

Title: Antifragility in small and medium service enterprises

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Abstract:

Purpose of the paper: Antifragility is the ability of companies to face crises and improve their strategic position. Service companies, typically not burdened by high fixed costs, are facilitated in developing antifragility. The purpose of the article is to analyze the factors that enhancing antifragility in small and medium-sized service enterprises (service SMEs).

Methodology: The article is exploratory in nature. Five cases of service SMEs that transformed their business model and strengthened their competitive position during the COVID-19 pandemic were analyzed.

Main Findings: Antifragility is a combination of entrepreneurial attitude, context intelligence and operational agility. The paper identifies resources and capabilities supporting the development of antifragility in service SMEs. Among the resources: slack financial resources and a broad and varied network of partners for research and innovation. Among the capabilities: operational agility, velocity and creativity.

Practical implications: Crises are not uncommon. This paper offers directions for entrepreneurs in services SMEs to be prepared for crises and turn them, to some extent, into opportunities.

Originality/value: While several related concepts, e.g. resilience or agility, have been extensively studied, there is a dearth of studies on antifragility. This is one of the first works to explore factors enhancing antifragility in service SMEs.

Type of paper: Research paper

Keywords: antifragility, small and medium enterprises, covid-19, dynamic capabilities, service firms.



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1. Introduction

Covid-19 has changed the way people live and work, the products and services we demand as well as the way organizations produce them (Belghitar et al., 2021). This requires firms to adapt to a new context. Some of them will not even survive especially small and medium-sized ones (Priyono et al. 2020). Thriving in times of crisis requires specific capabilities linked to the possibility to recognize and catch opportunities.

Small firms are fragile by definition. Even more so in face of a crisis, due to the lack of financial, organizational, and human resources (Inekwen, 2019). Smallness, however, can be an opportunity when it becomes leanness since it is easier to convert processes and capabilities, modifying processes, business models and value propositions (Ahn et al., 2018, Mahdad et al., 2020, Miroshnychenko et al, 2021). Through their flexibility and rapid response capabilities, SMEs can help the economy and society to adapt to the new, post- CoViD19 context.

To describe the ability to survive a crisis, the term resilience has been frequently used. Resilience represents the capability to absorb shocks and, although temporarily changing, recover afterwards. More recently the concept of antifragility has been used to describe the capability of a system to absorb shocks and get better (Ramezani and Camarinha-Matos, 2020).

Research on antifragility in business and management is still in its infancy. The lack of research in this field is even more evident in the case of small firms (de Bruijn et al. 2020).

Studying how small service firms reacted to the emergency created by CoViD19 is important to understand how they develop and implement antifragility.

This study addresses in particular the following research question:

RQ: what are the determinants of antifragility in small service firms?

To answer the above research question we conducted a multiple case study of six Italian small service firms. These case organizations were selected based on their antifragile behaviour during the CoViD-19 pandemic : they did not stop their business but transformed to catch new business opportunities. The study had the aim of investigating which factors were leveraged in order to identify the new opportunities and adapt the business to the new situation.

2. Theoretical background

2.1 Antifragility in small firms

Unforeseen, disastrous events are not as rare as we might perceive (Petit et al., 2013). The attack on the twin towers in 2001, the financial crisis in 2008 and now the CoViD-19 pandemics are the most visible examples. These events have huge effects on our personal lives but on organizations, causing major damage. The capability to change in this extremely turbulent environment is becoming essential to survive as it is increasingly difficult to rely on traditional forecasts and approaches (Geldenhuys et al., 2020). Changing their planning capabilities and disaster response strategies is vital (Gotham and Campanella, 2010).

Antifragility is the ability to transform an organization's business model in response to a crisis (Blečić and Cecchini, 2019, Conz and Magnani, 2019). Several factors can contribute to develop this ability. Among the others: *creativity* or the ability to imagine new solutions (Pettit et al., 2013); *adaptability or flexibility*, the ability to change in response to disruptions in the nevironment (Fiksel et al., 2015); *transformability*, that is the ability to transform processes, structure, and behavior to survive during a crisis (Gotham and Campanella, 2015).

