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Let's move on! How pair collaboration activates resilience toward innovation crises

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Keywords: pair, resilience, innovation

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ABSTRACT

This study explores how resilience is activated in pairs fostering innovation. On the one hand, a growing body of literature affirms pairs as a form of collaboration adept at instigating and developing breakthrough innovations. On the other hand, innovation inevitably entails failures and setbacks requiring resilience to thrive. As such, numerous scholars call for investigating how resilience works at different level of analysis in organizations: while much has been said at the individual and organizational levels, the literature is mostly silent on how resilience is activated and emerges through social connections. Therefore, this study explores how resilience emerges, and how it is nurtured and sustained in pairs facing innovation crises. Our multiple case study using data from ten innovation pairs in different industries shows that a pair's intimate environment enables resilience, and this intimacy activates two dynamics. First, it facilitates compassionate witnessing, the creation of cohesiveness within the pair, and mutual engagement to move forward. Second, it enables relational redundancy with actors both within and outside the pair's reference group, which is crucial to understanding who to trust and which direction to pursue. From a theoretical perspective, this study contributes to the literature on resilience and pairs. From a managerial perspective, our study suggests relying on pairs as a possible form of collaboration to nurture resilience in innovation.

Keywords: Pairs, resilience, innovation

1. Introduction

Pairs in innovation are extremely diffused (Hunter et al., 2012; Rouse, 2020). Indeed, most innovations that have disrupted our lives in recent years were conceived and developed not by individuals and teams but by pairs. To mention but a few: Jobs and Wozniak for personal computers (Isaacson, 2011), Brin and Page for the search engine that became Google (Hunter et al., 2012), and Murphy and Spiegel for the ephemeral one-to-one communication and sharing mechanism that turned into the social media Snapchat (Gallagher, 2018). These examples suggest that the number two holds something special when dealing with innovation projects (de Voogt & Hommes, 2007; Hunter et al., 2017).

Nevertheless, the elicitation and development of innovation does not come without a price: hurdles, failures, and obstacles are the norm and need to be appropriately managed and overcome (Leuridan & Demil, 2021). Pairs seem particularly able to foster resilience toward critical challenges and crashes (McGrath, 2015). As challenging and difficult moments arise within the pair's boundaries, the individuals seem to find a safe space of reflection to make sense of how to move forward (Thompson & Ravlin, 2017).

Consider the case of Spotify that Ek and Lorentzon created. As Lane (2014) describes, they had a vision to create a music service that would be better than piracy and, at the same time, compensate the music industry. In fact, they felt that piracy was leading music "down the drain," despite the fact that people were listening to more music from an ever-greater variety of artists. The revolution led by iTunes was deemed insufficient. However, it took years for Ek and Lorentzon to make their dream come true. Indeed, although starting in 2003, the company launched the service only in 2008; a journey that required them to be resilient and thrive despite numerous obstacles. To show that they were not there just to use content but to create value for the industry, they did not want to debut until they had signed deals with labels. They first attempted to obtain global music rights but were quickly turned down. They then aimed for European licenses, assuming it would take three months when instead it took two years. They hounded label execs, pitching their free ad-based model that would eventually lead to more sales. No one trusted them. Ek recalled, "They said 'yeah, it sounds really interesting' or 'send me over some stats,' which means, 'there is no way in hell we are going to do this'" (Lane, 2014, p. 63). While they were negotiating with labels, Spotify burned money. The pair pledged millions to the project, "We bet our personal fortunes, and sometimes we bet the entire company (…). We led with our conviction rather than rationale, because rationale said it was impossible" (Lane, 2014, p. 63). At the same time, they underlined that their strength resided in their close relationship, as Lorentzon stated, "I got a very strong feeling when I met Daniel

(…). To partner up, I have to like the person like a brother, because we will face so many problems. The value of a company is the sum of the problems you solve together" (Lane, 2014, p. 61–62). This example shows that Ek and Lorentzon managed to survive numerous challenges, difficulties, and hurdles by being resilient, sticking to their plan and vision. Still, how did they make it? How did they find resilience as a pair to follow their convictions over rationality?

From a theoretical perspective, resilience is defined as "a dynamic process encompassing positive adaptation within the context of significant adversity" (Luthar et al., 2000, p. 543). Coutu (2002) recognizes that resilient people have three main characteristics: the ability to face reality with resolution, find meaning in hardship, and improvise solutions. Gittell (2008) explores the role of relationships in facilitating resilient responses to external pressure. He suggests that the relational dimensions (such as shared goals, shared knowledge, and mutual respect) nurture resilience by providing a high level of information-processing capacity, thus facilitating relational coordination in highly uncertain activities. The interest of management and organization studies in the resilience concept has consistently grown in recent years (e.g., Raetze et al., 2021; Stoverink et al., 2020; Conz & Magnani, 2020; Linnenluecke, 2017). However, it is still rather unclear how resilience works at different levels of analysis in organizations (Raetze et al., 2021). Indeed, while much has been said at the individual and organizational levels, the literature is mostly silent on how resilience is activated and emerges through social connections.

Besides, little is known about how resilience is enacted in the context of an innovation crisis (Moenkemeyer et al., 2012). Most studies about resilience in managerial and organizational settings focus on a more classical instance of unforeseen contingent problems and crises: those that can emerge from the external environment (e.g., the financial crisis of 2008, the COVID-19 pandemic in 2020, an environmental disaster) (Lagadec, 2007). However, when dealing with innovation projects, unexpected problems and crises can emerge directly from the innovation activity per se. These are intrinsic to the specific innovative vision/idea or project and emerge as innovators are trying to frame it and bring it to life (e.g., in the case of Spotify, the process for obtaining licenses which took years because labels' execs did not trust them) (Chiesa et al., 1996; Kim, 2005). While an exogenous crisis represents a more typical instance of "crisis," endogenous crises are specific to innovation activities. They require a more sophisticated endeavor as the innovators have to question and decide whether to continue the project or not, whether what they are doing makes sense or not considering the crisis in place (Williams et al., 2017).

Therefore, expanding the knowledge about how innovators react and find the resilience to move on in the context of unexpected endogenous crises that threaten the innovation project becomes crucial (Williams et al., 2017).

Recent studies on pairs show that they might foster resilience through intimacy and connection (Thompson & Ravlin, 2017), specifically in innovation projects. Therefore, we aim to explore how resilience emerges in innovation projects, how it is nurtured and sustained in pairs, by asking: How is resilience activated in pairs facing an unexpected innovation crisis?

To do so, we adopt a qualitative case study approach relying on in-person semi-structured interviews with ten different pairs that experienced unexpected and near-disaster events in their innovation project. The pairs were selected from different industries and comprised entrepreneurs and managers. We focus our attention on pairs that operate in a larger organizational context: a setting that better represents the context of innovation projects. Somehow, rarely, innovation projects are managed and performed entirely by a pair, but most likely by larger forms of assembly where the pair is the pulsing heart and primary decision maker (Hunter et al., 2012). Regarding Spotify's example, Ek and Lorentzon did not operate in a vacuum but could leverage the competencies and resources of the organization they created. Each interview lasted an average of 2 h, leading to a total of 20 h of recording.

Our findings suggest that pair resilience is forged from pair intimacy that provides a safe space of reflection to recover and heal within the environment. In addition, the pair's sociological nature enables mutual compassionate witnessing, a dynamic that arises naturally. In a pair, individuals perceive when the other is not feeling good and provide care. Finally, we find that pairs do not overcome hurdles by themselves but rely on social connections to discern the right direction to take and gather critical knowledge to move forward after failure.

This study aims to contribute to both literature and practice. From an academic perspective, we aim to contribute to innovation management literature by expanding the knowledge on pairs in innovation, which has gained momentum in recent years (e.g., Rouse, 2020; Hunter et al., 2017). By introducing the concept of resilience, we shed light on a micro phenomenon that is crucial to innovation projects success (De Clercq & Pereira, 2019).

In particular, aggregating the two literature streams exploring pairs in innovation and resilience in innovation allows us to observe their joint effect. On the one hand, we observe how pairs enhance the resilience dynamics of individuals by providing an intimate space to go to when shocks occur (Hunter et al., 2017), a trusted person to refer to, and a safe space where empathy and engagement are easily obtained. We contribute to this literature by showing how pairs nurture innovation not only by being the locus of co-creation (Rouse, 2020) and curious

criticism (Verganti & Norman, 2019) but also the locus of resilience. On the other hand, we show how resilience decreases some of the traditional pitfalls of pairs, such as their tendency to be closed to the external environment (Järvinen et al., 2015). The need to react to an innovation crisis pushes pairs to reinvent and enlarge the relational space, thus reducing the potential threats of being part of an innovation pair. In other words, pairs and resilience in innovation seem to have a virtuous effect on each other. Finally, by focusing on pairs' collaboration, we provide insights about how resilience emerges through interactions.

From a managerial perspective, the study provides insights on how pairs might work as an organizational form to nurture resilience and overcome the hurdles and obstacles that characterize every innovation journey. In particular, we show that managers – and particularly innovation managers – should consider alternatives to traditional team working or individual spaces for innovation, allowing people to enter the intimate space of pairs, especially when innovation crises emerge, to exploit the mutual benefits that pairs and resilience can provide in innovation projects.

2. Literature background

Traditionally, cross-functional teams have been the primary organizational form adopted to foster innovation projects, as they ensure complementarity in competencies, skills, and perspectives. Nevertheless, the literature on pairs suggests that it is not only a matter of competencies and resources when dealing with innovation, but also a matter of closeness and intimacy in which self-disclosure and mutual criticism can take place (Rouse, 2020). In addition, stories about pairs suggest that they can nurture resilience toward critical challenges and crashes that occur daily in innovation (McGrath, 2015). In our literature review, we explore at what has thus far emerged about pairs, why they differ from other forms of collaboration, why they are so relevant in innovation, and the main dynamics they facilitate. Further, we deepen the concept of resilience from a human perspective, highlighting what people need to thrive when innovation crises arise.

