, 2023). Since then, the literature in Social Sciences and Management has seen a profusion of studies appear linked to the theme of resilience (Vella & Pai, 2019).

Sometimes creating confusion, resilience differs from other related concepts including flexibility and agility; Flexibility can be defined as the ability to quickly adapt to environmental changes (Gitelman et al., 2019), while agility is the ability to quickly recognize opportunities and change direction to avoid collisions (Kazancoglu et al., 2022). In addition, resilience also includes an aspect of adaptation, which allows companies to emerge from a crisis stronger than before (Trump & Linkov, 2020). This distinguishes resilience from robustness, which is the ability of a system to maintain its functions despite disturbances (Miroudot, 2020).

In the theoretical literature, there are many independent, ambiguous and partially inconsistent definitions of the concept organizational resilience. According to Goldschmidt et al. (2019) this can be expressed by the ability of a company to anticipate, resist and adapt to a disruption and to recover directly afterwards by returning as much as possible to the original state. According to Bell (2019), the notion of anticipation is a characteristic specific to the concept of organizational resilience.

In the same vein, Munoz et al. (2022) defined organizational resilience as the ability of the organization to absorb shock and preserve functioning despite the presence of adversity and the capacity to bounce back and develop after events and difficult experiences.

From another perspective, Benyacoub & Abdellah (2021) add that the company must activate its organizational learning, by developing routines and learning from past crises.

In an attempt to conceptualize the notion of organizational resilience, three approaches can be identified: those that view resilience as an outcome, those that treat resilience as a process, and those that emphasize resilience capacities (Duchek, 2020).

For a better understanding of the phenomenon of organizational resilience, Duchek (2020) combined the two approaches to resilience (the process approach and the capabilities approach). That is, it drew on the perspective of “resilience as a process” while combining it with the idea of resilience as a unique blend of organizational capabilities and routines (Duchek, 2020).

Recently, this concept of resilience is starting to be of great interest to small and medium-sized enterprises (SMEs). Although the latter are often considered the central element of the economy in many countries, they remain vulnerable in times of crisis and face various financial, technological and human problems and constraints (Huang & Farboudi Jahromi, 2021).

Despite the insufficiency of studies addressing the resilience of SMEs, some SMEs have demonstrated resistance and resilience in the face of crises, notably during the financial crisis, which shook the globe in 2008, and recently the health and economic crisis due to the Covid-19 pandemic (Acciarini et al., 2021).

Definition of the concept of crisis

The crisis constitutes an ambiguous and controversial concept (Gilbert, 2019). Among classical economists, the crisis does not occur thanks to the self-regulating mechanisms of the markets (Hansen, 2019). In this sense, Say, through the "law of outlets", strives to demonstrate the impossibility of the crisis occurring since "products are exchanged for products". In the 1930s, the validation of the concept of “effective demand” stated by the economist Keynes called into question the law of outlets and the self-regulating mechanisms of the market, leaving the possibility of the emergence of economic crises with a strong socio-economic impact (Mallya & D’Silva, 2020).

A crisis is an event with low probability but which has a considerable impact on the viability of the system. The causes, effects, and solutions to a crisis are often ambiguous, and it is widely accepted that decisions must be made quickly to address them (Delardas et al., 2022). These adverse events are caused by factors external to the system, unexpected and requiring immediate action.

According to Smart & Vertinsky (1984), crisis can prevent the normal functioning of the company and therefore threaten the achievement of long- and short-term objectives (Guo et al., 2020). Crisis is often defined as a negative phenomenon and in the context of organizations, the nature of the crisis negatively and dangerously affects the life cycle of a company, which can push the company to strengthen to deal with it (Franc-Dąbrowska & Drejerska, 2022).

Indeed, traditional risk management practices were insufficient to ensure protection against the crises that occurred. One of the main characteristics of crises that societies face is that they are triggered by improbable events whose causes are poorly understood. Many crises arise from the coincidence of events in space and time, and the consequences of these adverse events are difficult to anticipate and predict (Van Der Vegt et al., 2015). Previous research has focused on the consequences of crises (of different types) that the business world has experienced throughout the world natural disasters (earthquake, tsunami), wars, political riots, financial crises (Subprimes).

The health and economic crisis, caused by Covid-19, which has hit the global economy head-on, is a telling example. According to Bernanke & Yellen (2020), the nature of this crisis was not anticipated and economists underestimated the impact. It was the most crises since the Great Depression (1873-1896). It is also suggested that the degree of impact on the business varies depending on the nature and context of the business. Therefore, the decision maker should try to identify and understand the scale and nature of unforeseen events in all aspects of their business in order to develop a strategy to manage the crisis (Ritter & Pedersen, 2020).

