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Do you have feet in your shoes? Innovation and resilience in a footwear industrial district in Brazil

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Abstract:

This study examines innovation as a shock reaction in the process of regional economic resilience, focusing on a footwear industrial district in southern Brazil during the COVID-19 pandemic. The results show that innovation, a mechanism of adaptability, emerged in the industrial district not only to support economic recovery, but also to mitigate the adverse effects. Firms implemented novel marketing and sales processes, and some also had to change their information and communication systems or organisational structure to support e-commerce. As such, this study highlights the influence of adaptability on economic resistance.

Keywords: Regional resilience; innovation; adaptability; shocks.
JEL Classification: B52; O30; R11.

¿Estás por tu cuenta? Innovación y resiliencia en un distrito industrial del calzado en Brasil

Resumen:

Este estudio examina la innovación como reacción de choque en el proceso de resiliencia económica regional, centrándose en un distrito industrial del calzado del sur de Brasil durante la pandemia de COVID-19. Los resultados muestran que la innovación, un mecanismo de adaptabilidad, surgió en el distrito industrial no solo para apoyar la recuperación económica, sino también para mitigar los efectos adversos. Las empresas implementaron nuevos procesos de marketing y ventas, y algunas también tuvieron que cambiar sus sistemas de información y comunicación o su estructura organizacional para apoyar el comercio electrónico. Como tal, este estudio indica la influencia de la adaptabilidad en la resistencia económica.

Palabras clave: Resiliencia regional; innovación; adaptabilidad; choques.
Clasificación JEL: B52; O30; R11.

1. Introduction

Resilience has been repeatedly tested in the face of increasingly frequent shocks, revealing industrial districts' ability (or inability) to adjust their firms, workers and local institutions to changing conditions.

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The specific socioeconomic context in which they are embedded is conducive to the introduction of innovative products and processes, but it can also become a liability in the face of adverse effects from unanticipated events (Belussi, 2015). The dynamic interplay of different actors and their relationships, developed based on shared norms and values, shapes an industrial district's resilience process, which includes four dimensions: vulnerability before the shock, resistance, adaptability and recovery (see Martin & Sunley, 2020; Sutton et al., 2023).

In a context of rapid change, research has confirmed innovation as a key adaptability mechanism to explain regional performance differences (Viana et al., 2023). However, making industrial districts more innovative is not an easy task. Industrial districts may have difficulties adjusting their economies to new contexts (Alberti, 2006; Grabher, 1993). In times of crisis, firms may also hesitate to develop new relationships, processes and practices, such as narrowing the focus of attention, simplifying information codes and reducing the number of channels used (Netten & van Someren, 2011; Staw et al., 1981). When industrial districts overcome these challenges, they can respond to unexpected events with innovation, enabling them to reduce adverse impacts or seize new opportunities.

Nevertheless, numerous studies on regional resilience implicitly assume that economic adaptability only influences recovery and not resistance (e.g., Hu et al., 2022; Martin et al., 2016; Martin & Gardiner, 2019; Martin & Sunley, 2015, 2020; Sutton et al., 2023; Sutton & Arku, 2022). This assumption has led to the understanding that economic adaptation or transformation through innovation emerges after absorbing a shock (e.g., Filippetti et al., 2020).

Against this background, we aim to examine innovation as a reaction to a shock in the process of regional economic resilience. Using a case study of a footwear industrial district in Brazil, we analyse the perceptions of different regional actors about the effects of the COVID-19 crisis and some secondary data. By adopting an evolutionary perspective on regional resilience and viewing product and process innovation as a creative response, we seek to deepen the understanding of how an industrial district adjusts to a crisis.

This paper's main contribution is examining the dimensions of resilience, thereby enriching our understanding of how they are interrelated. In doing so, we extend the research on shock reactions (David, 2018; Molina-Morales et al., 2023; Simonen et al., 2020). This approach differs from the conventional focus of the regional resilience literature, which has predominantly examined the determinants of economic resistance or recovery while rarely considering the dimension of adaptability (see Miranda & Hoffmann, 2021; Sutton et al., 2023). In addition, we present two theoretical propositions to guide future research efforts.

The remainder of the paper is organised as follows. Section 2 assesses the process of regional resilience and the role of innovation as a creative response within this framework. Section 3 presents the methodological path followed, while Section 4 briefly contextualises the case study. The results of the empirical investigation are presented in Section 5, followed by a discussion of them in Section 6. Finally, Section 7 concludes the paper.

2. Integrating creative responses into the regional resilience process

2.1. The process of regional resilience

Regional resilience is the ability of a regional economy to adapt or transform in order to reduce vulnerability or enhance resistance or recovery from shocks (see Bristow & Healy, 2018; Sutton et al., 2023). From a regional perspective, resilience has been studied at the macro level, which includes municipalities, provinces and cities (e.g., Filippetti et al., 2020; Lazzeretti et al., 2022; Martin & Gardiner, 2019; Sedita et al., 2017), and at the meso level, which focuses on industrial districts or innovation systems (e.g., Belussi, 2015; Hervas-Oliver et al., 2011; Molina-Morales et al., 2023; Pinto, Nogueira et al., 2019).

The concept we adopt here views resilience from an evolutionary perspective, treating it as a dynamic process rather than a static attribute of a system (Boschma, 2015; Simmie & Martin, 2010). This process

encompasses the trajectory of economic development and the dimensions of regional resilience, namely vulnerability, resistance, adaptability and recovery (Martin & Sunley, 2015, 2020). Additionally, resilience is often characterised in terms of the capacity to adapt or transform in the face of shocks and the resulting performance of this capacity (e.g., Bănică et al., 2020; Evenhuis, 2017; Sutton & Arku, 2022). By integrating these categorisations, we present in Figure 1 the elements of the regional resilience process, their description and analytical focus.