2.1. Pairs in innovation

Recently, the study of pairs in innovation has gained momentum in various domains, such as entrepreneurship (Hunter et al., 2017), creativity (Rouse, 2020), management (Svejenova et al., 2010; Järvinen et al., 2015), and sensemaking (Bellis & Verganti, 2020, 2021).

Scholars seem to agree that in managing innovation, teams are far less likely to succeed than pairs, as dual arrangements seem to lead to unique and unexpected outcomes (de Voogt &

Hommes, 2007).

Indeed, the uniqueness of pairs compared to individuals and teams has emerged in terms of intensity of involvement, dependence, self-disclosure, participation, and behavioral attribution (see also Andersen & Taylor, 2010; Thompson & Ravlin, 2017). The reasons why dyads differ in eliciting and instigating novel and valuable ideas compared to larger constellations reside in their sociological traits that ensure full co-responsibility and reciprocity (Simmel, 1902).

When collaborating in pairs, the co-responsibility of the individuals for collaborative action is perfectly visible. Each has only the other individual at their side and not a multiplicity as in a team (Bellis & Verganti, 2021). As such, neither can hide behind a team in cases of positive or indeed negative action. Both must perform because if one refuses, the other remains, and the outcome is no longer the result of a collaborative endeavor (Hunter et al., 2012). Indeed, the departure of one individual will likely destroy the whole, unlike in the case of associations of even just three, whereby if one individual leaves, the group may continue to exist (Moreland, 2010).

In addition, scholars observe that it is challenging for a constellation of three to arrive at a unified state of feelings, which might occur with relative ease between a constellation of two (Tortoriello & Krackhardt, 2010). In other words, the two become one party and act accordingly, while constellations of three constitute three parties that unify the relation of each individual with the others.

Even emotions play a more significant role in dyadic than in team collaborations. Indeed, individuals seem to enjoy smaller constellations more than larger ones, mainly due to deviances, such as interpersonal conflicts, social loafing (Moreland et al., 1996), and evaluation apprehension (McGrath, 2015). Furthermore, the closeness experienced in a pair enables the individuals to interact more often and have a broader impact on the other, providing a higher sense of stimulation and enjoyment (McGrath, 2015). Given that each individual relates only to one other, there is only one relationship through which emotions can flow (Alvarez & Svejenova, 2005). In teams, this is more complicated, as they tend to establish norms that regulate the emotional experience of individuals in a way that could weaken the entire collaborative experience (Kelly & Barsade, 2001).

Therefore, pairs are a collaborative form where no other forces are available that do not spring directly from the partnership. Full reciprocity and co-responsibility anchor the individuals to the relationship, making it more intense and stronger (Simmel, 1902), enabling an intimate space of reflection in which emotions and thoughts flow (Farrel, 2003).

Pair intimacy allows immersion and reflection (Brenton & Levin, 2012), crucial for

opportunity identification and idea generation (O'Connor et al., 2004). Within the pair's intimacy, the individuals feel safer disclosing bold and half-baked ideas (Moss & Schwebel, 1993; Shotter & Billig, 1998), as the concern of being negatively judged by others is mitigated (Baer & Brown, 2012; Pierce et al., 2001). Ideas emerge as fragile thoughts that are easily flattened. The intimacy of pairs facilitates not only idea externalization but also nurturing through mutual criticism (Verganti, 2016) and creative abrasion (Hill et al., 2014). Individuals are more open to receiving critical feedback, hence reframing a more robust interpretation (Farrel, 2003). Therefore, pairs constitute a unique social entity (Moreland, 2010), a robust platform for envisioning and creating new interpretations (Rouse, 2020; Hemlin, 2006). Collaboration in pairs affords nurturing and an uninterrupted communication channel (Moreland, 2010). In addition, dyads offer an audience free and psychologically safe environment for disagreement, liberated of judgment by neither a majority nor a minority (McGrath, 2015).

2.2. Innovation Crises

Even if pairs are a powerful organizational form fostering innovation, innovation is not only about the emergence of novel and valuable interpretations but entails operating in an increasingly uncertain environment. Innovation implies long journeys and dealing with unexpected and surprising events that might lead to intolerable outcomes (Leuridan & Demil, 2021). These events are known as innovation crises, defined as "low-probability, unanticipated, high impact (i.e., harmful) events that are unpredictable, surprising, and threaten the viability of the project" (Williams et al., 2017).

Within an innovation project, crises might arise from different sources: they can emerge from exogenous contingent events happening in the external environment (Lagadec, 2007) or from the innovation project itself as innovators are trying to frame it and bring it to life (Blatt, 2009). The former crises are, for example, contingencies related to environmental crises, economic crises, or the more recent COVID-19 pandemic: all events that threaten the innovation project's success but are project independent.

The latter crises are endogenous to the innovation project and might be of a technical nature (e.g., a technology that does not perform as expected) (Chiesa et al., 1996), come from the market (e.g., a market test that fails) (Kim, 2005), or related to collaboration and leadership factors (e.g., the top management does not release the budget) (Hill et al., 2014; Hunter et al., 2017).

Somehow, dealing with crises in innovation projects is much more complicated than any other task or initiative, as innovators deal with hurdles coming from both outside and inside the project (Moenkemeyer et al., 2012). Besides, solving endogenous crises is a much more sophisticated activity as it requires innovators not only to endure but also to question the innovation project's credibility (Välikangas et al., 2009). As an endogenous crisis happens, innovators have no immediate answer regarding whether it makes sense to move forward or not, sometimes requiring innovators to pivot toward a new direction of development (Williams et al., 2017).

In this study, we examine how pairs behave when experiencing endogenous unexpected and near-disaster crises that threaten the success of the entire innovation project (Blatt, 2009), namely disrupting project-related events characterized by highly ambiguous causes, effects, and means of resolution where decisions must be made swiftly to avoid innovation failure (Williams, et al., 2017). We assume that pairs promote resilience to overcome crises and failures, acting mutually as mood stabilizers. The intimacy of the relationship might promote obligations, volunteerism, and the responsiveness of one to the other (Roloff 1987; Roloff et al., 1988). As the topic of resilience has been widely explored mainly at the intersection of the psychological and organizational fields, in the next section, we explore resilience with a focus on innovation projects.

2.3. Resilience in innovation

Studies on resilience focus mainly on two perspectives: a static view and a dynamic view (e.g., Dutton et al., 2002; Richardson, 2002). The static view sees resilience as the ability to bounce back in the face of adversity and restore the status quo (Dutton et al., 2002). In this light, resilience is simply the ability to rebound from unexpected, stressful, or adverse situations, picking up where you left off (Robb, 2000; Rudolph & Repenning, 2002). This view is similar to definitions of resilience in the physical sciences in which a material is resilient if it can revert to its original shape (Lengnick-Hall et al., 2011).

The dynamic view sees resilience as a process of coping with adversity, change, or opportunity, resulting in the identification, fortification, and enrichment of resilient qualities or protective factors (Richardson, 2002; Luthar et al., 2000). This view goes beyond simple restoration following shocks, underlining the ability to keep pace with change, learn (Sarkar & Fletcher, 2014), and create new opportunities (Coutu, 2002).

As scholars of resilience in innovation suggest (e.g., De Clercq & Pereira, 2019; Todt et al., 2018), we focus on this latter definition. Innovation is characterized by high unpredictability,

complexity, and risk (Van de Ven, 1986). Therefore, resilience entails not only the ability to recover from adversity, but also, and above all, the potential to maintain motivation and innovativeness after setbacks and crises, finding the strength to cope with future issues generally expected in innovation contexts (Moenkemeyer et al., 2012). Thus, resilience in innovation refers to a continuous reconstruction capacity (Välikangas & Hamel, 2003).

From a human perspective, studies suggest that resilience is strictly related to good interpersonal relationships (Sutcliffe & Vogus, 2003). Resilient responses to external adversities require both emotional (Stephens et al., 2013) and psychological resources (Gittell, 2008), while relationships help access and accumulate these resources in the form of caring and concern (Abbey et al., 1985).

Scholars have extensively investigated how personal relationships nurture resilience (Sutcliffe & Vogus, 2003; Abbey et al., 1985). Different empirical studies demonstrate that social support predicts individual resilience (Meng et al., 2019; Kakkar, 2019; Todt et al., 2018). Stephens et al. (2013) show that the closeness experienced in a relationship nurtures individual resilience, and that trust facilitates team resilience. Other scholars focus on the role of positive relationships in enhancing individual resilience (Wang et al., 2014). Although these studies have generated important insights on the role of social relationships as an antecedent of resilience, they neglect its dynamic and emerging nature (Raetze et al., 2021). The only model, to our knowledge, that moves in this direction is that of Powley (2009) exploring how resilience emerges as a socially enacted and embedded phenomenon. Powley's (2009) model is particularly interesting given that we aim to investigate how resilience is activated in pairs experiencing unexpected and near-disaster innovation crises (e.g., events that are detrimental to the innovation project's progress). Indeed, Powley's model explains how resilience, defined as the latent capacity to rebound from setbacks, is activated through social connections in unexpected organizational crises, finding application in studies in different fields, such as organization (Cerquetti & Cutrini, 2022), management (Wang et al., 2021; Kahn et al, 2018), and leadership (Dimas et al., 2018). Although Powley's model does not specifically consider the innovation context, it suits the purposes of our study focused on innovation crises that threaten the success of the entire innovation project, thus requiring individuals to gain a profound understanding of how not to give up and move on.

Powley's model is based on three dynamics explaining how an individual's resilience is activated through social connections: liminal suspension, compassionate witnessing, and relational redundancy. In what follows, we summarize Powley's (2009) framework (Figure 1) to explore how it helps explain pair resilience.

First, *liminal suspension* is defined as the alteration of relational structures and the emergence of new relational patterns. As a crisis occurs, people enter a liminal space where they take time to readjust psychologically, emotionally, and relationally by making sense of the change in place (Turner, 1974). Furthermore, being suspended in liminality makes relational structures shift: to cope with the crisis, people form new relationships and strengthen existing ones. The liminal space is a cross-over space to restore the environment without considering prior constraints, as they may no longer be meaningful in the upcoming scenario (Kahn, 2001). The liminal space initiates resilience, allowing people to experience a sense of belonging or community.