Today, to deal with disruptive events that cannot be adequately addressed with traditional risk management tools, a significant number of academics and specialists have shifted their focus to identification and mitigation risks, towards the search for strengthening the organizational resilience of companies (Settembre- Blundo et al., 2021). According to a large number of researchers, organizational resilience allows the company to react adequately to unforeseen events (Mokline & Ben Abdallah, 2021; Duchek, 2020; Mitsakis, 2020).

2. Research hypotheses and methodological approach

In order to meet our research objective, we will test hypotheses formulated from the literature review. In addition, in this section we will describe the methodological approach that we adopted to carry out our research.

Research hypotheses

The literature shows that DT presents enormous advantages for companies in general and SMEs in particular. In this context, Barrett (2015) argues that digital technologies are paving the way for new forms of benefit that are increasingly service-oriented. Digital technologies make it possible to move from the simple sale of physical products to the provision of services. Indeed, companies now integrate associated services as an essential component of their value proposition, with the aim of meeting customer needs by offering them innovative solutions (Almeida et al., 2020).

In the same vein, thanks to digital technologies, communication with customers (whether existing or potential) is improved, which allows, on the one hand, to better understand their requirements and, on the other hand, to develop offers personalized and new products adapted to their specific needs (Barnes & Antoniou, 2012). Along the same lines, communication with customers is improved and personalized with an increasing number of social platforms, which make it easier and more direct to reach those (Fernandez-Vidal et al., 2022).

For its part, Fernandez-Vidal et al. (2022) asserts that the rise of analytical technologies has allowed companies to better understand the behavior and needs of their customers. In other words, improving customer knowledge allows companies to offer a variety of offers adapted to different segments of this customer base (Chaithanapat et al., 2022).

Digital technologies have also been used to implement changes in distribution and sales channels. This is through the creation of new customer-facing channels, for example using social media, to reach and interact with consumers (Hese, 2022). As an illustration, the corona-virus pandemic has led to changes in both customer behavior and supply chains (Rutitis et al., 2022). Indeed, the intensification of e-commerce was a strong response from small businesses during the economic crisis caused by the Covid-19 pandemic (Al-maitah et al., 2021).

At the level of internal processes, the adoption of digital technologies by companies leads to a reduction in physical resources in favor of an increase in intellectual resources (Urbinati et al., 2020).

Additionally, digital technologies enable the digitalization of work processes, making it easier for employees to collaborate and share knowledge through virtual platforms, which ultimately results in lower costs (while improving organizational learning within companies (Mitchell, 2023).

At the external level, digital transformation allows companies to adapt to changes in ecosystems, in particular thanks to the emergence of new platforms that facilitate interactions between partners and competitors (Chaithanapat et al., 2022). Likewise, digital technologies enable competitors and suppliers to cooperate, thus promoting the emergence of strategic partnerships and innovative collaborations (Fernandez-Vidal et al., 2022). For Rutitis et al. (2022), digital technologies can help value chain actors work more closely together by promoting collaboration, coordination and communication between different actors.

In recent studies, like that carried out by Corvello et al. (2022) in Italy, the integration of new technologies in SMEs has favored the anti-fragility of the companies studied to face the recent Covid-19 crisis and adapt to the new requirements imposed (Corvello et al., 2022). Along the same lines, the He et al. (2023) study confirms the crucial role of digital investments in providing organizations with immediate and accessible tools and resources to increase their organizational resilience (He et al., 2023).

To meet the objective of this article, we based ourselves on the contributions of the literature review developed previously and on the contribution of Weick & Sutcliffe (2011) in terms of explaining the notion of organizational resilience. The latter define organizational resilience as the interweaving of three dimensions, namely: absorption capacity, renewal and adaptation capacity, and appropriation capacity.

In light of the contributions above, we can assume that digital transformation through its action on the customer experience, operational processes (internal and external) and the business model (Siachou et al., 2021), would affect positively the resilience of businesses, particularly among SMEs in times of crisis. This influence would act on the three dimensions of organizational resilience mentioned above. Based on this assumption, we can make the following hypotheses, which we will try to verify:

H1: TD promotes organizational resilience in times of crisis.