FIGURE 1.
The process of regional resilience

Analytical focus	Element of resilience process	Description
Trajectory disruption	Pre-shock reference state or dynamic	Pre-shock economic development levels and trajectory
	Shock	Discrete events with sudden negative effects on economic activity
Resilience performance	Vulnerability	The degree of exposure and susceptibility of a regional economy to a shock
	Resistance	The degree and extent to which a regional economy can withstand the shock's initial impact
	Recovery	The degree and extent of post-shock economic growth
Resilience capacity	Adaptability	Capacity of economic adaptation or transformation

Source: Prepared by the authors based on Bănică et al. (2020), Evenhuis (2017), Martin and Sunley (2015, 2020) and Sutton et al. (2023).

The focus on vulnerability, resistance and recovery has enabled the study of the asymmetric performance of regions experiencing shocks and their inherent, inherited and adaptive determinants (Hu et al., 2022; Martin & Sunley, 2015). This emphasis on performance is the most prolific line of inquiry in the regional resilience literature (Miranda & Hoffmann, 2021; Sutton et al., 2023; Viana et al., 2023). Typically, this analysis relies on secondary data on employment or wealth (Sensier et al., 2016). Molina-Morales et al. (2023) have also proposed alternative measures specifically for assessing the resilience of industrial districts facing technological disruption, including increases in product portfolios and the number of firms.

In contrast, adaptability analysis focuses on the "mechanisms by which the region's firms, workers, and institutions respond and adjust to shocks" (Martin & Sunley, 2015, p. 15). Potential mechanisms might include innovation, entrepreneurship, provision of support services (see Hervas-Oliver et al., 2011; Hoffmann et al., 2017; Simonen et al., 2020), as well as retrenchment and actions aimed at maintaining the status quo (see Wenzel et al., 2020). Among the dimensions of regional resilience, adaptability has received less attention and usually requires a qualitative or multi-method approach to understand reactions to shocks (Lemke et al., 2023; Pinto, Healy et al., 2019; Sutton et al., 2023). Because adaptability is the least studied dimension, empirical research contributes little to understanding its relationships with the other dimensions (see Evenhuis, 2017; Sutton et al., 2023).

The problem is that the prevailing studies in regional resilience often depict a sequential progression through dimensions—vulnerability, resistance, adaptability and recovery—shaping the process linearly (e.g., Martin et al., 2016; Martin & Gardiner, 2019; Martin & Sunley, 2015, 2020; Sutton et al., 2023). According to this model, vulnerability influences resistance, which shapes adaptability and leads to recovery (Sutton et al., 2023). However, this linear perspective may overlook the dynamic nature of how reactions to shocks influence the degree and extent of their impact on a regional economy. In other words, these reactions could aim not only to foster recovery but also to reduce the magnitude of the shock itself.

2.2. Innovation and response to shocks

Under high-impact events, organisations need to be connected with the environment to search for unorthodox and unprecedented responses (Lengnick-Hall & Beck, 2005). Innovated reactions can be called creative responses, which are context-dependent and characterised by technological change (Antonelli, 2015). These innovations make it possible to undermine existing practices that prove inadequate in moments of shock, thus promoting resilience (Filippetti et al., 2020).

In industrial districts, this creative response can be supported by the existence of a web of relationships that foster innovation. The relationships between firms and other organisations allow for the dissemination of knowledge, particularly tacit knowledge, the promotion of cooperative action and the monitoring of the actions of other organisations (Belussi, 2015). The agglomeration of firms in the same sector can also facilitate the dissemination of knowledge from sources outside the industrial district, which, when recombined, enables the emergence of innovations (Hervas-Oliver et al., 2011).

Recent research on organisational resilience has highlighted the benefits of being flexible and innovative and having networks to access relational resources and social capital in the face of disruptive events (Hillmann & Guenther, 2021; Lengnick-Hall & Beck, 2005). Belonging to a web of relationships helps organisations anticipate relevant information about future events, share experiences on how to respond to the new environment, access experiences and ideas from others, learn new management practices that are more appropriate to the new situation and possess complementary resources (Díez-Vial & Fernández-Olmos, 2016).

From a regional perspective, studies exploring the relationship between innovation and resilience also provide insights into innovative responses to different types of shocks (see Viana et al., 2023). For example, Hervas-Oliver et al. (2011) showed that the resilience strategies of the North Staffordshire ceramics industrial district in the first decade of the 21st century included diversifying into new markets through product innovation, including changes in format and design and using ceramic in other products. Other research done in the United Kingdom revealed that Leicester's clothing industry has moved towards fast fashion through product innovation as a strategic response to an economic recession (Oxborrow & Brindley, 2012).

In addition, Machado et al. (2019) suggested product innovation through value-added investments as a means for a clustered footwear industry in southern Brazil to cope with recessions and exchange rate fluctuation scenarios. Furthermore, Schmidt et al. (2023) explained how the Brazilian wine cluster Serra Gaúcha fostered resilience through process innovation, especially regarding production methods, by introducing new equipment and automation.

Looking at other types of shocks, Simonen et al. (2020) showed that the response to the collapse of Nokia's operations in Oulu, Finland, included retaining human capital in the region, which supported entrepreneurship based on product innovation, while diversifying into clean technology, health and printed intelligence. Moreover, in analysing technological disruptions—digital printing on tiles in the 2000s in Castellón (Spain) and the rise of plastic ski boots in the 1970s in Montebelluna (Italy)—Molina-Morales et al. (2023) suggested that industrial districts need external knowledge to facilitate the introduction and development of new technologies and internal firms to absorb and recombine knowledge. In the diffusion phase, industrial districts benefit from machinery and component manufacturers that act as promoters of innovation (Molina-Morales et al., 2023).