Second, *compassionate witnessing* involves noticing and feeling empathy for others. It focuses on the role of deeply personal and interpersonal emotions, thoughts, and concerns for individuals in their relations with others that enable healing from trauma (Butler et al., 2009). Compassionate witnessing involves seeing others in a different light and empathizing with them, referring to the disclosure and pain-sharing dynamics that activate resilience by enabling people to find relief and strength to move forward (Frost et al., 2006).

Finally, *relational redundancy* refers to how interpersonal connections intersect and span beyond the immediate social group of reference. It activates resilience through intersecting interactions that produce redundant actions, thereby extending the knowledge and information inputs crucial to reorienting the new reality (Sutcliffe & Vogus, 2003). Redundancy is crucial in this mechanism, as it facilitates the transmission of critical information among actors. As people share knowledge and create opportunities to recover, resilience is enabled.

Interestingly, Powley (2009) characterizes these three dynamics and assigns them different roles in the activation of individuals' resilient behaviors (Figure 1). On the one hand, the three dynamics – liminal suspension, compassionate witnessing, and relational redundancy – have the same role regarding resilience, namely activating it. On the other hand, they are not at the same conceptual level. Exogenous shocks usually trigger liminal suspension, an enabler of compassionate witnessing and relational redundancy.

(Insert Figure 1 about here)

In sum, our study builds on and aggregates two main literature streams: the role of pairs in innovation projects, and the role of resilience in innovation activities. Scholars highlight that pairs are a particular organizational form enabling resilient behaviors (Thompson & Ravlin, 2017); however, there is a lack of research contextualizing resilience in pairs, how it is

activated, and the pair-related peculiarities that matter.

3. Method

This research is based on a multiple case study and a contextualized analysis leveraging primary and secondary sources in a retrospective approach (Yin, 1998). Our aim is to investigate how resilience is activated in pairs facing challenges in innovation. In designing our study, we followed the CASET method of Goffin et al. (2019). Further, in accordance with Gibbert et al. (2008), we adopt current theories to help us interpret our data and obtain internal validity.

3.1 Research design and sampling

To address our research question, the case study methodology is the most appropriate for the following reasons. First, despite that the role of pairs is well known both in the academic and practitioner literature, it remains inadequately explained in existing studies (Hunter et al., 2012). Most studies of pairs in innovation rely on secondary sources (e.g., Svejenova et al., 2010) or on experiments in a controlled environment (Bellis & Verganti, 2021). Second, our study is exploratory from both the pair and resilience perspectives. In the former, empirical investigations of the dynamics that characterize this form of collaboration are lacking (Rouse, 2020), while the latter is still in the early stages with regard to innovation (De Clerq & Pereira, 2019).

Therefore, we selected and interviewed 10 pairs as a convenience sample, since dyadic relationships can often be hidden in an organizational environment and hence not easily spotted. To the best of our knowledge, this is the first study that relies on first-hand data, hence providing greater accuracy and authenticity to our findings. Table 1 summarizes the characteristics of each pair. We ensured heterogeneity in our sample (Eisenhardt & Graebner, 2007) by selecting pairs differing in terms of industry, tenure, and roles, including start-up co-founders and managers. All the selected pairs, entrepreneurs and managers, operated in the context of a larger organization. It implies that they could rely on other competencies and resources than the one held by the duo, despite being the pulsing heart and primary decision maker of the innovation project from envisioning to developing and market release. We also adopted additional selection criteria. First, we considered the existence of patents and the growth rate of sales as indicators of the goodness of the innovation initiative. Finally, we selected pairs according to the crisis faced, including in our sample those that faced a major endogenous unexpected crisis that threatened the innovation project itself (Table 2).

(Insert Tables 1 & 2 about here)

3.2. Data collection

We conducted and recorded at least one interview with each pair (see Table 3) for a total 1,150 min adopting a semi-structured interview protocol (Bell et al., 2018; Yin, 2009). The questions aimed to investigate the pairs' innovation story and the critical episodes characterizing it with a particular focus on moments of crisis or failure. We tested and refined the research protocol through pilot studies with pairs not included in the final sample. The pilot interviews were crucial to test whether to interview the two individuals in each pair separately or together. We found that interviews in pairs were more valuable because more insights emerged as the individuals started building on each other's content. The interviews, took place between February 2019 and July 2022, were conducted in Italian with Italian pairs and in English with the others. When needed, the interviews were integrated with email exchanges.

In addition to the data collected through interviews, we gathered secondary sources. These secondary sources varied and were used for different purposes. On the one hand, we consulted newspaper or magazine articles and video interviews to obtain initial background information on the two individuals forming the pair and their history. In cases where individuals were very active on social media (e.g., Instagram or LinkedIn), we closely monitored these channels during the data gathering period. These secondary data analyses provided preliminary knowledge about the pairs and enabled focusing the interviews on the main points of interest without spending too much time on contextualization. On the other hand, internal documents made available by the pairs allowed integrating the data gathered in the interviews. Finally, the secondary sources also allowed monitoring the development of the innovations themselves and their success rate, as well as increasing the robustness and reliability of our findings (Miles & Huberman, 1984). In particular, the secondary sources were fundamental to contextualizing the environment in which the pairs collaborated and triangulating the historical events characterizing their stories.

Interviewees and fellow researchers who were not part of the primary data collection reviewed and validated all the data gathered to avoid bias and misinterpretation.

(Insert Table 3 about here)

3.3 Data analysis

We analyzed the data using a structured coding approach (Corbin & Strauss, 2008). One of the authors performed the data analysis independently, subsequently validated by the two co-

authors (Saldaña, 2021). The coding started from line-by-line coding to identify the first-order codes (Gioia et al., 2013). Next, we undertook axial coding to examine and compare the first-order codes with the dimensions of Powley's (2009) framework to formulate theoretically informed second-order codes (Gioia et al., 2013; Van Maanen, 1979). We checked the internal validity through pattern matching. Then, an external researcher validated the codebook to increase the reliability of the research process. Finally, we created the coding tree in Figure 2.

(Insert Figure 2 about here)

4. Results

In exploring how resilience is activated in pairs facing crises in innovation projects, Powley's (2009) three dimensions also emerged in our data, even if his study focused on individuals rather than pairs. Therefore, in what follows, we present our findings for each of Powley's three dimensions – liminal suspension, compassionate witnessing, and relational redundancy – highlighting the pair-related implications. Table 4 summarizes our findings.

(Insert Table 4 about here)

4.1. Liminal suspension

The first second-order category relates to a liminal moment in which the relational structures are altered, and people need time to readjust psychologically (Powley, 2009). In the analysis of pairs, this dimension also exists. In particular, the pair's intimacy seems to provide a safe space of reflection in which individuals take refuge after an innovation crisis in order to restore, take a breath, and look at the outside through a new lens. This is discernible in the following quotes:

"We took a longer break than needed. Breaks are for sorting out these sorts of issues. And then we went back in and Frank was a different person and he felt like a load had been lifted from his shoulders." (Pair 7)

"There are those days where maybe you're on the phone 8 h and everyone is like 'no, I don't care', and so you think, 'Do I go on? Does this make sense? What am I doing wrong?' Here is the luck of being in two. Then also the fact of having a laugh and saying, "tomorrow it will happen again, but it's okay." (Pair 4)

In this intimate space, different dynamics take place, serving in those moments when words are not needed and the pair might simply remain silent, giving one another space and time to reflect. In fact, what is needed is the pair's presence:

"I would say that every time we've faced really big problems and challenges, we found

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ourselves sitting together for dinner. We order the food and then an hour later, when we have eaten and paid the bill, we realize that we haven't said a word. But rather we're sitting there just looking up at the ceiling, both trying to play the game of chess and trying to come up with what the next move is. How do we move to checkmate? I think we have that process very much in our heads, and then we come to conclusions and we share those. So, it's never anyone throwing out this is bad or this is good. It's really trying to play all the different moves and trying to find the best move." (Pair 6)

In addition, this space might be used for intimate and direct communication based on gut feelings as well as verbal language, but with the same perception that choices mostly come from within, from a shared feeling and sense of doing the right thing. Still, when perceptions come from within, they are half backed and not properly defined, but the fact that both individuals perceive them similarly is enough to move forward. For example:

"We weren't clear on what we were doing, it was all done from the gut, and there was little business and a lot of gut." (Pair 1)

"The belly told us 'how cool is this thing,' because it is a product that can be adapted to the needs of the customer." (Pair 9)

Otherwise, when communication is based on verbal language within the pair's intimate environment, the individuals reach a level of focus and detail that enables them to design and build solutions by simply speaking. As Pair 10 stated the following:

"We spoke on the phone, we understood each other (…) we didn't design over the phone but we didn't miss much, in the sense that we could understand the important things."

Within this space, all the formal rules and norms are suspended. Above all, coherently with Powley's (2009) model, relational rules seem to shift. In particular, any sort of formal or hierarchical relationship seems to disappear, as well as formal differences in competences, as individuals perceive being on the same level without any sort of formal agreement:

"It was really working together because it was feeling on the same side. Maybe it seemed to both of us that we completed each other." (Pair 3)

"Each has a more or less defined role, but there is always the 'Do you like this?' or 'Listen, I send this what do you think?' So, it's a daily exchange, a natural balance." (Pair 4)

This ability to alter relational structures is crucial to pair resilience, as it enables moving forward. As innovation crises occur, it seems that one of the two individuals takes the lead and pulls both. For example:

"I personally thought it was an insurmountable obstacle. Luckily, he went ahead anyway." (Pair 3)

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Even when the other is your direct boss, as in the case of Pair 10:

"I remember one morning he came to my office. We were there and he said, 'Look, I want to stop working on everything else, let's just do the accelerometer.' I asked 'But why?' It turned out that he had found certain particular applications. I said OK, let's move on with only this."