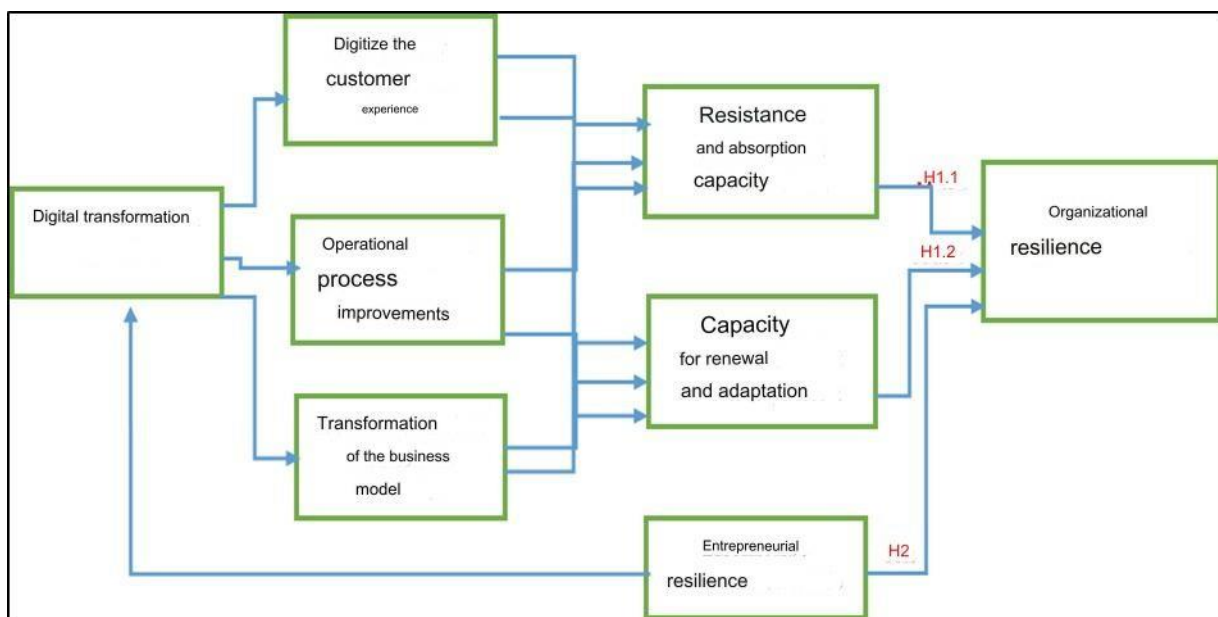
For reasons of clarification, this first hypothesis can be broken down into two sub- hypotheses:

- **H1.1:** *By acting on the customer experience, operational processes and business model, TD would promote organizational resilience by improving its capacity to resist and absorb shocks.*
- **H1.2:** *By acting on the customer experience, operational processes and business model, TD would promote organizational resilience by improving its capacity for renewal and adaptation. .*

H2: Entrepreneurial resilience would increase the impact of TD on organizational resilience.

The schematization of these three hypotheses would lead to the conceptual model adapted below. This model relates the different aspects of TD (explanatory variables) and organizational resilience through its different manifestations (explained variables). In addition, this model highlights the supposed influence of entrepreneurial resilience (moderated variable) on the relationship between DT and organizational resilience.

Figure 1: Theoretical model of the impact of digital transformation on resilience organizational



Source: Adapted from Siachou et al. (2021)

Methodological approach

To meet the objective of this article, we placed our research in a positivist posture by adopting the hypothetic-deductive mode of reasoning. The objective of this approach consists of developing one or more hypotheses and then confronting them with reality. The aim is then to make a judgment on the relevance and validity of the hypotheses initially formulated. Although qualitative methods are dominant in constructivist and interpretative perspectives and quantitative methods in positivist positions (in order to test underlying hypotheses), we have chosen to adopt a qualitative method to verify the hypotheses. Indeed, qualitative approaches can, however, have purposes other than the construction of theories. According to Yin (2014), the case study is a relevant approach for testing, refining or extending theories, including when it involves the study of a single case or unique case.

Within the framework of the positivist paradigm, Yin (2014) believes that the single case can be assimilated to an experiment (Yin, 2014). Also, George (2019) specifies that this approaches used when we aim to test an existing theory, or even several, on a critical case, whether to confirm it, question it or complete it (George, 2019).

To do this, we adopted the qualitative method based on the study of two longitudinal cases with explanatory purposes for a better understanding of the effect of digital transformation on the resilience of SMEs in times of crisis and consequently, to be able to validate our research hypotheses. This method promotes back and forth between the field and the literature used in this research. We also adopted a biographical approach, which requires life stories to better understand and measure such a central element of our research, namely entrepreneurial resilience, also to be able to measure the degree of resilience of our study subjects longitudinally.