However, industrial districts can also face challenges in innovating as a means of promoting resilience. These challenges can arise for a number of reasons: i) innovation may emerge too late; ii) firms may not take into account the support organisations for business activity, or these organisations may have been affected by a shock (Hoffmann et al., 2017); iii) there may be resistance to change on the part of firms, an issue discussed in organisational theory (e.g., Staw et al., 1981); or iv) there may be difficulties in redirecting the trajectory of economic development—lock-in (e.g., Alberti, 2006; Grabher, 1993).

Nonetheless, acknowledging the challenges that industrial districts face in innovating does not lead to the conclusion that innovation, as a creative response, only emerges during the economic recovery. Filippetti et al. (2020) introduced the Schumpeterian concept of creative response in the regional resilience

literature; the authors used patents as a proxy for technological innovation, showing that this variable was associated with resilience both during and after the 2008–2010 financial crisis. However, the study also established theoretical links between shock absorption and the resistance dimension, as well as between response and the recovery dimension. These links support the implicit assumption that creative response manifests itself after the end of the recession. Accordingly, this theoretical postulate raises the question of whether persevering or retrenching during a shock is the only option (Viana et al., 2023).

The fact that a shock affectes the creative response capacity of economic actors does not mean that this response does not occur during the recessive period. Instead, this awareness allows us to shed light on the effects triggered during a shock, the resilience performance of an economy and, in particular, how innovation and other response mechanisms relate to this performance.

3. Method

3.1. Characterization of the research and case selection

We conducted an exploratory-descriptive and cross-sectional case study, considered an appropriate method for understanding the emergence of innovation in a changing context (Eraso et al., 2017). We chose to study the footwear industry, the Brazilian manufacturing sector most affected by COVID-19 (Brazil, 2023), as this facilitated our examination of the sector's reaction to the shock. Specifically, the industrial district of São João Batista, located in Santa Catarina, Brazil, was selected. This choice was based on the high level of economic specialisation in its main municipality (Begnini & Carvalho, 2021), as well as the presence of several supporting institutions and suppliers in the district that influence innovation in local firms (see Belussi, 2015; Boschma & ter Wal, 2007; Hoffmann et al., 2023).

3.2. Data collection

We used interviews for data collection because they allow for a deeper exploration of complex phenomena through dialogue and interaction (Kvale, 2007; Tracy, 2020). We conducted semi-structured interviews using predetermined questions and had the flexibility to include or exclude questions based on the responses obtained (Morse, 2012). This technique allows for clarification of the perspectives of different interviewees and has been widely used in writings on regional resilience (e.g., Bathelt et al., 2013; Hervas-Oliver et al., 2011; Oxborrow & Brindley, 2012).

Based on the elements of the resilience process (Figure 1), we developed the interview script based on two categories (Figure 2): i) trajectory disruption and resilience as performance and ii) resilience capacity (i.e., adaptability). The first category let us delve deeper into perceptions about resilience to what and with what outcome, while the second allowed us to explore by what means—how the reaction was. Because there is no consensus on how to study adaptability, despite our focus on innovation, we also considered other subcategories. In terms of innovation, we looked at both product and process innovation. In this case, process innovation included, for example, marketing and sales innovation, production methods, administration and management, and information and communication systems (see OECD, 2018). Furthermore, as we used a semi-structured instrument, (sub)categories not foreseen a priori were extracted and marked in italics in Figure 2.

We conducted 20 interviews with economic actors, such as business executives, labourers and representatives from the regional government and other institutions supporting business activities (Figure 3). This approach follows other studies on regional economic resilience (e.g., David, 2018; Hervas-Oliver et al., 2011; Hoffmann et al., 2017). We identified initial contacts from documentary research by searching for local news about the footwear industry, a procedure used in the studies of David (2018), Miranda et al. (2023) and Schmidt et al. (2023). Other participants were selected by chain sampling, as people who were contacted recommended new informants (Patton, 2014).

FIGURE 2.
Research categories and subcategories

Category	Subcategory	References
Trajectory disruption and resilience performance	Pre-shock economic development path	Bristow and Healy (2018); Brown et al. (2020); Evenhuis (2017); Harris et al. (2020); Martin and Sunley (2015, 2020)
	Vulnerability	
	Pre-shock reference	
	Shock	
	Resistance	
	Recovery	
Resilience capacity-adaptability	Retrenchment	Bathelt et al. (2013); Bristow and Healy (2018); Brown et al. (2020); David (2018); Hervas-Oliver et al. (2011); Hoffmann et al. (2017); Martin and Sunley (2015, 2020); OECD (2018); Oxborrow and Brindley (2012); Simonen et al. (2020); Spigel and Vinodrai (2021); Williams and Vorley (2014)
	Perseverance	
	Entrepreneurship	
	Innovation	
	Provision of support services	
	Importance of intraregional relations	
	Importance of extra-regional relationships	
	Expansion	
	The passivity of regional actors	
	Change in horizontal relationships	

Note: ex-post categories.
Source: Developed by the authors based on the cited references and the present case study.

FIGURE 3.
Profile and code of the interviewees

Code	Interviewee	Function	S.	Code	Interviewee	Function	S.
I01	Firm	Labourer	□	I11	Firm	Owner	→
I02	Firm	Manager	□	I12	Firm	Owner	□
I03	Credit union	Manager	□	I13	Labour unions	Director	□
I04	Local association	Manager	□	I14	Firm	Owner	→
I05	Local government	Director	□	I15	Firm	Manager	→
I06	Firm	CEO	→	I16	Technical support institution	Manager	□
I07	Firm	CEO	□	I17	Firm	Manager	□
I08	Firm	Manager	→	I18	Real estate agent	Owner	→
I09	Firm	Manager	□	I19	Firm	Owner	→
I10	Firm	Manager	→	I20	Trade association	Director	□

Note: S. = Source; □ = documentary research; → chain sampling.
Source: Prepared by the authors.