This strength to take the lead over the other in critical situations is crucial not only to making decisions when needed but also and above all to provide emotional support:

"There were times when he was discouraged and said 'no, it's enough!', he would quit and would no longer go on. And then I would go on, we pushed each other a bit." (Pair 1)

4.2 Compassionate witnessing

Compassionate witnessing refers to the ability to empathize with others during an innovation crisis. The collective experience of sharing pain provides a space to connect with others, fostering confidence in working together. This mechanism takes place within pairs, also in this case with some specific dynamics. First, the collective experience of sharing pain happens within the pair boundaries and nurtures mutual deep learning about each other:

"We always told each other what we had to say, both in good times and even in the worst of times, but this made it possible to create total transparency and to learn about each other" (Pair 5)

This mutual learning through pain and setbacks contributes to creating cohesiveness between the two individuals:

"The way we have gone about the bigger challenges and problems, rather than arguing, we found ourselves." (Pair 6)

"We were in the competition, and we had to win, but we also needed the product. And my concern was related to the depth of Mike's dark circles under his eyes. He was spending nights with his team trying to find a solution. It was a hot three months, including August, in which however we all gave more than 100% and won the bid." (Pair 8)

Further, mutual learning nurtures the confidence to take the next step in the innovation project, as Pair 4 stated the following:

"So, the fact that we have each other's back all the time, knowing that we are compact, whatever happens, slowly step by step, it sounds silly, but it makes so much difference."

Compassionate witnessing nurtures not only mutual learning but also mutual engagement. Through mutual empathy, individuals find it easier to engage each other and gain strength to overcome innovation crisis.

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"He couldn't have done it alone. And the fact that we were a couple that brought us together. If we hadn't spent our Sundays studying as well, even when we were out, we wouldn't have been so strong. In my opinion, if it had only been for work, we wouldn't have cared so much. We both put so much passion into it." (Pair 1)

"I've come to appreciate that enormously, that's such a good thing. And not always wanting to do stuff on your own and in your own way, but rather in partnership with someone, when it comes to business he has been invaluable to me. As Jack said before, I would never have built this company on my own." (Pair 6)

Finally, besides nurturing engagement, compassionate witnessing is also about mutual care and relief, recognizing that your partner needs your full and unconditional support to move forward. Within the pair, the partner seems to be the only one able to pursue this task and ensure that the other does not collapse:

"I'm looking over there, I'm saying, 'Frank is not okay. He's looking sad' and I just don't like it because I usually get this vibe from Frank, there's no vibe. He's not making eye contact. He is sitting at an angle. So I call a break and I take Frank to my office and say, 'Frank, what's going on?' and thank God, Frank trusted me enough to break down and tell me what was going on." (Pair 7)

The pair relationship seems to enable knowing when the other is distressed and needs some kind of relief. In this sense, compassionate witnessing as a mutual caring dynamic is something that spontaneously arises in pairs during innovation crises.

"You have this sensitivity to do it first. So, you sense it. And then the intention, the purpose of taking me to your office, which you could have felt it without doing anything about it. So, you felt it, then you act on it, and it's unique." (Pair 7)

4.3. Relational redundancy

In the same way as Powley (2009), we observed that in order to achieve resilience, pairs need to expand the interpersonal relationship beyond the relationship boundaries to obtain the critical knowledge that enables overcoming innovation crisis. We found that pairs tend to expand their relationship toward two main types of networks: an internal network constituted of the social reference group of friends and colleagues, and an external network constituted of potential partners or suppliers.

Engaging with the internal network is fundamental to find help to move forward. The internal network enables building a reference group and finding co-conspirators who support the pair with competences and resources:

"Inside the company, someone defended us many times, someone believed in the project even though they were not really involved." (Pair 10)

"Everybody in design, I take them to dinner (….) I brought every one of the designers and I had a special relationship with all of them." (Pair 7)

Therefore, the pair is not an island in which the entire endeavor is completed (Rouse, 2020), and where individuals find the strength to overcome innovation crises. Instead, it is a platform to take refuge in and find compassionate witnessing from which to move toward the external world. As such, other actors are still needed.

Besides the internal network, the pair also needs to intersect with the external world. Our data show that the external network might include stakeholders who are not always open to supporting the pair, or may even be hostile or adversarial, apparently hampering the pair. However, contact with these actors and understanding their perspective is crucial for the pair to gather critical information that enables them to take the right direction following innovation crisis. On the one hand, knowing the external network is crucial to distinguish whom to avoid:

"At a certain point, an investor started telling us that we had cheated him, that the product didn't work, and blah blah blah, and then he practically unleashed the lawyers on us (...). This investor was hoping that we would drop the ball, he wanted to take everything. In the end, however, we managed to get this investor to leave and we somehow managed to keep everything and take back control." (Pair 5)

On the other hand, knowing the external network is crucial to distinguish whom to convert:

"There was a side that saw us as disturbers of an established quiet. We had to win over those who considered us very technical and unscientific. We had to convince the legislator that what we were proposing was healthy." (Pair 3)

Therefore, relational redundancy nurtures pair resilience whereby the internal network provides stability and support, and the external network helps in setting the direction to pursue to move forward the innovation project.

5. Discussion

In this study, we have investigated how resilience emerges in pairs fostering innovation projects, and hence how to thrive over innovation crises. Based on Powley's (2009) framework, we expand current knowledge on the role of pairs in innovation and resilience in innovation, aggregating the two literature streams. Our findings show that the three main dimensions of Powley's (2009) model are not only verified in pairs but also even accentuated. In the following, we discuss how resilience occurs in individuals when part of a pair, highlighting

how pairs add to the model.

5.1. Liminal suspension: An intimate space of reflection and readjustment

The literature on resilience shows that as crises occur, individuals tend to experience a period of liminal suspension (Powley, 2009), which allows time to restore (Turner, 1974), and where social structures are suspended (Kahn, 2001).

Our findings suggest that liminal suspension and being part of a pair strengthens the ability to react to innovation crises.

When innovation crises occur, individuals experience liminal suspension as they lose control of the situation, finding themselves in an open space where the norms and patterns are no longer valid, and new pathways must be traced (Powley, 2009). Being part of a pair enables at least the first step of the new pathway, as the partner is the first point of reference. In addition, having someone on their side provides a protected space to manage the crisis.

Our data show that as crises arise in a pair's innovation journey, the individuals tend to seek refuge in the pair's intimate space. This resonates with the concept of liminal suspension, which considers the trigger of resilience as a temporary holding space, a moment of reflection to understand where to go and how to move forward. When individuals are part of a pair, this moment of reflection is situated in the intimacy provided by the pair. Reis and Shaver (1988) define such intimacy as a space where a process of escalating reciprocity of self-disclosure takes place. Each individual feels his or her innermost self-validated by the other; a safe psychological space that is available when needed. We show that pairs enact such a space as innovation crises arise, whereby one of the two individuals senses a crisis in advance and enacts this intimacy before it is too late. However, our findings seem to suggest something more: the intimate space of reflection is not simply a moment of suspension and reorganization but a call for collaboration. Therefore, resilience is activated by collaborative rather than holding behaviors, with individuals anchoring themselves in an intimate relationship to find the serenity to move forward. The partner is the first individual to look to, and the pair facilitates the creation of liminal suspension because each individual in the pair knows who to refer to first.

Furthermore, we observe that as the pair enters liminal suspension, their primary relationship changes and becomes pure collaboration and reciprocity beyond formal constraints where the differences in roles and competences disappear (Wicks, 1998). The two become sparring partners and is not a matter of relationship but interdependence where both recognize in the other someone who makes them to see things from a different perspective. This dynamic is easier in pairs (Simmel, 1902), without the need to recognize a decision-maker, but having

someone who makes you see things with different eyes or proposes a different direction in a moment of difficulty.

In addition, we observed that pairs move beyond simple relational suspension by continuously changing roles within the pair. When one of the two individuals starts giving up or feeling a little lost, the other feels the responsibility to take over in both an emotional and an operational perspective, even beyond the competences and skills held. This dynamic is the ultimate expression of complete reciprocity characterizing the pair (Simmel, 1902; Rouse, 2020). If one starts giving up, it is immediately clear that the other has to take control of the situation, otherwise the collaboration no longer exists nor the innovation they pursue.

Therefore, both relational suspension and role exchange within the pair space are crucial to overcoming an innovation crisis. On the one hand, relational differences in competences and roles create constraints that prevent the pair from dealing with change. Suspension helps undo these constraints and unlock the situation. This enables the pair to become a pure collaboration machine where full reciprocity and co-responsibility are completely visible (Rouse, 2020), without the burden brought by differences in competences and roles. On the other hand, role exchange enables shifts in leadership and facilitates change. In many cases, we observed that in moments of crisis, one individual takes leadership over the other, regardless of their roles. This determines the start of a new course needed to address and exit the innovation crisis.

5.2. Compassionate witnessing: Mutually sensing the other

As innovation crises arise, it is easier to empathize with others facing the same situation and provide support to heal after a crisis (Butler et al., 2009). However, we found that in pairs, the ability to understand the seriousness of the situation and empathize with others in the organization is accompanied by compassionate witnessing that occurs within the pair's boundaries. In other words, sensing that something is wrong with the other person, helping unconditionally, and providing care and support without the other person having to ask. Empathy is there regardless of the situation, and the pair's intimacy ensures a unique channel through which information and emotions flow. Thus, when an innovation crisis happens, emotions come first. The partners recognize and support each other, sharing their innermost feelings and emotions (McAdams, 1988), revealing something private (Prager, 1995), and engaging with one another. Through this dynamic, individuals feel their inner selves validated, understood, and cared for by others (Reis & Shaver,1988).

Compassionate witnessing allows the pair to move forward in the innovation project, enabling them to find each other and reconnect after the innovation crisis. The individuals in

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the pair need compassionate witnessing to reconnect with the person closest to them, namely their partner.