In a spirit of “theoretical sampling” (Farrugia, 2019), we have selected two entrepreneurs likely to provide us with insight, which will clearly highlight the relationships between the concept of digital transformation and the resilience of SMEs. An entrepreneur network of which one of our case study subject entrepreneurs is a member facilitated the selection of these two companies serving as case studies for our research. The choice of these two companies was motivated by the atypical paths of the two entrepreneurs in their entrepreneurial adventure and also motivated by the responses provided in crisis situations, in particular their use of digital solutions to deal with the recent economic crisis which shook the world entire following the Covid-19 pandemic.

Concretely, our qualitative study was based on semi-structured interviews. We opted for the semi-structured interview since it allows us to focus the speech of the interviewees around different aspects of the objective of our research. Thus, to achieve the objectives assigned to our research, we conducted a series of interviews spaced over time in order to collect a life story punctuated by the main difficult events likely to threaten the survival of the company (McMullin, 2023). The life story covers a period going from 2013 (year of creation) until January 2023. In fact, the semi-structured interviews are made up of different themes that were deemed relevant by the literature review and which gave us shed light on the possible impact of digital transformation on the resilience of SMEs. These interviews were carried out either at the workplace or in a friendly place (such as a café or restaurant), on the date and times chosen by the person interviewed.

At the very beginning of the series of interviews, we quickly presented the framework of our research, its objective as well as the estimated time of each interview. The table below summarizes the main characteristics of the data collection methods:

Table 1: Characteristics of data collection methods

	Entrepreneur A	Entrepreneur B
Diploma	Engineer	Engineer
Current age	37 ans	43 ans
Duration of entrepreneurial experience	9 ans	18 ans
Field of activity	Service	Service and catering
Number of employees	4	23

Our interview guide was designed following the funnel principle, starting first with generalities and then focusing on questions relating to our research objective. The interview guide is composed of standardized questions with closed and open questions in order to be able to structure the discussion and delve deeper into the questions, to collect the maximum amount of information. It was administered directly (face-to-face) with each entrepreneur in order to collect as much information as possible. To finalize and validate it, the interview guide was subject to several rereading, firstly by our research team and then secondly by our peers in our research laboratory.

The interviews were recorded and then transcribed. The information collected is formatted in “verbatim” writing which represents the raw data of our study. The transcription is done manually to faithfully reproduce the words of the interviewed subjects (McMullin, 2023). Thus, for greater fidelity and clarity, the transcriptions were also subject to successive rereading’s, on our part and that of the people interviewed. In addition, involving the interviewees in rereading the transcriptions helps reduce the bias of erroneous interpretations (McMullin, 2023).

To extract as much information as possible, we have established a chronology of the main disruptive events, which have punctuated and marked the company's life course, including the latest economic crisis (due to Covid-19). This approach makes it possible to describe the context and consequences of each event as well as the responses put in place to deal with the negative consequences. This way of proceeding is in line with the logic recommended by Mao et al. (2020) for research on longitudinal processes. Indeed, Neale (2021) suggests that in this type of study, the quality of the study is not judged by the number of cases studied but rather by the number of events identified in the entrepreneur's life story. For reasons of anonymity, we have designated by letter “A” the first entrepreneur and the second entrepreneur by letter “B”.

The interview guide included four sections: the first section concerns the characteristics of the SME and its owner (the profile of the entrepreneur, the number of employees, the year of foundation, the sector of activity, etc.). Second section is devoted to the story of the main difficult events (including the recent crisis) that our subjects had gone through during their entrepreneurial adventure in order to be able to evaluate their degree of resilience (psychological and entrepreneurial resilience). While the third section focuses on DT in terms of the degree of integration and maturity in the organization, in order to extract the challenges and contingency variables to this transformation during the pandemic. The fourth section is devoted to evaluating the impact of DT, in times of crisis, on the main functions of the company. In this section, more emphasis was placed on DT's impact on customer experience, operational processes and the business model. Finally, the fourth section concerns the evaluation of the degree of organizational resilience, which followed the DT experienced by the different organizations subject to our research.

3. Presentation and discussion of results

In this part, we will first present, in an individual manner, the results of our research, in terms of professional career paths, the impact of digital transformation on organizational resilience, the role played by entrepreneurial resilience, to be able to confirm or refute our initial hypotheses. Then we will then discuss the results obtained in relation to the existing literature (previous studies).