The script was submitted for pre-testing with an outsourced firm and a businesswoman to verify the interviewees' understanding and determine whether the answers obtained were in line with the questions asked (Breakwell et al., 2012). The interviews were conducted in June 2022 after obtaining informed consent forms as recommended by method manuals (e.g., Breakwell et al., 2012; Tracy, 2020). After that,

the interviews were transcribed in a denaturalised manner, including grammatical corrections and application of the discursive conventions of written language (Nascimento & Steinbruch, 2019).

Secondary data also supported the analysis. We collected the 2020 and 2021 footwear industry sector reports (coded D1 and D2, respectively) and the 2020 annual activity report (D3), all published by the Brazilian Footwear Industry Association (Abicalçados). We also used data from the Semiannual Survey of Innovation (Semiannual PINTEC), based on the Community Innovation Survey (CIS), available on the website of the Brazilian Institute of Geography and Statistics (IBGE). The Abicalçados reports generally refer to the national footwear industry. The results of the Semiannual PINTEC on economic sectors, in addition to referring to Brazil, also aggregate data on preparing leather and manufacturing leather goods, travel goods and footwear. Although these open data cannot be stratified at the level of São João Batista, they also help to understand the reaction to the shock of the COVID-19 pandemic.

3.3. Data analysis

Content analysis, a set of techniques that enable the systematic description of message content, was applied in three stages of operationalisation, following Bardin (2011): i) pre-analysis, which involved organising the transcriptions and skimming; ii) exploring the material with coding and categorising; and iii) processing and interpreting the findings. We analysed the data using MaxQDA software. In writing the results of the paper, we included transcripts of the interviews to address construct validity, following the guidance of method manuals (e.g., Beverland & Lindgreen, 2010; Yin, 2018). Following Hoffmann et al. (2017), we inserted the transcripts into the figures for ease of access. We have enumerated and cited the transcripts in the text to support the data analysis. Furthermore, we performed an exploratory analysis of the quantitative data from the Semiannual PINTEC.

4. The footwear industrial district of São João Batista

The footwear industry in Brazil accounted for approximately 270,000 formal jobs and more than 6,000 companies in 2021 (Brazil, 2023). This industry is characterised by the development of spatially clustered activities in different parts of the world (Boschma & ter Wal, 2007; Eraso et al., 2017; Galuk et al., 2023).

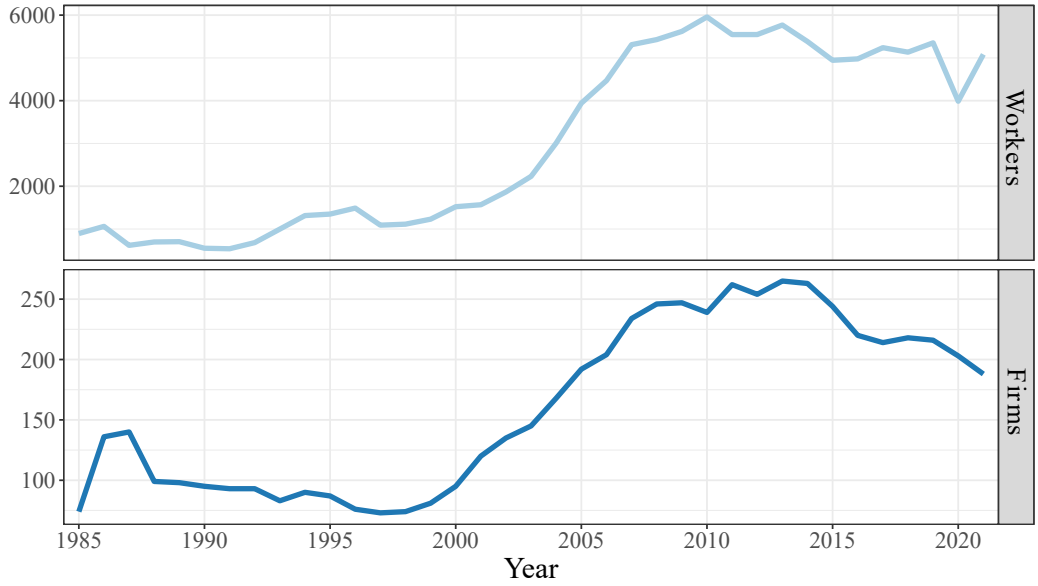
The industrial district of São João Batista, located in the Tijucas River Valley, is the largest footwear producer in Santa Catarina and accounted for more than 70% of jobs in this industry in the state in 2021 (Brazil, 2023). The region's origin as a footwear producer dates back to 1926 with the artisanal production of shoes. The sector expanded in the region in the last two decades of the 20th century, driven by the closure of the Usati sugar factory and the migration of workers to the footwear industry (Vargas et al., 2015). As an almost century-old industrial district, it includes suppliers of soles, insoles, cardboard manufacturers, metallurgical companies and business support institutions, such as trade unions and industrial learning organisations.

In line with the work of Marshall (1920), Andrade and Hoffmann (2010) highlighted the following trends in São João Batista: i) specialisation due to the high degree of outsourcing between firms; ii) advantages resulting from the co-location of suppliers and resources, including the presence of institutions to support business activity; iii) the predominance of micro and small firms; and iv) a tendency for firms to act similarly, which seems to refer to the diffusion of knowledge. In addition, the interviewees in this paper emphasised the availability of skilled labour in São João Batista, especially before the COVID-19 shock. These characteristics led us to refer to São João Batista as an industrial district, following Marshall's (1920) concept.