In addition, this emotional connection and the sharing of pain do not hinder collaboration (Frost et al., 2006), but bring something more. On the one hand, it nurtures mutual learning and cohesiveness. Individuals find and recognize themselves as a pair and start behaving as a single unit, a self-sustained organism in which both individuals mutually need one another. The two individuals do not move in parallel but are interlocked in managing the innovation crisis. On the other hand, in finding themselves and cohesiveness, the pair gains the strength to go beyond the innovation crisis and fight common enemies. They are motivated to not giving up in the face of the innovation crisis, mutually engaging in generating new ideas for the future. Therefore, compassionate witnessing also allows continued engagement over time. This engagement is mutual and not toward an abstract entity, such as the team or the organization, but toward the other person: if one gives up or fails, the other fails, and there is no longer collaboration. Thus, mutual engagement is pivotal and very strong.

5.3. Relational redundancy: The pair as a platform

The creation of redundant relations to gather critical information about recovering from innovation crises appears crucial to activating individual resilience (Sutcliffe & Vogus, 2003). Still, things seem to be more articulated and interesting regarding pairs on innovation journeys.

Scholars recognize that one of the main limitations of pair collaboration in innovation is the lack of openness toward the external environment, creating a microworld and preventing engagement with others (Hunter et al., 2017; Järvinen et al, 2015). More precisely, the pair's intimate and close relationship is characterized by boundaries that can be too exclusive and not leaving space for others to interact with (Rouse, 2020). This might create a sense of otherness, even if the pair is a well-functioning unit on its own (Järvinen et al., 2015; Simmel, 1902), eventually leading to the failure of the innovation project (Hunter et al., 2017).

Our findings provide insights with regard to this constraint. To overcome an innovation crisis, individuals feel the need to establish new redundant relations to gather knowledge about how to move on (Powley, 2009), a tension that is also present when collaborating in pairs and facing a crisis. Therefore, interesting to note is that while compassionate witnessing is crucial to unite the pair and create mutual engagement, the individual's tension toward relational redundancy forces the pair to move beyond its own boundaries, opening up to new relationships.

In particular, we observe that pairs engage both within and outside their social group of

reference, even involving adversaries or obstructers. More precisely, relational redundancy implies a dual process: first, seeking allies and co-conspirators to build a community of trusted people ready to support and help; second, engaging the external network selectively, which it is not only a matter of enlarging the network but building it with the right actors. For both types of networks, connections are established through concrete actions, creating proof points that, on the one hand, demonstrate that the innovation proposed makes sense and is valuable, and on the other, enable gathering additional ideas and insights to move forward.

Therefore, from a pair perspective, building relational redundancy is not only a matter of relational factors, since the network enables the pair to set the direction to move forward. In essence, the pair is a platform to find refuge, strength, caring, and positive emotions when things are not fine, and move toward the external world. In a pair, relational redundancy is richer, as the individuals have greater strength in building a network of relationships. Furthermore, as the pair may not have all the competencies and resources needed to overcome the innovation crisis and develop the innovation project, engaging with others is crucial to learn and thrive, to become stronger and ready to cope with future issues (Välikangas & Hamel, 2003).

5.4. The pair as a catalyst of resilience for innovation

Our study shows that pairs nurture resilience toward innovation crisis. More precisely, coherently with Powley's (2009) model, we observe that individuals need to experience the liminal suspension, compassionate witnessing, and relational redundancy dynamics when innovation crises occur, but in a pair, these dynamics take on some peculiarities.

As such, in Figure 3, we propose a revised version of Powley's (2009) framework adapted to pairs where the three dynamics – liminal suspension, compassionate witnessing, and relational redundancy – are still present but have a slightly different nature and role.

To understand how these dynamics relate to each other, we refer back to the quotes from Pair 7 as an illustrative case. The pair aimed to transform the internal company culture by developing a culture based on design practices. In 6 years, they innovate the company's entire product portfolio worldwide. However, suddenly, they found themselves fighting against detractors, a veto from the board of directors, and budget cuts that did not allow them to hire the people they needed. In thinking back to those moments, they recalled the following:

"*It was a meeting with a lot of people. My God, it was a big strategic planning meeting with 40 to 50 people in the room, and it was going on and on. I'm looking over there, I'm thinking, "Frank is not okay". Therefore, I call a break and call Frank to my office. We took a longer*

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break than needed. Breaks are for sorting out these sorts of issues. And then we went back in, and Frank was a different person and he felt like a load had been lifted from his shoulders".

This quote highlights that one of the individuals in the pair senses a crisis in advance and enacts pair intimacy before it is too late. Thus, the two relied only on each other to recover from the shock. They were alone in the office, with nobody else was there, and they experienced a moment of liminal suspension, finding a temporary holding space to restore with the environment and understand where they needed to go and how to move forward. Compassionate witnessing arises naturally within this same space: one perceived the other was not feeling good and provided care. As they recalled the following:

"While we were in my office, I say, "Frank, what's going on?" And thank God, Frank trusted me enough to break down and tell me what was going on".

In this way, she provided unconditional help, care, and support without Frank asking, enabling him to heal from the trauma, finding relief and the strength to move forward. As Frank recalled the following:

"You have this sensitivity to do it first. So, you sense it. And then the intention, the purpose of taking me to your office, which you could have felt it without doing anything about it. So, you feel it, then you act on it, and it's unique."

Both liminal suspension and compassionate witnessing seem to coexist within the intimate space of the pair, hence not two distinct dynamics, and it is not that the former enables the latter, as in the case of individuals according to Powley (2009).

As presented in our findings, to move on, the pair relies on relational redundancy, which is activated beyond the relationship boundaries, meaning the pair does not rely solely on its strengths to overcome the crisis but looks to others:

"Everybody in design, I take them to dinner (….) I brought every one of the designers, and I had a special relationship with all of them."

We observe in our case study that even if the dynamics that Powley defined exist in pairs, they occur differently and lead to different outcomes. If in Powley's model liminal suspension enables compassionate witnessing and relational redundancy, within a pair performing innovation, the former two are almost contextual and occur within the same relational space. In contrast, relational redundancy does not involve the individual moving toward other actors but unites the pair.

The dynamics described lead to different outcomes compared to Powley's model (i.e., resilience). Based on our findings, we propose that these dynamics not only activate resilience

but also enhance the pair dynamics and collaboration for innovation.

Specifically, these dynamics enable overcoming some pair limitations, empowering the pair itself. Liminal suspension alleviates formal relational differences, allowing the pair to become an entity of pure collaboration and co-responsibility (Rouse, 2020). Compassionate witnessing enables enhancing mutual engagement, as the innovation initiative only survives if the pair continues collaborating (Simmel, 1902). Finally, relational redundancy forces the pair to go beyond its own relational boundaries, avoiding the creation of a collaborative space that is too exclusive, and opening up toward the external environment looking for the help and collaboration of others to engage in the innovation project (Järvinen et al, 2015).

Indeed, we observe that pairs are not only empowered by the liminal suspension, compassionate witnessing, and relational redundancy dynamics, but also enhance these dynamics and their effects. In particular, pair intimacy enables liminal suspension, allowing the individuals to readjust to the external environment (Thompson & Ravlin, 2017). At the same time, compassionate witnessing is stronger, allowing empathy and mutual engagement, a unique relational channel through which emotions and ideas can flow (Moreland, 2010). Finally, pairs ensure richer relational redundancy, whereby the number of potential connections increases as the two individuals move in parallel, with greater strength to build relationships with other actors and evaluate them for the good of the innovation project.

In other words, pairs are catalysts of resilience during innovation crisis. Revisiting Powel's (2009) model that we started from, resilience is activated by the same dynamics that nurture individual resilience. However, these dynamics and their effects are amplified in pairs, empowering and nurturing resilience.

(Insert Figure 3 about here)

6. Conclusion

This study investigates how resilience emerges in pairs facing endogenous innovation crises, meaning crises that are intrinsic to the specific innovative vision/idea or project and emerge as innovators are trying to frame it and bring it to life (Chiesa et al., 1996; Kim, 2005). These innovation crises are particularly critical as they require innovators to continuously question whether to continue with the project: innovation crises are not only a matter of endurance but also of understanding if it is valuable to continue or not. Being resilient in front of such crises is about learning (Sarkar & Fletcher, 2014), creating new opportunities (Coutu, 2002), and developing a continuous reconstruction capacity (Välikangas & Hamel, 2003).

Thus far, pairs have been considered as an effective organizational form that facilitates

innovation activities as a co-creation locus (Rouse, 2020). This study expands the knowledge of such a peculiar constellation by exploring how pairs might also be the locus of resilience in the context of an innovation crisis. By exploring the pair's mechanisms that lead to resilience, the study aims to contribute to theory and practice.

6.1. Theoretical contribution

This research has theoretical implications for both the study of resilience in innovation and the study of pair collaboration.

With respect to the growing literature on resilience in innovation (Todt et al., 2018), the concept of resilience has been widely studied in the psychology field (Luthar et al., 2000), and more recently in the management field (Conz & Magnani, 2020; Todt et al., 2018). Nevertheless, there is an ongoing call for more multilevel and cross-disciplinary research on resilience in organizations (Linnenluecke, 2017; Raetze et al., 2021), especially with regard to innovation-oriented behaviors, where resilience has been mainly studied as an individual characteristic (De Clerq & Pereira, 2019; Powley, 2009).

By focusing on pairs facing endogenous innovation crises, we show that resilience can be an interpersonal characteristic that emerges and is enhanced thanks to the intimate space that characterizes pairs, thus fostering innovation. We expand Powley's (2009) model by highlighting the similarities and differences that emerge in resilience as an individual characteristic and as a pair attribute. More precisely, we highlight that liminal suspension is enacted in the pair's intimate space that provides a safe space for reflection, not in the open space of an organization or social environment. Pair intimacy enables individuals to enact this liminal suspension when perceiving the need, and not only when setbacks arise, anticipating the innovation crisis, and therefore the moment when resilience is activated. Similarly, compassionate witnessing takes place in the pair's intimate space. However, rather than merely connecting and reaching out to others, as might occur in a more open abstract space, the individuals sense when something is wrong, offer unconditional care and support, and take concrete actions to enable recovery. This dynamic strengthens the pair's bond, their involvement and responsibility to each other, engendering the resilience and motivation to move on (Moenkemeyer et al., 2012). The pair provides the emotional (Stephens et al., 2013) and psychological resources (Gittell, 2008) needed to activate resilience in the form of caring and concern (Abbey et al., 1985).