Presentation of the results

Summary of the professional careers of the two entrepreneurs

• Entrepreneur "A"

After excellent results throughout his school career, our entrepreneur "A" followed advanced studies in computer science at a private Tunisian university (BAC+5). Freshly graduated, our subject held positions of responsibility in national and international companies, established in Tunisia, before setting up on his own account. After 3 years, our subject changed the host company twice in a row. This instability was an opportunity for him to enrich his professional career. After these 3 years of employment in large service companies, our subject decided to create his first company. The company created operated in the field of IT consulting established in Tunis. This entrepreneurial adventure was not crowned with success. After this entrepreneurial "misadventure", our subject created a new IT training, certification and consulting company. The subject was 37 years old at the time of the second creation. Today, the company is doing well with an ambition to expand its business to other cities in particular.

• Entrepreneur "B"

Our subject "B" was able to obtain his Baccalaureate and join a computer engineering school. Choosing the school was an opportunity for him to sharpen his computer skills. Initially, IT for him was a simple passion, over time, this passion transformed into a business opportunity and therefore he made the decision to monetize his skills and expertise by creating his first website development and hosting company.

From the first, he signed a contract with a large client that allowed him to gain confidence and notoriety and in a short time; he saw his client portfolio expand to other clients.

Tasted with the success of his first business, our subject decided to begin a new entrepreneurial adventure by investing in the catering field. Today, his new business has three restaurants.

Impact of digital transformation on organizational resilience

• The case of entrepreneur “A”

Our entrepreneur “A” has started the process of digital transformation of his company little by little since the creation of his own company. Although the area in which his company operates is not very capital intensive, the first years were difficult for the company in terms of controlling costs, especially salary costs. Employees deemed to be overstaffed and entrusted with routine and rudimentary tasks. In addition to the problem of overstaffing, the company had a high turnover rate, especially among the population of qualified employees who already had salary experience elsewhere.

“Compared to our competitors, we were overstaffed. We suffered a lot from the high turnover rate in the first years. As a result, we were obliged each time to train the new recruits, which cost us a lot in terms of money and integration time. To remedy this situation, we preferred to recruit newly qualified employees. The latter are not very tempted by the idea of changing the company.”

Faced with this situation, our entrepreneur “A” decided to automate and digitize all tasks likely to be automated, particularly routine tasks. Thus, the main processes that have been digitalized are: human resources management, billing and accounting service, commercial communication management (marketing) and customer relationship management. This digitalization has allowed the company to gain in efficiency, especially in terms of saving processing time. As for human resources, appropriation of the new tools must have taken time. However, the workforce has fallen by a third and employees have gained skills and flexibility (job rotation). The digital solutions, which have proven themselves at the training center established in Rabat, have been duplicated at the new training center established in Tunis. The duplication of these digital solutions has made it possible to achieve economies of scale in the various processes.

“To automate our processes, I was required to equip the company with software in the areas of human resources management, billing and accounting services, and customer relationship management. For the communication and marketing aspect, we have modernized our website by integrating more features such as the choice of training, its duration, online payment, etc. In addition, our website has become our advertising medium par excellence with very good SEO on search engines. For customer prospecting we use targeting options offered by social networks (mainly LinkedIn and Facebook) and marketing tracking tools and technologies for the processing and analysis of customer data and for improving the performance of our marketing partners.” The company of our study subject “A” was no exception.

Due to confinement, his business had to close its doors for 7 months in a row. Although all of its employees worked remotely, thanks to the efforts made to digitalize processes before the crisis, sales of training and IT advice were not there. Clients did not want to go to the center for training for fear of contamination. Faced with this situation and with the preponderance of fixed charges, our study subject had to draw on his savings (financial slacks) to cover fixed charges and to think about solutions to resume his activity as quickly as possible.

To overcome this crisis, our entrepreneur had to review his business plan (moving from face-to-face training to remote training). To do this, he did not hesitate to invest in online training tools, by purchasing “turnkey” digital solutions from a German company that is a pioneer in this field. The cost of the investment was around 135000 TD. These digital solutions made it possible to quickly resume training activity and stay one-step ahead of its competitors. On the customer side, these digital solutions have greatly improved the customer experience and enabled the company to expand its customer portfolio by erasing all geographical constraints. Today, thanks to its digital solutions, its clientele extends throughout Tunisia and the company has been able to penetrate the French-speaking market in Africa and Europe.