Figure 4 shows the evolution of the number of jobs and firms in the footwear industrial district of São João Batista from 1985 to 2021. We can highlight a crisis in 1987–1988 due to the price of leather and the fact that the Brazilian economic opening, which aimed to liberalise the economy and integrate it into the global market, did not affect São João Batista as much as other footwear agglomerations in the country due to the industrial district's focus on the domestic market in the early 1990s (Vargas et al.,

2015). The industrial district expanded between the end of the 1990s and the beginning of the 21st century.

FIGURE 4.
Evolution of the number of footwear workers and firms in the São João Batista industrial district



Source: Developed by the authors based on data from Brazil (2023).

Between 2002 and 2010, a period of economic growth in Brazil, the number of formal workers in the industrial district more than tripled, increasing from 1,800 to almost 6,000. Between 2011 and 2019, the employment level fluctuated between 4,900 and 5,700, as it was affected by the 2008–2010 financial crisis and the 2014–2015 political crisis. The situation worsened in 2020 due to the COVID-19 pandemic, with the number of formal jobs falling to 3,987. The following year, just over 5,000 formal jobs were recorded, a number lower than the pre-crisis situation but tending to recovery. The pandemic also affected the number of formal firms, which fell to levels close to 2006, the lowest in 15 years, and continued to decline in 2021, reaching a low of 188. The region is characterised by the production of women's shoes, which suffered the greatest drop in demand due to COVID-19 (D2).

5. EMPIRICAL EXPLORATION

Before the pandemic, the employment level had been increasing, although it had not surpassed the levels before the 2008–2010 and 2014–2015 crises, as shown in Figure 4 (see also T01-02 in Figure 5). Vulnerability to the COVID-19 crisis was related to the nature of the shock, the types of manufactured products and the lack of firms' cash reserves (T03-05). The pandemic resulted in uncertainty, suspended activities and absenteeism, which led to layoffs, company closures, order cancellations, production drops, revenue reduction, default and a shortage of input materials (with subsequent price increases) (T06-12; D1-2). There was also a loss of human capital, as migrant workers from other states had left São João Batista (T13-15). Furthermore, the negative effects of the shock were not homogeneous at the micro level. The data indicate that workers, outsourced firms and smaller industries were more afflicted, while larger industries had a greater capacity to absorb the adverse effects (T16-18; D3). After the initial impact of the shock (T19-20), the impression that the industry had resumed a trajectory of economic growth was almost unanimous (T21-23), which is consistent with the employment data (Figure 4).

FIGURE 5.
Transcripts on trajectory disruption and resilience performance

Pre-shock reference state or dynamic

T01 - Before the pandemic, the city's economy was better… plenty of jobs and population growth. (I03)

T02 - Before the pandemic, if I announced that I was hiring workers, there would be a crowd in front of the firm..., including qualified workers. (I12)

Vulnerability

T03 - Our [industrial district], producing both types of shoes [open- and closed-toe shoes], could not ship either to the Northeast or the South; the stores were closed. Exporting was even harder. (I13)

T04 - The firms needed more preparation to survive this crisis. (I16)

T05 - The main lesson is that people need to be better prepared financially. Those who often work on the edge can't cope when the crisis hits. (I03)

Shock

▪ *Shock effects*

T06 - Manufacturing activities began to decline. There is no manufacturing without employees. (I01)

T07 - The price of raw materials has risen too much. And there's a shortage of raw materials. (I01)

T08 - It was sometimes challenging to produce because the workers also got sick. (I03)

T09 - We saw firm closure. (I13)

T10 - Large chain stores cancelled orders. (I17)

T11 - The market was very uncertain. We didn't know what was going to happen. (I09)

T12 - There were many layoffs in São João Batista. (I09)

T13 - With the pandemic, people returned to their cities of origin. (I09)

T14 - Many people migrated to another industry in São João Batista. (I14)

T15 - Today, we cannot even select [labourers]. The workforce is very scarce. (I17)

▪ *Most affected actors*

T16 - Default increased more for individuals and microentrepreneurs. (I03)

T17 - Some small companies have suffered. Large companies have succeeded. (I04)

T18 - Large and medium-sized firms were better able to absorb the impact. (I13)

Resistance

T19 - At the beginning of the crisis, São João Batista had a significant retraction. (I03)

T20 - We were able to absorb the negative impact that the pandemic had on other sectors. (I13)

Recovery

T21 - [The economy] improved in the second half of last year, 2021. (I08)

T22 - The market today is very good. People have a very positive sales perspective. (I09)

T23 - The number of workers is increasing every day. (I17)

Source: elaborated by the authors.

Just as the actors were affected differently, the adjustment to the crisis was also heterogeneous (Figure 6). As a means of absorbing the shock, there was cost containment, contract suspension, process reduction and renegotiation with suppliers (T24-27). Measures to persevere were also adopted, such as retaining human capital, preparing samples for product dissemination and avoiding any changes to the production process (T28-30). In the case of some companies seeking to retain human capital, it should be noted that Brazilian labour laws discourage unfair dismissal through termination penalties, which justifies the retention of workers. Furthermore, there are indications that business expansion measures were particularly successful for some firms, as demand for footwear was not uniformly affected (T31-32; D1).

Despite reports of new firms, especially those classified by Brazilian legislation as individual microentrepreneurs (who can only hire one labourer) (T33-34), the number of formal firms in the industrial district decreased in 2020 and 2021, as seen in Figure 4. In this context, the opening of firms providing services related to the footwear production stages is a warning point, especially if it is done informally and because of job losses.