Finally, relational redundancy in pairs is not about the proliferation of general connections aimed at making sense of the innovation crisis, but a more complex and multifaceted dynamic.

First, the selective proliferation of connections is aimed at identifying who can bring value and support to the innovation project and who cannot. Second, it moves in two main directions. On one side, it moves toward the reference group of allies and co-conspirators who are able to provide the competencies and resources to move on. On the other side, it moves toward the external network where stakeholders who are selectively chosen to find a clear and valuable solution to the problem and what comes next. As Coutu (2002) argues, resilience is the ability to create new opportunities, and pairs seem to enhance this aspect, providing a robust platform to move on.

This research also advances the growing literature on pairs in innovation from different perspectives.

First, thus far, pairs in innovation have been mainly considered as the locus of co-creation (Rouse, 2020), where individuals feel free to share half-baked ideas and look for the criticism of the partner to reframe (Farrel, 2003). In this study, we show that how pairs are not only the locus of co-creation but also the locus where to nurture resilience to face innovation crises. Somehow, the intimacy provided by the pair enables a safe space where both nurture bold ideas and readjust and find the engagement to move on when an innovation crisis emerges.

Second, scholars have highlighted that innovation success in pairs does not derive directly from the complementarity of their competences and skills, but from a shared purpose and understanding of where to go (Hunter et al., 2017; Moreland, 2010; Alvarez & Svejenova, 2005), beyond the traditional resource-based view of innovation (Shane & Ulrich, 2004; Luchs et al., 2016; Prahalad & Hamel, 1990; Barney, 1991). We contribute to this stream of studies by showing that any kind of formal complementarity is effectively suspended and sometimes even shifts within the pair's boundaries when facing innovation crises. This debunks the resource-based perspective concerning pairs. Specifically, while complementarity of competences and skills might be crucial for larger constellations, such as teams (e.g., De Dreu et al., 2008; Stroebe & Diehl, 1994), it is not a crucial feature of pairs. Thus, pairs stand apart from teams and should not be considered as merely a smaller team form (Rouse, 2020; Hunter et al., 2012, 2017; Moreland et al., 2010).

Third, our study provides insights on the role of pair boundaries, considered a potential major limitation of this form of collaboration (Järvinen et al., 2015). Scholars argue that boundaries lead to too much exclusivity and do not leave space for others to interact with (Rouse, 2020), creating a sense of otherness, eventually causing the failure of the innovation endeavor (Hunter et al., 2017), even if the pair is a well-functioning unit on its own (Järvinen et al., 2015; Simmel, 1902). Differently, we show that as setbacks occur, pairs are naturally

pushed beyond their boundaries, as the tension toward new knowledge and connections to overcome failure is stronger than the pair's bond. Indeed, we observe that pairs move together in establishing relationships with other actors, and it is not the individual seeking new connections, but the pair bounded as a single social entity moving together.

In other words, aggregating the two literature streams exploring pairs in innovation (Rouse, 2020; Hunter et al., 2012, 2017) and resilience in innovation (De Clercq & Pereira, 2019; Todt et al., 2018) allowed us to observe their joint effect (Figure 4). First, pairs seem to enhance the resilience effect through continuous exchanges that facilitate reacting to an innovation crisis and providing an intimate space when crises occur. Second, resilience seems to reduce some of the traditional pitfalls of pairs, such as their tendency to be closed to the external environment. The need to react to an innovation crisis pushes the pair to reinvent and enlarge the relational space, eventually reducing the potential threats of being an innovation pair. In other words, pairs and resilience in innovation seem to have a virtuous effect on each other.

(Insert Figure 4 about here)

6.2. Managerial contribution

From a managerial perspective, pairs are considered as an effective way to foster innovation, thanks to the intimate space that generates curious criticism (Verganti & Norman, 2019). However, our study suggests the need for managers think about pairs more broadly. On the one hand, for innovators, pairs can be an organizational tool to enhance resilience in innovation, providing not only a sparring partner but also a safe space to reflect and react to any innovation project's challenges and hurdles. On the other hand, for leaders and process designers, this type of organizational form might enhance innovation projects' resilience, especially in innovation crises, as pairs facilitate resilience activation.

In addition, pairs themselves seem to benefit from managing innovation crises by not only enhancing their dynamics and features but also mitigating their limitations. In other words, boosting the full reciprocity and co-responsibility characterizing pairs, nurturing engagement, motivation, and innovativeness after innovation crises, overcoming constraints, and hence fostering resilience.

Innovation managers, and more broadly professionals dealing with creativity and idea generation, tend to promote team working to incorporate different views and perspectives, reducing the risk of overlooking potential challenges, as in the case of design thinking and design sprint, but even more in agile methods (Dell'Era et al., 2020). Without comprising the

effectiveness and benefits of involving teams in innovation activities, this study suggests that design processes or even specific activities performed in pairs might benefit from the intimate space characterizing pairs (Verganti, 2016), a useful buffer to enhance resilience when innovation crises occur. Therefore, we suggest that innovation managers think about ways of integrating pairs into innovation and other team activities, since this might ignite resilience when needed.

6.3. Limitations and future studies

Like any other study, our research is not free from limitations that provide opportunities for future inquiry. First, relying on primary sources and a convenience sample is one limitation that reduces the generalizability of our findings, even if we aimed to limit any biases. We encourage future work to explore the validity of our results in other fields. While case replication in our sample increases the robustness of our findings, a confirmatory study would strengthen and extend our findings. Second, future studies using quantitative methodologies could validate our results by exploring other potential directions, such as the type of innovation or the nature of the pair. For example, we have not distinguished between radical or incremental innovation, and future studies might explore if there are any differences in how resilience is activated accordingly. Third, we have not considered whether the innovation crisis encountered by our pairs occurred in specific phases of the innovation process. Also in this case, future studies could investigate whether different phases of the innovation process require different endeavors. For example, the front-end phases call for more cognitive and emotional processes, such as sensemaking, while the development phases require more problem-solving capabilities based on heuristics (Verganti et al., 2020). Thus, future studies might investigate whether resilience is activated differently and with diverse features depending on the development stage. Fourth, even if our sample includes different types of pairs (managerial, entrepreneurial, self-selected, or matched), we did not consider how the pairs in our study formed their partnerships. However, we believe that this aspect opens the door to exploring whether any differences in resilience activation manifest. Finally, we posed the focus on endogenous innovation crises as a boundary condition of our study, and we focused on pairs who were able to manage the crisis and move on with the project. Future studies should explore situations, where a pair, in front of an endogenous innovation crisis, decides not to continue in the journey. Studies should understand the factors that lead to a no-go decision and the implications in terms of resilience. Todt and colleagues (2018) provide interesting insights about how project termination nurtures individual resilience. It would be interesting to understand what it implies

for innovation pairs.

References

Abbey, A., Abramis, D. J., & Caplan, R. D. (1985). Effects of different sources of social support and social conflict on emotional well-being. *Basic and Applied Social Psychology, 6*(2), 111-129.

Alvarez, J. L., & Svejenova, S. (2005). *Sharing executive power: Roles and relationships at the top*. Cambridge University Press.

Andersen, M. L., & Taylor, H. F. (2010). *Sociology: The essentials* (6th edition). Belmont, CA: Wadsworth.

Baer, M., & Brown, G. (2012). Blind in one eye: How psychological ownership of ideas affects the types of suggestions people adopt. *Organizational Behavior and Human Decision Processes, 118*(1), 60-71.

Barney, J. (1991). Special theory forum the resource-based model of the firm: Origins, implications, and prospects. *Journal of Management, 17*(1), 97-98.

Becraft, M. B. (2014). *Bill Gates: A biography*. ABC-CLIO.

Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*. Oxford University Press.

Bellis, P., & Verganti, R. (2020). Pairs in innovation: How working in pairs helps organisations to move into A new shared direction. *International Journal of Innovation Management, 24*(03), 2050072.

Bellis, P., & Verganti, R. (2021). Pairs as pivots of innovation: How collaborative sensemaking benefits from innovating in twos. *Innovation, 23*(3), 375-399.

Blatt, R. (2009). Resilience in entrepreneurial teams: Developing the capacity to pull through. *Frontiers of Entrepreneurship Research, 29*(11), 1–14.

Brenton, B., & Levin, D. (2012). The softer side of innovation: The people. *Journal of Product Innovation Management, 29*(3), 364-366.

Butler, L. D., Koopman, C., Azarow, J., Blasey, C. M., Magdalene, J. C., DiMiceli, S., ... & Spiegel, D. (2009). Psychosocial predictors of resilience after the September 11, 2001 terrorist attacks. *The Journal of Nervous and Mental Disease, 197*(4), 266-273.

Cerquetti, M., & Cutrini, E. (2022). Structure, people, and relationships: A multidimensional method to assess museum resilience. *Nonprofit and Voluntary Sector Quarterly*, https://doi.org/10.1177/08997640211068409.

Chiesa, V., Coughlan, P., & Voss, C. A. (1996). Development of a technical innovation audit. *Journal of Product Innovation Management, 13*(2), 105-136.

Conz, E., & Magnani, G. (2020). A dynamic perspective on the resilience of firms: A systematic literature review and a framework for future research. *European Management Journal*, *38*(3), 400-412.

Corbin, J., & Strauss, A. (Eds) (2008). Strategies for qualitative data analysis. In *Basics of qualitative research. Techniques and procedures for developing grounded theory* (3rd edition) (pp. 65–86). Sage Publications.

Coutu, D. L. (2002). How resilience works. *Harvard Business Review, 80*(5), 46-56.

De Clercq, D., & Pereira, R. (2019). Resilient employees are creative employees, when the workplace forces them to be. *Creativity and Innovation Management, 28*(3), 329-342.

De Dreu, C. K. W., Nijstad, B. A., & Van Knippenberg, D. (2008). Motivated information processing in group judgment and decision making. *Personality and Social Psychology Review, 12*(1), 22-49.