“The first months of confinement were too difficult for me. We were not well prepared for such an event. Although the company's employees were all able to work from home, activity was at half-mast due to the constraints imposed by the authorities at the time. We did not have the possibility of providing quality training remotely despite the solutions offered by platforms such as Zoom and Teams. Faced with this situation, I was obliged to invest the sum of 135000 TD in order to equip all my training rooms with a complete online training system. These solutions allowed me to maintain my activity remotely and expand my customer portfolio in Tunisia but abroad. Today, we are trying to experiment with the new Metaverse technology in terms of training.”

• **The case of entrepreneur “B”**

As a self-taught entrepreneur, our entrepreneur has managed to thrive in the health and economic crisis caused by Covid-19. Indeed, its first company operating in the field of internet hosting, communication and IT solutions saw its turnover increase by around 30% during the crisis. This increase is explained by the acceleration of the digital transformation initiated by a large majority of companies in Tunisia with a view to maintaining their “online” activity. At the level of its first company, all processes are digitalized from customer prospecting to after-sales service (support service). With qualified staff, the company was able to adapt to new requirements (especially with the appearance of new needs that emerged during the Covid-19 crisis) and withstand the shock.

“For our hosting and communication activity, the Covid-19 crisis worked in our favor. There was so much demand for our different services. It was truly a godsend for us. Our turnover increased by 40% across all services. To meet this additional demand, we had to recruit new skills (5 employees).”

The impact of the Covid-19 pandemic on the restaurant industry has been significant. Travel restrictions and social distancing measures have led to a significant decline in restaurant footfall, which has had a negative impact on revenue and profits.

Many restaurants have had to close temporarily or permanently due to reduced demand And the high costs associated with implementing health safety measures.

Created in 2015, the three restaurants founded by entrepreneur “B” are counted among the first connected restaurants in Tunisia. Indeed, the digitalization process of its two restaurants started well before the Covid-19 crisis. At the very beginning, the three restaurants were equipped with a mobile application for the delivery of sushi dishes only. Over time, the menu has been enriched with other types of dishes. Inside the restaurants, customers can place their orders and pay via tablets installed and embedded in each table. Even the choice of music is done via tablets. Indeed, digitalization has allowed the company to gain in efficiency and effectiveness in terms of information processing. Thus, at the level of the supply process, the company has the possibility of knowing the stock level of foodstuffs in real time. This makes it possible to maintain the freshness of foodstuffs and avoid losses in stocks. In addition, thanks to digitalization, the company delivers customer orders in less than 55 minutes (with a score of 3 minutes as delivery time).

In terms of human resources, digitalization has made it possible to drastically reduce the payroll. For illustration, a single server can serve 55 people. On another level, the customer experience has significantly improved and customer feedback has become instantaneous. The customer journey has been completely dematerialized. From ordering to after-sales service, the entire process has been dematerialized. This allowed the company to engage in a process of continuous improvement of its processes geared towards customer satisfaction. For example, there are customers who have ordered 650 times from restaurants and each time different dishes.

“Digitalization has enabled the optimization of processes and the use of resources. In addition, digitalization has contributed to improving the customer experience. It has become an undeniable resource of competitive advantage compared to traditional restaurants”

Under the motto: “Covid-19 or without Covid-19 you will be delivered with complete peace of mind”, our entrepreneur’s two ultra-connected restaurants have withstood the shock of the economic crisis caused by Covid-19. Unlike other restaurants and despite the restrictions imposed by the authorities, the two restaurants were able to maintain their activity and turnover increased by 30%. Indeed, digitalization has played a crucial role in the ability of restaurants to adapt to the era of the Covid-19 pandemic and maintain their business.

Today, online meal delivery represents 70% of turnover in the restaurants. Faced with this evolution and with the changes that have affected the mode of consumption since the health crisis, the restaurants are in the process of switching to a new 100% delivery-catering model.

Entrepreneurial resilience moderating variable in the relationship DT and organizational resilience

In the relationship between digital transformation and organizational resilience, entrepreneurial resilience could be considered as a moderating variable. It can influence the relationship between digital transformation (independent variable) and organizational resilience (dependent variable). In other words, entrepreneurial resilience can increase or attenuate the effect of digital transformation on organizational resilience.

Entrepreneurial resilience is defined as the ability to overcome entrepreneurial challenges and persist in the entrepreneurial process in the face of adverse situations and unexpected outcomes (Purnomo et al., 2021). Based on the life stories of our two entrepreneurs, we can say that entrepreneurial resilience is a personal quality that our entrepreneurs enjoy. Indeed, observation of the professional and personal journey of the two entrepreneurs clearly demonstrates that they faced several challenges and traumas. The latest challenge that our two entrepreneurs faced was the health and economic crisis caused by Covid-19. Faced with these challenges, our entrepreneurs have demonstrated a capacity for persistence, reactivity and even proactivity (Zajkowski et al., 2020).