FIGURE 6.
Transcripts on reaction except for innovation

Retrenchment
T24 - There was a salary reduction. There was also cost reduction, as much as possible, to maintain the firm. (I09)
T25 - In fact, we had to reduce processes. (I17)
T26 - The organisation continued to operate, but with fewer employees. Some had their contracts suspended. (I04)
T27 - We calculated how much money we had to pay, how much we had to receive... We talked to all the suppliers and negotiated. (I10)
Perseverance
T28 - The manufacturing process has not changed. (I01)
T29 - We tried to keep as many workers as possible, there wasn't a big reduction in the workforce. (I09)
T30 - We produced samples while the market was at a standstill. We did what we could do. (I10)
Expansion
T31 - During the pandemic, the firm hired three times the number of workers it had. I hired people who were fired or who had a salary reduction. (I14)
T32 - The firm did not follow what was most common. Everyone sought cost reduction. (I14)
Entrepreneurship
T33 - People chose to work at home after losing their jobs, look for other opportunities, and work in ateliers. (I09)
T34 - [Some people] sought micro-entrepreneurship. Some people got services from large industries, acting as outsourced workers, while others produced their own footwear. (I13)
Provision of local services
T35 - We did not need it, but we saw Sebrae helping other firms and providing consultancy. (I08)
T36 - Before there was a shoe fair, but events were forbidden during the pandemic. So, travel tickets were paid to customers to visit the factories. The customers came directly to the source. (I10)
T37 - Both employers' and workers' unions supported the firms. There were many lectures on what could be improved and what could be done to avoid layoffs. (I17)
T38 - Online fairs were held. It took a while for sales to grow, but the online fairs were great. (I17)
T39 - In 2020, we talked to the government about changing the city's patron saint's holiday to an optional holiday. (I20)
The passivity of regional actors
T40 - In terms of local government, I did not see support for firms. I also saw the unions very quiet. (I08)
T41 - I did not see many local government actions. (I09)
T42 - [Technical support institution] performance has not changed concerning the pandemic. (I17)
Importance of intraregional relations
T43 - We've made some partnerships to borrow raw materials; this has happened several times. (I07)
T44 - Entrepreneurs met. A business circuit was set up [to bring customers to visit the factories]… Unity was strength. (I10)
T45 - I realised how important networking is. Relationships generate dialogue. (I20)
T46 - We also show projections to banks to get a credit loan. People at the bank already knew me because I had been in the footwear market for a long time. (I10)
Change in horizontal relationships
T47 - Firms tried to reinvent themselves by uniting during the pandemic. (I05)
T48 - Our firm became closer to some competitors, as it was a time for one to depend on the other. (I09)
T49 - Before the pandemic, we did not have access [to other competitors]. (I07)
Importance of extra-regional relationships
T50 - I firmly believe that factories have seen the need to be faster, to be more connected to the domestic and foreign markets. (I05)
T51 - We hired two Milan-based women for fashion advice. (I10)
T52 - São João Batista depends a lot on other regions. The factories do not produce for the city's stores. It is very to the Northeast and other countries. So, when businesses began to reopen, São João Batista began to react. (I01)
T53 - And our industry depends on national retailers, not only in Santa Catarina, but especially in the Southeast. Many companies also sell to the Northeast, and others here even have a market share in the South. (I20)

Source: elaborated by the authors.

Figure 6 also reveals that firms benefited from the actions of support institutions, such as guidance, training, consulting, holding online fairs and paying for tickets for clients to visit the industrial district (T35-38). Due to the shock, political representation was also carried out to ease restrictions on the operation of firms and reduce labour costs (T39). However, the shock also affected business support institutions, with the suspension of activities contributing to a perception of passivity on the part of some interviewees (T40-42).

The transcripts also highlight the perceived importance of relationships in São João Batista (T43-45), including easier access to credit (T46). Some firms also sought closer links with competitors, which was facilitated by the fact that they were facing common problems (T47-49). In addition, respondents mentioned extra-regional links as a means of accessing new information (T50-51) and because of the location of consumer markets (T52-53). With the reopening of shops in several cities, firms in São João Batista have resumed suspended distribution channels, which has stimulated the economic recovery of the industrial district.

Figure 7 shows some transcripts about innovation, with the segregation to other reactions because of this study's focus solely. The corpus indicates that different types of innovation emerged in the industrial district. Product innovations included new models and design improvements based on the understanding that fashion constantly changes (T54-56). In terms of process innovations, those related to marketing and sales were driven by the need to facilitate the commercialisation of footwear directly to end consumers, which boosted internet use during the pandemic (T57-61). To this end, the footwear industrial district has accelerated digitalisation (T62-65), and some firms have also created departments or business models dedicated to e-commerce (T66-68). In addition, there were some reports of firms introducing new machinery, including using credit lines offered during the pandemic (T69-71) or trying to improve the manufacturing process in response to the drop in sales (T72). Thus, among the innovations emerging in São João Batista in the face of the COVID-19 shock, the data suggest that process innovations—particularly marketing and sales innovations—were the ones guiding the response to the contingencies arising from the pandemic.

FIGURE 7.
Transcripts about innovation

Product innovation

T54 - In the footwear industry, fashion changes very quickly; the footwear factories focused on modernising the shoe design [and] working with fashion materials. (I05)

T55 - When a colour comes into fashion, factories start producing shoes in that colour. (I05)

T56 - Our firm's innovation was to give extra joy to the product by working with the colours… We have invested in life [colours] and in the comfort of products. (I12)

Process innovation

▪ *Marketing and sales*

T57 - Despite all the bad things that have happened, companies have also recognised the need to reinvent themselves. There has been a lot of reinventions in São João Batista. Many companies have increased their turnover by reinventing themselves with internet sales. (I05)

T58 - We invested more in social media, social networks and digital marketing during the pandemic. (I12)

T59 - E-commerce was one area of positive growth in the industry. (I13)