Dell'Era, C., Magistretti, S., Cautela, C., Verganti, R., & Zurlo, F. (2020). Four kinds of design thinking: From ideating to making, engaging, and criticizing. *Creativity and Innovation Management, 29*(2): 324-344.

de Voogt, A., & Hommes, K. (2007). The signature of leadership: Artistic freedom in shared leadership practice. *The John Ben Shepperd Journal of Practical Leadership, 2*(1), 1-5.

Dimas, I. D., Rebelo, T., Lourenço, P. R., & Pessoa, C. I. P. (2018). Bouncing back from setbacks: On the mediating role of team resilience in the relationship between transformational leadership and team effectiveness. *The Journal of Psychology, 152*(6), 358-372.

Dutton, J. E., Frost, P. J., Worline, M. C., Lilius, J. M., & Kanov, J. M. (2002). Leading in times of trauma. *Harvard Business Review, 80*(1), 54-61.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal, 50*(1), 25-32.

Farrell, M. P. (2003). *Collaborative circles: Friendship dynamics and creative work.* University of Chicago Press.

Frost, P. J., Dutton, J. E., Maitlis, S., Lilius, J. M., Kanov, J. M., & Worline, M. C. (2006). Seeing organizations differently: Three lenses on compassion. In S. R. Clegg, C. Hardy, T. B. Lawrence & W. R. Nord (Eds.), *The Sage handbook of Organization Studies* (pp. 843-866). Sage Publications Ltd.

Gallagher, B. (2018). *How to turn down a billion dollars: The snapchat story*. St. Martin's Press.

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal, 29*(13), 1465-1474.

Gioia, D. A., Patvardhan, S. D., Hamilton, A. L., & Corley, K. G. (2013). Organizational identity formation and change. *Academy of Management Annals, 7*(1), 123-193.

Gittell, J. H. (2008). Relationships and resilience: Care provider responses to pressures from managed care. *The Journal of Applied Behavioral Science, 44*(1), 25-47.

Goffin, K., Åhlström, P., Bianchi, M., & Richtnér, A. (2019). Perspective: State-of-the-art. The quality of case study research in innovation management. *Journal of Product Innovation Management, 36*(5), 586-615.

Hemlin, S. (2006). Managing creativity in academic research: How could creative action and management be reconciled in research? *Science & Technology Studies, 19*(1), 83-92.

Hill, L. A., Brandeau, G., Truelove, E., & Lineback, K. (2014). *Collective genius: The art and practice of leading innovation*. Harvard Business Review Press.

Hunter, S. T., Cushenbery, L., Fairchild, J., & Boatman, J. (2012). Partnerships in leading for innovation: A dyadic model of collective leadership. *Industrial and Organizational Psychology, 5*(4), 424-428.

Hunter, S. T., Cushenbery, L. D., & Jayne, B. (2017). Why dual leaders will drive innovation: Resolving the exploration and exploitation dilemma with a conservation of resources solution. *Journal of Organizational Behavior, 38*(8), 1183-1195.

Isaacson, W. (2011) *Steve Jobs*. New York: Simon & Schuster.

Järvinen, M., Ansio, H., & Houni, P. (2015). New variations of dual leadership: Insights from Finnish theatre. *International Journal of Arts Management, 17*(3), 16-27.

Kahn, W. A. (2001). Holding environments at work. *The Journal of Applied Behavioral Science, 37*(3), 260-279.

Kahn, W. A., Barton, M. A., Fisher, C. M., Heaphy, E. D., Reid, E. M., & Rouse, E. D. (2018). The geography of strain: Organizational resilience as a function of intergroup relations. *Academy of Management Review, 43*(3), 509-529.

Kakkar, S. (2019). Leader-member exchange and employee resilience: The mediating role of regulatory focus. *Management Research Review*, *42*(9), 1062-1075.

Kelly, J. R., & Barsade, S. G. (2001). Mood and emotions in small groups and work teams. *Organizational Behavior and Human Decision Processes, 86*(1), 99-130.

Kim, W. C. (2005). Blue ocean strategy: From theory to practice. *California Management Review, 47*(3): 105–121.

Lane, R. (2014). *You only have to be right once: The unprecedented rise of the instant tech billionaires*. Penguin UK.

Lengnick-Hall, C. A., Beck, T. E., & Lengnick-Hall, M. L. (2011). Developing a capacity for organizational resilience through strategic human resource management. *Human Resource Management Review, 21*(3), 243-255.

Leuridan, G., & Demil, B. (2021). Exploring the dynamics of slack in extreme contexts: A practice-based view. *Human Relations*, https://doi.org/10.1177/00187267211007786.

Linnenluecke, M. K. (2017). Resilience in business and management research: A review of influential publications and a research agenda. *International Journal of Management Reviews, 19*(1), 4-30.

Luchs, M. G., Swan, K. S., & Creusen, M. E. (2016). Perspective: A review of marketing research on product design with directions for future research. *Journal of Product Innovation Management, 33*(3), 320-341.

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3), 543-562.

McAdams, D. P. (1988). Personal needs and personal relationships. In S. Duck, D. F. Hay, S. E. Hobfoll, W. Ickes, & B. M. Montgomery (Eds.), *Handbook of personal relationships: Theory, research and interventions* (pp. 7–22). John Wiley & Sons.

McGrath, L. (2015). When pairing reduces scaring: The effect of dyadic ideation on evaluation apprehension. *International Journal of Innovation Management, 19*(04), 1550039.

Meng, H., Luo, Y., Huang, L., Wen, J., Ma, J., & Xi, J. (2019). On the relationships of resilience with organizational commitment and burnout: A social exchange perspective. *The International Journal of Human Resource Management, 30*(15), 2231-2250.

Miles, M. B., & Huberman, A. M. (1984). Drawing valid meaning from qualitative data: Toward a shared craft. *Educational Researcher, 13*(5), 20-30.

Moenkemeyer, G., Hoegl, M., & Weiss, M. (2012). Innovator resilience potential: A process perspective of individual resilience as influenced by innovation project termination. *Human Relations, 65*(5), 627-655.

Moreland, R. L. (2010). Are dyads really groups? *Small Group Research, 41*(2), 251-267.

Moreland, R. L., Argote, L., & Krishnan, R. (1996). Socially shared cognition at work: Transactive memory and group performance. In J. L. Nye & A. M. Brower (Eds.), *What's social about social cognition? Research on socially shared cognition in small groups* (pp. 57–84). Sage Publications.

Moss, B. F., & Schwebel, A. I. (1993). Defining intimacy in romantic relationships. *Family Relations, 42*(1), 31-37.

O'Connor, G. C., & McDermott, C. M. (2004). The human side of radical innovation. *Journal of Engineering and Technology Management, 21*(1-2), 11-30.

Pierce, J. L., Kostova, T., & Dirks, K. T. (2001). Toward a theory of psychological ownership in organizations. *Academy of Management Review, 26*(2), 298-310.

Powley, E. H. (2009). Reclaiming resilience and safety: Resilience activation in the critical period of crisis. *Human Relations, 62*(9), 1289-1326.

Prager, Karen J. (1995). *The psychology of intimacy: Guilford Series on personal relationships*. New York: Guilford.

Prahalad, C., & Hamel, G. (1990). The core competencies of the firm. *Harvard Business Review, 68*(3), 79-91.

Raetze, S., Duchek, S., Maynard, M. T., & Wohlgemuth, M. (2021). Resilience in organization-related research: An integrative conceptual review across disciplines and levels of analysis. *Journal of Applied Psychology, 46*(4), 607-656.

Reis, H. T., & Shaver, P. (1988). Intimacy as an interpersonal process. In S. Duck (Ed.), *Handbook of Personal Relationships* (pp. 367–389). London: Sage.

Richardson, G. E. (2002). The metatheory of resilience and resiliency. *Journal of Clinical Psychology, 58*(3), 307-321.

Robb, D. (2000). Building resilient organizations resilient organizations actively build and integrate performance and adaptive skills. *OD Practitioner, 32*(3), 27-32.

Roloff, M. E. (1987). Communication and reciprocity within intimate relationships. In M. E. Roloff & G. R. Miller (Eds.), *Interpersonal processes: New directions in communication research* (pp. 11–38). Sage Publications, Inc.

Roloff, M. E., Janiszewski, C. A., McGrath, M. A., Burns, C. S., & Manrai, L. A. (1988). Acquiring resources from intimates when obligation substitutes for persuasion. *Human Communication Research, 14*(3), 364-396.

Rouse, E. D. (2020). Where you end and I begin: Understanding intimate co-creation. *Academy of Management Review, 45*(1), 181-204.

Rudolph, J. W., & Repenning, N. P. (2002). Disaster dynamics: Understanding the role of quantity in organizational collapse. *Administrative Science Quarterly, 47*(1), 1-30.

Saldaña, J. (2021). *The coding manual for qualitative researchers*. Sage Publications Limited.

Sarkar, M., & Fletcher, D. (2014). Ordinary magic, extraordinary performance: Psychological resilience and thriving in high achievers. *Sport, Exercise, and Performance Psychology, 3*(1), 46-60.

Shane, S. A., & Ulrich, K. T. (2004). Technological innovation, product development, and entrepreneurship in management science. *Management Science, 50*(2), 133-144.

Shotter, J., & Billig, M. (1998). A Bakhtinian psychology: From out of the heads of individuals and into the dialogues between them. In M. Bell & M. E. Gardiner (Eds.), *Bakhtin and the Human* Sciences (pp. 13–29). Sage Publications.

Simmel, G. (1902). The number of members as determining the sociological form of the group. II. *American Journal of Sociology, 8*(2), 158-196.

Stephens, J. P., Heaphy, E. D., Carmeli, A., Spreitzer, G. M., & Dutton, J. E. (2013). Relationship quality and virtuousness: Emotional carrying capacity as a source of individual and team resilience. *The Journal of Applied Behavioral Science, 49*(1), 13-41.