Ramezani and Camarinha-Matos (2020) consider the response to a crisis as made up of three phases : *readiness*, that is the phase before a disaster happens; *response*, that is the actions implemented after the crisis; *recovery*, in reference to the activities that are adopted post-crisis.

While large incumbents are usually well adapted to a context, and suffer from its modifications, small firms can take advantage of crises to improve their position if they have the ability to strenghten their strategic position (Mendoza et al., 2018). Several different capabilities are needed to achieve this result (Máñez et al., 2015, Mahdad et al., 2020). The characteristics such as flexibility and adaptability, are typical of SMEs and help them to respond to a crisis by accelerating decision-making (Branicki et al., 2018). SMEs, besides, are generally more open to uncertainty and to scarcity of financial and human resources (Branicki et al., 2018).

1. Methodology

3.1 Research design and sample

The research was conducted according to the methodology of the multi-case study. This approach is usually used to explore still emerging phenomena and understand 'who' and 'why' of real phenomena that are still little studied (Yin, 2014) to build the first steps of a new theory (Eisenhardt and Graebner, 2007). In fact, this approach allows to mitigate the evaluator's judgments and to increase the external validity (Eisenhardt and Graebner, 2007; Yin, 2014). It is especially useful in the research and formulation of new hypotheses that allow to subsequently investigate other research hypotheses (Sellitto, 2018). It is less useful in generating results of completely general value.

Table 1 Main features of cases study

<i>SME</i>	Sector	Product description	Interviews number and duration	Other sources of data
<i>Case 1</i>	Publishing	Editorial services	1 interview, 90 minutes	Website ; Onsite observation
<i>Case 2</i>	ICT	AI and Big Data	1 interview, 60 minutes	Website
<i>Case 3</i>	Transport	Buying and selling freight transport	1 interview, 60 minutes	Website
<i>Case 4</i>	ICT	Website, portals, ecommerce, apps, web editorial contents	1 interview, 60 minutes	Website; Workshop
<i>Case 5</i>	ICT	Information systems	2 interviews, 60 and 30 minutes	Website; Internal documentation; Workshops

For this study, 5 small and medium-sized service enterprises were selected that demonstrated antifragile qualities during the pandemic period. The companies were selected through the analysis of different sources (media, personal networking) and, despite being located in a region of Southern Italy (Calabria), companies operating in different sectors and with different characteristics were selected to increase the generalizability of results (Flyvbjerg, 2006). Table 1 shows the main elements that characterize the selected sample.

3.2 Data collection

The people interviewed (often the founding entrepreneur of the company) had in-depth knowledge of the company and a very important role in business management. The interviews were recorded and a report was drawn up for each case study which was shown to the interviewees, asking for any additions and clarifications. Any observations and unclear elements were evaluated to improve the interview protocol to be used in subsequent cases.

3.3 Data analysis

The analysis of the case studies was developed in two phases: in the first the single case studies were analyzed, in the second a cross analysis was carried out in order to integrate what emerged with other additional data.

In more detail, in the first phase, following an approach based on grounded theory (Strauss and Corbin, 2008), the interviews were conducted and analyzed separately by at the researchers, in order to bring out any divergent interpretations and to be able to compare in ways to arrive. to a shared vision with respect to each point. The interviews were coded (Pratt, 2009) in order to bring out the relevant concepts and the relationships between them.

In the second phase, the results that emerged were compared with each other according to the cross-case analysis approach, in order to obtain a synthesis of the concepts that emerged and of the relationships between them with an acceptable level of internal consistency.

The aim was therefore to identify the similarities and differences between the case studies with respect to the research questions analyzed.

2. Results

The next section describes the 5 case studies analyzed in the sample and then a comparative analysis is made with respect to the elements under study. In particular, for each case study, in addition to the main elements that characterize the business and the history of the company, the experience of anti-fragility and the main contingent variables are described.