T60 - E-commerce boosted the firm… the consumption of footwear continued. The final consumption of shoes was happening. It wasn't happening in normal, physical shops. So where were the end consumers shopping? In e-commerce. And the company was selling through e-commerce. (I14)

T61 - Online fairs were held… We now have an online store we acquired at that time. (I17)

▪ *Information and communication systems*

T62 - Now, basically, everyone is more digital. (I03)

T63 - Our digital structure was something that had been planned. However, it was small, incipient and, out of nowhere, took on enormous proportions. (I03)

T64 - The pandemic brought everything online. There has been a rapid evolution in technology to be able to have an online meeting. I think we've evolved about ten years of technology in one year. (I12)

T65 - Clearly [the pandemic] has accelerated digitalisation. (I20)

FIGURE 8. CONT.
Transcripts about innovation

▪ *Administration and management*
T66 - Today, firms have people dedicated to digital marketing and to e-commerce. (I13)
T67 - Some firms today only work with e-commerce, outsourcing footwear production. (I05)
T68 - Specific departments were created, people were assigned to work with social networks… People have been assigned to work with marketing… (I20)
Production methods
T69 - Some industries were looking for new machines during the pandemic… A few times, a businessman said there was [an imported] machine… he wanted to finance it. What I see most in terms of innovation in this industry is investment in new machines. (I03)
T70 - [After the credit line was opened during the pandemic] we were able to buy another machine, an Italian machine, which we needed to produce our products. By buying that machine, we also had to buy another one, and we had to invest in the factory, in production. And that [buying new machines] helped the production process a lot.
T71 - The firm also acquired new machinery… We invested in the company. (I14)
T72 - If you enter our factory floor, you will see the most organised factory in Brazil because we started having a lean and fast production process… We achieved that post-pandemic. (I07)

Source: elaborated by the authors.

The results of the interviews with different actors in the São João Batista industrial district are in line with the data available at the national level. According to reports from Abicalçados, the pandemic has prompted footwear companies to implement digital strategies, resulting in increased online sales and relationships (D1-2). Furthermore, among the sectors surveyed by the Semiannual PINTEC, preparing leather and manufacturing leather goods, travel goods and footwear had the highest percentage of innovative firms that developed innovation activities as a result of the pandemic (43.13% of the 234 responding companies, compared to 10.2% of the total sample of 6,630 innovative companies).

6. Discussion

Our empirical research indicated that the footwear industrial district of São João Batista was still dealing with the impacts of the 2008–2010 financial crisis and the 2014–2015 political crisis when it faced the shock of COVID-19 (see Figure 4). The pandemic triggered adverse economic effects, such as layoffs and company closures, with small and medium-sized enterprises, workers and outsourced firms—formal and informal—being particularly affected. The industrial district's response to this latest shock involved a range of mechanisms, which we explore in the subsequent paragraphs, detailing how they contributed to its resilience.

Marketing and sales innovations emerged in the São João Batista industrial district to facilitate interaction with the end consumer. With the closure of retail outlets in various regions due to measures aimed at reducing the spread of COVID-19, these process innovations enabled firms to implement direct sales to final clients, configuring an adaptation to the shock. These innovations were sought to mitigate negative impacts, a scenario that questions the segmentation between a moment of shock absorption without innovation and a moment of creative response. As such, this study extends our understanding of the creative response in the regional resilience process introduced in this literature by Filippetti et al. (2020).

By conceptualising innovation as a mechanism of adaptability, we challenge the sequential ordering of the dimensions of regional resilience—vulnerability, resistance, adaptability and recoverability—as found in other studies (e.g., Hu et al., 2022; Martin et al., 2016; Martin & Gardiner, 2019; Martin & Sunley, 2015, 2020; Sutton et al., 2023; Sutton & Arku, 2022). We argue that the initial impact of the shock could have been more severe if reactive measures based on innovation had not been taken or if they had been limited to attempting to maintain the status quo. It cannot be assumed that adaptation or economic transformation happens only after the shock's initial impact. Thus, this study contributes by

indicating that the influence of adaptability is not limited to economic recovery. We therefore suggest the following for future studies:

Proposition 1: The economic resistance of an industrial district is positively related to its adaptability.

The results also showed that the creative response is not limited to one type of innovation. In the case study, some companies reported that they had to improve their information and communication systems to support marketing and sales innovations. Others changed their organisational structures or business models. The existing literature has already reinforced the role of knowledge accumulation in the innovation process, showing that the pre-crisis innovations enabled the mitigation of adverse impacts during a shock (e.g., Bathelt et al., 2013). This article adds to these studies by showing that when pre-shock conditions are not well developed or are insufficient, the creative response requires a complementary set of innovations to cope with new contingencies. Therefore, it seems riskier and more costly to assume that the lack of pre-crisis innovations can be compensated by innovation during the crisis.

Regarding innovation types, this paper highlights process innovation as a reactive mechanism. In the industrial district studied, product innovation was related to using new materials, which is common in the footwear industry (see Boschma & ter Wal, 2007; Galuk et al., 2023). There were also design changes aimed at a "positive emotional response[s]" (OECD, 2018, p. 71), another common reaction in the fashion industry during recessionary periods, as shown by Oxborrow and Brindley (2012). Another response documented in the resilience literature is the introduction of new, higher value-added products (Belussi, 2015; Machado et al., 2019; Molina-Morales et al., 2023). However, process innovation, especially in marketing and sales, supported the search for adaptation in São João Batista in the face of the negative effects of COVID-19. Our findings suggest that process innovation can help explain the resilience of a fashion-related industrial district in the face of a pandemic.