Two major professional challenges marked our entrepreneur “A”. The first challenge concerned the closure of the company in which he was an employee due to the “subprime” crisis that shook the business world between 2014 and 2016. The second challenge that our entrepreneur “A” was able to overcome was the failure of his first business. No challenges prevented our entrepreneur from embarking on a new entrepreneurial adventure and facing the recent crisis through the digital transformation of his company's various processes. Moreover, Sakurai & Chughtai (2020) highlights that people with resilience have a great ability to find innovative solutions and improve the results of their business.

As for entrepreneur “B”, his life was strewn with challenges, starting with his illness. His fight against his illness was fought with a smile and optimism. This fight was an opportunity to test and gauge his capacity for resilience.

“For me success is based on a series of failures and challenges. My illness was for me a test, a challenge but also a catalyst to move forward and undertake what I want to undertake. What doesn't kill you makes you strong. Life is so short; you have to make the most of it. Each difficulty allows you to sculpt yourself.”

From the same perspective, during the interviews, we asked our two entrepreneurs to cite the main factors that positively affect their resilience. The results of the interviews show that these factors revolve around the following personal qualities: Perseverance, passion for entrepreneurship, optimism, self-esteem and the desire to take on challenges (Kiani et al., 2023). Which seems to be in line with the contribution of Lima et al. (2020) who showed the importance of confidence to face unforeseen situations with optimism.

Entrepreneurial resilience can increase the impact of digital transformation on organizational resilience. Indeed, entrepreneurial resilience allows companies to quickly adapt to changes by seizing the opportunities offered by digital transformation. This can be done by identifying emerging trends, investing in appropriate technologies, developing digital skills and creating processes to quickly implement innovative ideas.

Entrepreneurial resilience can also help businesses better manage risks related to digital transformation and maintain business performance despite disruption (Purnomo et al., 2021). Businesses can also use entrepreneurial resilience to anticipate risks related to digital transformation and to maintain their performance despite disruptions. In other words, through digital transformation, entrepreneurial resilience allows companies to be more agile, more innovative and more adaptable, which strengthens their organizational resilience in the face of disruptions linked to digital transformation (Schiuma et al., 2022).

By focusing on entrepreneurial resilience, businesses can improve their ability to identify digital transformation opportunities, invest in appropriate technologies, develop digital skills, and put in place processes to quickly implement innovative ideas, which positively affects organizational resilience.

Discussions of the results

As noted previously, the Covid-19 pandemic has not only been a shock to businesses large and small, it has changed the competitive landscape and business environment in general (Trump & Linkov, 2020). Some businesses were unable to survive the crisis, others will have to adapt to the new landscape (Belghitar et al., 2022). Digital technologies should play an essential role in adapting to the new context and, therefore, for the survival of businesses, especially SMEs (Miroudot, 2020).

In addition, as mentioned previously in our research question, the objective of our article is twofold. On the one hand, it aims to study the impact of digital transformation on the different aspects of organizational resilience in times of crisis, in particular the recent crisis caused by Covid-19 (Amghar et al., 2023; Ngoc-Vinh et al., 2022; Amankwah-Amoah et al., 2021). On the other hand, we tried to demystify the role that entrepreneurial resilience can play in this relationship (Paul et al., 2023; Schechter & Halevi, 2023; Purnomo et al., 2021). Our research specifically aims to deepen our understanding of the impact of digital transformation on the development of organizational resilience in SMEs. To answer our research question, we adopted a qualitative approach based on two case studies.

This research shed light on the way in which digital transformation affects organizational resilience in the case of SMEs. Indeed, according to the results of our research, we can say that digital transformation had affected several aspects of the organization (Trump & Linkov, 2020; Bell, 2019). Concretely, DT made it possible for our two entrepreneurs to create a new offer exclusively online. A wind fall effect for our entrepreneur “B”, especially with the change in consumption patterns. Indeed, more and more consumers are opting for online purchasing, even the most skeptical.

This new offer allowed the two companies to circumvent the health restrictions imposed by local authorities. This ability to seize new opportunities, made possible by DT, has enabled our entrepreneurs to withstand the shock of the crisis and maintain or even develop their activities (Huang & Farboudi Jahromi, 2021; Guo et al., 2020; Purnomo et al., 2021). These results confirm our first hypothesis according to which DT would promote organizational resilience by improving its capacity for resistance and absorption in the face of shocks (He et al., 2023; Miceli et al., 2021; Goldschmidt et al., 2019).