4.1 Within case analysis

Case 1 is a medium-sized company founded about fifty years ago and operating in the letterpress printing sector. During the crisis they accelerated their launch of digital products. While the revenues from traditional products dropped, revenues from digital products increased rapidly. The owner stated that most of his time is occupied by networking activities. The habit of using digital media to communicate also derives from the need to travel for work, but in recent times, due to Covid, this familiarity has become increasingly widespread and has made it easier for him to interact with others. Over the past three years there has been an increase in the use of communication tools, dashboards and databases. However, communication using digital tools is a source of considerable stress, because we try to guarantee maximum availability and at the same time there is a high risk of misunderstandings and ambiguity.

Case 2 is an IT company specializing in the fields of Big Data Management and Artificial Intelligence. It was born in 2019 and in a few years it has reached 16 employees with a turnover of around 900,000 euros in 2020.

During the pandemic, a new product was developed that helps organizations monitor compliance with anti-covid regulations. The peculiarity of the product is the exploitation of neural networks for automatic and not too invasive support. The gradual success of this product represents the antifragility element of this company.

According to the CEO, another element that has allowed the company to be more competitive is the spread of smart working: not so much for employees, accustomed to this way of working, but above all because it has been accepted by its customers (they are mainly consultants). For their work, the need to go in person (often having to undergo long, tiring and expensive

journeys) represents a significant cost, from various points of view. The result was for the company to have reduced costs and had the opportunity to reach new customers thanks to the time saved and the willingness of customers to accept this type of interaction.

Digital technologies have therefore influenced both the management of external relations and the processes of internal change (for all the variables investigated here, visibility, process support, intelligence and communication). For the contingency variables for antifragility analyzed in this paper, finance was the most important.

Case 3 tries to solve the problem of the user who is looking for a suitable carrier to transport bulky goods. The business idea is to manage a platform that connects supply and demand for this type of service.

In recent months, the platform managed about 25,000 transport requests per month with a turnover of € 1,500,000, a strong growth compared to 2019.

Antifragility comes from the ability to manage the growing number of services required during the pandemic with a home delivery (and not a collection point). The growth and success of the platform have made it possible to start two collaborations with important international partners (home delivery of treadmills on behalf of Decathlon and of refrigerators on behalf of an important French company).

Covid has indirectly provided Case study 3 with an increase in turnover (in terms of margins and traffic on the platform).

Digital technologies therefore have a strong impact on process support, communication and visibility. With reference to the contingency variables, the company emphasized the role of finance and internal skills: having a liquidity base available and the skills to solve new problems allowed the company to overcome more complex lockdown periods unscathed.

Case 4 creates and manages in an integrated way solutions for web management at all levels (websites, apps, eCommerce), both in the optimization of data and flows, and in the production of content on behalf of important and selected partners. The company's core business is linked to the tourism sector (for example, it deals with the tourism section of one of the most visited portals in Italy, that of the Ansa news agency).

By offering services to companies and public bodies operating in the tourism sector, the success that denotes antifragility according to one of the founders is precisely having kept the turnover constant despite the pandemic, which has strongly affected the tourism sector (about 400,000 euros). A careful use of digital technologies has made it possible to strengthen ongoing relationships (taking care of the needs of client companies in an effective, fast and flexible way), to strengthen the brand and to get in touch with new customers. So digital technologies have influenced visibility, intelligence and communication (internal and external). Finance and external networks proved to be the most important contingency variables for overcoming the delicate pandemic phase underway.

Case 5 provides ICT services to companies operating in the field of clothing and fashion. It currently has around 80 employees and a turnover of 5 million euros which has been growing continuously in recent years.