Accordingly, we emphasise that the shock's nature influences the creative response. The drop in demand in the São João Batista industrial district was temporary due to limited spatial mobility and face-to-face social contact in consumer markets. The COVID-19 crisis is distinct from recurrent financial crises and exchange rate fluctuation scenarios, as in these cases, differentiation is seen as a resilience strategy for the footwear industry, as Machado et al. (2019) suggested. Our case also differs from the Finnish one studied by Simonen et al. (2020) when it comes to entrepreneurship and product innovation in response to a shock. The case reported in this article is also different from the technological disruptions caused by the innovation of plastic ski boots in Montebelluna (Italy) and digital printing on tiles in Castellón (Spain). In these industrial districts, disruptions emerged from firms activating intra- and extra-industrial district networks, generating shocks that required responses in search of innovation diffusion and resilience (Molina-Morales et al., 2023). Thus, by drawing on the context of São João Batista in the face of COVID-19, and contrasting it with other cases presented in the regional resilience literature, we argue that the specificity of a shock drives industrial districts to direct their efforts towards different types of innovation. Therefore, we suggest:

Proposition 2: The relationship between the type of innovation and the economic resistance and recovery of an industrial district is shaped by the shock's nature.

This study's findings also highlight how the determinants of resilience can be affected during a shock, thereby reducing the capacity for a creative response. While the ability to attract and retain skilled workers is a source of regional resilience (Spigel & Vinodrai, 2021), the emigration of human capital is seen as a barrier to resilience (Simonen et al., 2020). In this context, the footwear sector faces a challenge: the low attractiveness of the manufacturing sector for the next generation of workers (Galuk et al., 2023). Furthermore, in the case of the pandemic, interviewees reported an exodus of workers in São João Batista due to the cost of rent and the closure of workplaces. Thus, the present case study sheds light on how a shock can affect human capital in the form of skilled labour, thereby turning a source of resilience (availability) into a barrier (scarcity). Previous research has shown the limitations of using the sectoral structure as a determinant of economic resilience or recovery, emphasising skill and experience levels instead (Harris et al., 2020; Martin et al., 2016; Martin & Gardiner, 2019). Moreover, regardless of the preexisting capabilities considered, from the perspective of our results, they cannot be assumed to be immutable or available and ready to be mobilised in times of shock.

Another mechanism of shock reaction is entrepreneurship, a source of adaptability and economic diversity (Simonen et al., 2020; Williams & Vorley, 2014). In this sense, Molina-Morales et al. (2023) pointed to the growth in the number of firms in an industrial district as one of the possible alternative measures of resilience in the context of a shock resulting from disruptive innovation. In the case of this paper, we considered the reaction to a pandemic shock in a footwear industrial district. While formal employment in the São João Batista recovered to just below pre-pandemic levels in 2021, the number of firms declined (Figure 4). The evidence from the interviews portrays the opening of outsourced firms, mainly through i) the legal figure of the micro-entrepreneur, characterised by the work of a business owner with up to one employee or ii) informality. Thus, in the industrial district under study, entrepreneurship as a response to the crisis resulting from COVID-19 did not support the type of resilience characterised by a propensity to risk and innovation. When dealing with different industries and shocks, we suggest extending the measure proposed by Molina-Morales et al. (2023) to include informality. As such, we recommend that future studies include the rates of change in the number of formal and informal firms as complementary proxies for assessing the resilience of an industrial district.

The reaction to the studied shock also included business support services, such as consultancy, training, online fairs and political representation. Despite reports of the provision of these services, some interviewees perceived passivity on the part of certain institutions. These findings point to an active role for institutions in the event of a shock and that firms should not simply wait to be rescued (see also Brown et al., 2020; Hoffmann et al., 2017). In particular, the present paper suggests that these services should include informal economic activities to create conditions for exploring opportunities during a pandemic shock. Furthermore, this study also illustrates the perceived importance of relationships within an industrial district in responding to a pandemic shock. Our results indicate that some may be temporary and established because of contingency (see also David, 2018).

7. Conclusion

This research examined innovation as a response to a shock in the process of regional economic resilience through a case study of the footwear industrial district of São João Batista (Southern Brazil), considering the COVID-19 crisis. We conducted interviews with different regional actors and collected secondary data to complement the analysis of the transcripts. Our findings suggest that the emerging reactions supported the footwear industrial district's adaptation to the shock, allowing us to outline some propositions.

First, our empirical evidence indicates that innovation, particularly in marketing and sales, was sought to mitigate the severity of the COVID-19 pandemic crisis in the São João Batista footwear industrial district. Understanding innovation as a mechanism of adaptability, we propose the influence of this dimension of resilience on economic resistance. Second, our discussion contrasts the findings of our paper with studies in the regional resilience literature that emphasise other types of innovation as a means of adaptation or transformation. In this context, we suggest that the relationship between the type of innovation and economic resistance and recovery depends on the nature of the shock.

In terms of practical implications, considering resilience as a process, we recommend promoting a culture of innovation in the industrial district and identifying different types of shocks and possible preventive measures or responses to them. For a traditional manufacturing industrial district characterised by the outsourcing of services, including informally, we also suggest that institutional support should not be limited to formal firms during a shock. In addition, following reports of worker migration, we suggest considering policies to maintain employment through different forms of work contracts in the absence of technological obsolescence. During a pandemic, public policies to settle people in the region can reduce the outflow of skilled workers and increase employment and production levels when activities resume.

One limitation of this research is that we conducted it shortly after the shock. Therefore, the reaction dynamics may not have been completed when we collected the interview data. As a recommendation, we suggest further studies with a longitudinal perspective, which could also compare the reaction process to different types of shocks and even cover multiple regions. In addition, the procedures used to reach our interviewees, though based on the literature, emphasised the selection of firms and support institutions.

Future research could delve more deeply into the perceptions of (former) labourers and the question of resilience for whom (see also Lemke et al., 2023). Furthermore, the propositions in this article represent avenues for advancing knowledge on regional resilience.

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