In terms of internal operations, DT enabled the optimization of processes and the resources used (Guo et al., 2020). The entire process has been digitalized, from customer prospecting to after-sales service. In addition, thanks to TD we have seen a reduction in staff numbers in favor of an increase in skills among employees (multi-skilled employees). As a result, both companies have gained both in agility but also in flexibility (Zajkowski et al., 2020).

Aside from process optimization, DT has enabled our two entrepreneurs to significantly improve the customer experience by involving them more in the various processes. From another perspective, DT has enabled our entrepreneurs to rethink their business model. A business model that is based on the integration of new technologies. This allowed our entrepreneurs to adapt to the new constraints imposed by the crisis. These results validate our second hypothesis according to which DT would promote organizational resilience by improving its capacity for renewal and adaptation. Therefore, our results are consistent with the results of recent studies which defend the idea that digital transformation promotes organizational resilience in times of crisis, such as the study conducted by Corvello et al. (2022) and that led by He et al. (2022).

As for the moderating role of entrepreneurial resilience, our results demonstrate that the entrepreneurial resilience enjoyed by our entrepreneurs according to their respective lifestories, enabled companies to react quickly to adapt quickly to changes by seizing opportunities offered by digital transformation (Schechter & Halevi, 2023; Kazancoglu et al., 2022; Trump & Linkov, 2020). This involves, concretely, investing in appropriate technologies, developing digital skills, and implementing processes incorporating innovative ideas, which has a positive impact on organizational resilience. From these observations, we can confirm our third hypothesis according to which entrepreneurial resilience would increase the impact of DT on organizational resilience (Munoz et al., 2022; Acciarini et al., 2021; Duchek, 2020).

Conclusion

To meet our research objective, which consists of explaining how digital transformation promotes the organizational resilience of SMEs in times of crisis, we relied on three hypotheses. According to the first hypothesis, by acting on the customer experience, operational processes and the business model, digital transformation would promote organizational resilience by improving its capacity for resistance and absorption in the face of shocks. According to the second hypothesis, by acting on customer experience, operational processes and the business model, DT would promote organizational resilience by improving its capacity for renewal and adaptation. While the third hypothesis highlights the supposed role of entrepreneurial resilience in increasing the impact of DT on organizational resilience.

To carry out our research, we adopted the qualitative method based on the study of two longitudinal cases with explanatory purposes for a better understanding of the effect of digital transformation on the resilience of SMEs in times of crisis and through consequently, to be able to validate our research hypotheses.

We also adopted a biographical approach based on the analysis of life stories to better understand the role that entrepreneurial resilience can play in the relationship between digital transformation and organizational resilience in times of crisis. Furthermore, the economic and health crisis caused by Covid-19 constitutes for us an appropriate crisis context to test our research hypotheses.

At the end of this study and in light of the results obtained, we maintain that digital transformation promotes organizational resilience in times of crisis (Corvello et al., 2022; He et al., 2022). Indeed, by acting on the customer experience, the business model and operational processes, digital transformation promotes organizational resilience (He et al., 2023; Miceli et al., 2021; Goldschmidt et al., 2019). Concretely, DT improves the capacity for resistance and shock absorption in times of crisis (Ngoc-Vinh et al., 2022; Amankwah-Amoah et al., 2021). In addition, DT improves the company's capacity for renewal and adaptation in crisis situations such as the recent crisis.

Still referring to the results of our study, we can emphasize that entrepreneurial resilience, a kind of catalyst, increases the impact of DT on organizational resilience (Munoz et al., 2022; Acciarini et al., 2021; Duchek, 2020).

This article has a number of limitations. The number of cases studied remains limited to be able to generalize the results. It is appropriate to pursue the perspective with quantitative studies based on a large population of SMEs. In addition, only SMEs presenting characteristics of resilience in the face of the Covid-19 crisis were studied. It would be useful and judicious in the future to study SMEs that have introduced digitalization into their process without being able to gain resilience in order to identify the conditions for the success of the relationship between digital transformation and organizational resilience.

From a managerial point of view, this research provides a new and more articulated vision of the link between digital transformation and organizational resilience as well as the supposed role played by entrepreneurial resilience in this relationship. In other words, digital transformation represents a context of action for resilient entrepreneurs to work to improve organizational resilience. In the same context, the approach we adopted based on case studies can serve as an illustrative framework of the relationship between digital transformation and organizational resilience, for entrepreneurs who have not yet started their digital transformation.

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