Table 2 Main results of data collection

<i>Main results</i>	Case 1	Case 2	Case 3	Case 4	Case 5
<i>Core business before the crisis</i>	Printing	Product based on Artificial Intelligence	Bulky goods transport	Website, portals, ecommerce, apps, web editorial contents	Information systems
<i>Covid-19 opportunities</i>	Switch to digital products	Product for compliance with social distances measures	New partnerships and a sharp increase in the demand for transport	Acquisition of new customers and consequently creation of new relationships	Exploration of new markets
<i>Contextual Factors</i>	Internal skills External network	Finance Internal Skills	Finance Internal Skills	Finance External Network	Finance External Network

The experience developed in previous years in the management of remote work proved to be very valuable with the advent of the pandemic, because on the one hand they did not have to change their way of working, on the other hand it became easier to widen contacts and look for new ones. customers.

Customers have recognized the company as being very efficient and effective. Video calls have become the most used digital tool, consolidating a growing trend since before the pandemic. Strategic decisions are also made through the analysis of the data available in the company databases.

Table 2 summarizes the most interesting data collected for each case study analyzed.

4.2 Cross-case analysis

The analyzed companies demonstrated the ability to face the exceptional situations caused by the pandemic, continuing to invest and changing their business models.

They have consolidated the relationship with existing customers (case studies 4 and 5) and at the same time were able to explore new markets (case studies 3, 4 and 5).

The company in case study 2 was able to develop new products based on the problems that emerged during the pandemic, or they were able to broaden the range of services offered (case study 3).

Very important for all interviewees is the attitude to accept change, to seek new opportunities, to maintain the entrepreneurial spirit even when the organization begins to grow. Often this attitude is necessary because the market evolves quickly or undergoes the radical changes brought about by technological innovation. The aftermath of the pandemic was just one of the many external pressures that have pushed these companies to grow and change continuously in recent years.

The antifragility is however demonstrated by the fact that it has achieved positive results (if not better than in the past) even in this period.

Both for the predisposition of the entrepreneurs and for the nature of the work (in many cases these are companies offering services in the ICT sector) in companies digital technologies were already widely exploited also as a way of working. The outbreak of the pandemic and the need to change the way of working did not find these companies unprepared, which, on the contrary, in some cases have exploited this advantage as a competitive lever.

The competitive advantage derives both from the efficiency in the manufacturing processes and in the internal coordination, and from the possibility of interacting constructively with the outside world. In fact, the analyzed companies demonstrated the ability to exploit technologies to strengthen relationships with their customers (by intervening quickly at a distance or listening to their needs even in a context that prevented visits to the customer due to the pandemic). The new context and digital communication technologies have also created new opportunities, making it possible to give visibility and reach new potential customers. It should not be overlooked that for companies 2, 4 and 5, technologies have allowed, in the pandemic context, to save a lot of money and a lot of time for travel: in the ICT field often the physical presence at the customer is more of a cultural heritage of the customer than an actual need.

Another important element that emerged from the interviews is the need for a light and non-rigid approach to organizational routines.

As one of the interviewees stated:

“When digital technologies are used in an easy way within the company, for example to solve organizational problems related to physical distance, they become a real complementary tool for business activity”.

From the interviews it emerged that it is necessary to distinguish between companies that operate with mainly physical or digital goods and services. In fact, for the latter, after a first moment of disarray, essentially nothing has changed, except the possibility of avoiding almost useless trips to the customer. The business and ways of working have remained virtually the same.

In the case of physical products, on the other hand, the difficulties in handling the goods initially displaced everyone. Where possible, the demand for digital services has increased (think of case study 3, where physical handling has been made possible and optimized thanks to the advanced use of digital technologies). After the initial slip, however, the subjects involved had

the clear perception that the digital transition had a strong acceleration and nothing would ever be the same again.

The pandemic was a strong accelerator for the digital transformation, helping to change the attitude of the external environment (customers and partners). This was in a sense a reward for those who had long believed in this transformation and had invested in this direction.

The link between antifragility and digital technologies can be analyzed by studying the role of some external factors, the so-called contingent variables. Those that emerge from the literature in this case are mainly the availability of financial capital and the possibility of referring to a network of external relations from which to acquire, as needed, skills and other resources not available internally.

The entrepreneurs interviewed highlighted that a share of the financial resources available for research at the beginning of the pandemic nevertheless made it possible to start new projects useful for dealing with the crisis and provided a certain psychological tranquility, which is essential for facing the risks of a new initiative in a such a complicated and unexplored context.

The founder of the company case study 3 for example highlighted the importance of having had a positive cash flow at the beginning of the pandemic crisis, because he gave the possibility to start new projects in the presence of new business opportunities using the better internal skills.

External resources are very important for completing new projects: in fact, in many cases they make the process faster that otherwise would have been slower with only internal resources.

The external resources to which the interviewed companies refer are universities, technical and commercial partners, industrial customers, able to provide complementary resources and skills which, in some cases, have been integrated in a stable way into business processes.

The founder of the company in case study 2, for example, highlighted that his company constantly has relationships with different universities and that the development of joint research projects represents a precious opportunity for mutual comparison and growth.

In other cases, external resources have helped the company in the transition to new business models, supporting the acquisition phase of missing or complementary resources, useful for consolidating the transition and providing security, even psychological.

3. Discussion

Entrepreneurship, that is an attitude towards seeking new opportunities is a feature of small firms, above all young ones and a necessary component of antifragility, sometimes called entrepreneurial firms (Branicki et al. 2018). The CoViD-19 pandemic did not change this attitude in the investigated cases: one first result of our study is that organizations antifragile service firms see the environment as a context of threats and opportunities even before the crises takes place.

The investigated companies considered agility, that is the ability to change goals and behaviour, as one of their main strenghts (Camarinha-Matos, 2014; Soni et al., 2014; Zitzmann, 2014; Carvalho et al., 2012; Wieland and Wallenburg, 2012). Antifragility relies on agility (Ramezani

and Camarinha-Matos 2020) even if the two concepts are separated. Antifragility is an entrepreneurial attitude that emerges in front of a crisis.

Our findings suggest that the adoption of digital technologies supports antifragility. However, digital technologies are not merely enablers. Digitalization represents for entrepreneurs in service SMEs first of all a context of work. The everyday activity of entrepreneurs and employees in this companies takes place to a large extent in the digital environment. Antifragility is to a large extent the ability to navigate this context during a crisis. Intelligence of the digital world, rather than the flexibility of processes, seems to be a distinctive property of antifragile companies. Digital competence (Depaoli et al. 2020) then, affects antifragility.

Based on the interviews, another element fostering antifragility is past experience with change of context. For example, Case 3 was experimenting with a new online business model when the pandemic started and this business model was the basis for their new activities. Interestingly the experience does not necessarily need to be in the same sector of activity of the new business model (Ansoff, 1958). In particular, for service SMEs, which are less weighted with sunken costs, experimenting with different business model is less costly (Corvello et al. 2021).

Interestingly all the interviewed SMEs underlined that their processes were fluid: either because of a recent transformation or for the young age of the firm. Consistently with previous literature (e.g. Mamouni Limnios et al. 2014) we can hypothesize that antifragility is positively related with low standardization.

As highlighted by previous studies (Jespersen et al. 2018) networks are important to guarantee adaptation: to guarantee access to resources (Lazzarotti et al. 2017) in the short and long term. Finally, antifragility requires to a certain extant slack resources to be available: financial capital, human resources, time.

4. Conclusion

Small and medium-sized businesses are facing a huge crisis during the CoViD-19 pandemics (Zimmerling and Chen, 2021). Disruptions, even if of a smaller scale, are not uncommon. This study analyzes the conditions under which service SMEs are able to thrive in times of crisis.

Our study identifies factors that can be leveraged by service SMEs to build antifragility.

This paper is among the first ones to study antifragility in service SMEs. It shows, however, some limitations.

The sample is small even if compatible with the suggestions by Eisenhardt (1989). Future studies should consider larger samples in order to increase the generalizability of the findings. Only antifragile organizations were studied. Also fragile companies should be considered in future studies for a comparison.

All the companies are Italian. Geographical location has possibly an influence and should be considered in future research.

Finally, long term results should also be studied for a thorough evaluation of the phenomenon.

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