Stoverink, A. C., Kirkman, B. L., Mistry, S., & Rosen, B. (2020). Bouncing back together: Toward a theoretical model of work team resilience. *Academy of Management Review, 45*(2), 395-422.

Stroebe, W., & Diehl, M. (1994). Why groups are less effective than their members: On productivity losses in idea-generating groups. *European Review of Social Psychology, 5*(1), 271-303.

Sutcliffe, K. M. & Vogus, T. J. (2003). Organizing for resilience. In K. Cameron, J. E. Dutton, R. E. Quinn (Eds.), *Positive organizational scholarship* (pp. 94-110). San Francisco: Berrett-Koehler.

Svejenova, S., Vives, L., & Alvarez, J. L. (2010). At the crossroads of agency and communion: Defining the shared career. *Journal of Organizational Behavior, 31*(5), 707-725.

Thompson, B., & Ravlin, E. (2017). Protective factors and risk factors: Shaping the emergence of dyadic resilience at work. *Organizational Psychology Review, 7*(2), 143-170.

Todt, G., Weiss, M., & Hoegl, M. (2018). Mitigating negative side effects of innovation project terminations: The role of resilience and social support. *Journal of Product Innovation Management, 35*(4), 518-542.

Tortoriello, M., & Krackhardt, D. (2010). Activating cross-boundary knowledge: The role of Simmelian ties in the generation of innovations. *Academy of Management Journal*, *53*(1), 167-181.

Turner, V. (1974). Liminal to liminoid, in play, flow, and ritual: An essay in comparative symbology. *Rice Institute Pamphlet-Rice University Studies*, *60*(3), 53-92.

Turner, V. (2018). *Dramas, fields, and metaphors: Symbolic action in human society*. Cornell University Press.

Välikangas, L., & Hamel, G. (2003). En busca de la capacidad de adaptación. *Harvard Deusto Business Review*, *117*, 16–28.

Välikangas, L., Hoegl, M., & Gibbert, M. (2009). Why learning from failure isn't easy (and what to do about it): Innovation trauma at Sun Microsystems. *European Management Journal, 27(4), 225-233.*

Van de Ven, Andrew H. (1986). Central problems in the management of innovation. *Management Science, 32*(5), 590-607.

Van Maanen, J. (1979). Reclaiming qualitative methods for organizational research: A preface. *Administrative Science Quarterly, 24*(4), 520-526.

Verganti, R. (2016). The innovative power of criticism. *Harvard Business Review, 94*(1), 18.

Verganti, R., & Norman, D. (2019). Why criticism is good for creativity. *Harvard Business Review,* https://hbr.org/2019/07/why-criticism-is-good-for-creativity.

Verganti, R., Vendraminelli, L., & Iansiti, M. (2020). Innovation and design in the age of artificial intelligence. *Journal of Product Innovation Management, 37*(3), 212-227.

Wang, J., Cooke, F. L., & Huang, W. (2014). How resilient is the (future) workforce in China? A study of the banking sector and implications for human resource development. *Asia Pacific Journal of Human Resources, 52*, 132–154.

Wang, M., Zhang, Y., Zhang, D., Zheng, Y., Li, S., & Tan, S. K. (2021). Life-cycle cost analysis and resilience consideration for coupled grey infrastructure and low-impact development practices. *Sustainable Cities and Society*, 75, 103358.

Wicks, D. (1998). *Nurses and doctors at work: Rethinking professional boundaries*. Open University Press Buckingham.

Williams, T. A., Gruber, D. A., Sutcliffe, K. M., Shepherd, D. A., & Zhao, E. Y. (2017). Organizational response to adversity: Fusing crisis management and resilience research streams. *Academy of Management Annals, 11*(2), 733-769.

Yin, R. K. (1998). The abridged version of case study research. In L. Bickman (Ed.), *Handbook of applied social research methods* (pp. 229-259). Sage Publications Ltd.

Yin, R. K. (2009). How to do better case studies. In L. Bickman, & D. J. Rog (Eds.), *The Sage handbook of applied social research methods* (pp. 254-282). Sage Publications Ltd.

Table 1. Pairs sample and main characteristics

Pairs ID	Industry	Country	Manager/Co-founder/Partner	Gender	Pair tenure	Short description of the innovation
Pair_01	Home appliances	Italy	Co-founders	1 male and 1 female	2008 – to date	Developed and patented a system to sanitize air conditioning, preventing respiratory diseases.
Pair_02	IoT	Italy	Co-founders	2 males	2013 – to date	Developed and patented systems based on shape memory springs to manage fluids.
Pair_03	Food and Beverage	Italy	Partners	2 males	Between 1970 and 1990	Developed and patented a disruptive technology for packaging grated cheese in a controlled atmosphere. This brought to a radical shift in market habits.
Pair_04	Fashion	Italy	Co-founders	2 females	2012 – to date	Developed and patented a fabric made of marble fiber that is resistant to wind, fire, and water.
Pair_05	Healthcare	Italy	Co-founders	2 males	2015 – to date	Developed a smartphone electrocardiograph capable of giving results comparable with hospital-type examinations
Pair_06	Fintech	Sweden	Co-founders	2 males	2008 – to date	Developed a digital payment system for small businesses.
Pair_07	Food and Beverages	USA	Managers	1 male and 1 female	2012 - 2018	Disrupted the internal company culture by developing a culture based on design practices. In 6 years, they redesigned the company's entire product portfolio worldwide.
Pair_08	Automotive	Italy	Managers	2 males	1992 - to date	Developed and patented a high-tech tire for luxury cars by embedding IOT and artificial intelligence.
Pair_09	Engineering	Italy	Managers	1 male and 1 female	2008 – to date	Developed and patented radically new thermosetting resin bars that remain ductile until installation.
Pair_10	Electronics	Italy	Managers	2 males	1995 – 2021	Developed and patented the MEMS accelerometer and its main applications in electronic devices (from video games and wearables, to smartphones and computers).

Table 2. Major crises experienced by the pairs

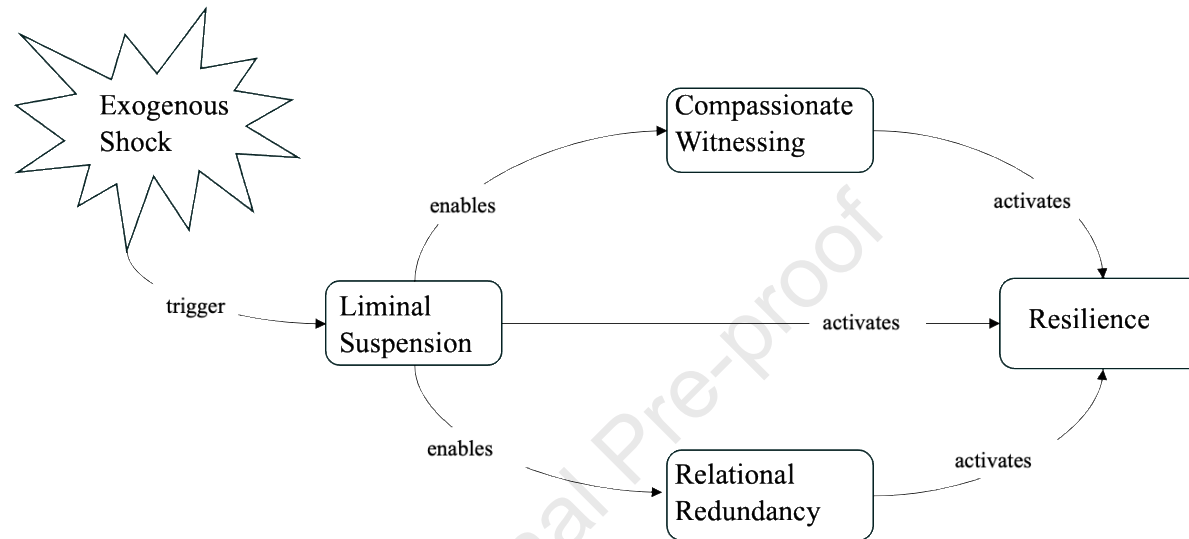| Pairs ID	Short description of the major crises experienced
Pair_01	They were in the process of internationalizing the patent, but it cost too much, and they could not afford it. In addition, there were no specific laws in place to start commercializing the product.
Pair_02	They were approaching the first big project in the healthcare sector. The project would have enabled the start of numerous subsequent initiatives. The line was set, and everything was ready to start, but all of a sudden, the client halted the project.
Pair_03	A national regulatory constraint prevented the industrialization of food based on the innovative packaging system, hence its commercialization.
Pair_04	1. In the transition from producing the fiber in the lab to the factory, the preliminary test did not come out as expected, and industrialization did not work upfront with very high costs. 2. The agreement for the first significant sale campaign, which was crucial to recover the costs, failed at the very last moment.
Pair_05	The technological system on which the product is based is an electrode positioning system by means of the smartphone camera. They were about to submit a patent application when the entire system did not work as expected. They needed a database of chest images to train the algorithm, but it did not exist in the world.
Pair_06	1. They were navigating a market regulated by the highest financial authorities. At a certain point, Visa changed the rules; thus, they could no longer follow the main track embarked on. They needed to decide whether they could still afford the company's next projects or cut the company in half. 2. They were on the point of closing round C with the venture capital. In one week to the day they would receive the money they had been waiting for with many sacrifices along the way, they realized the hardware part of the product, they promised the venture capital, would not work and there were no chances it could work in the future.
Pair_07	They found themselves fighting against detractors, a veto from the board of directors, and budget cuts that did not allow them to hire the people they needed.
Pair_08	They had a sudden tight deadline (3 months) for the world's largest automotive circuit. They did not have any allies in the company nor the machines to make the tires, which were outside of any market standard.
Pair_09	The 2008 financial crisis brought them to the point of failing. Despite this, they made everything right, the product was perfect, and the timing was respected, and all of a sudden, there were no more clients, and hence, no more revenues.
Pair_10	The Chairman of the company did not believe in the idea and under-budgeted the project, which prevented the pair from reaching the expected results within the anticipated time.

Table 3. Data collection details

Pairs ID	Number of interviews	Total minutes recorded	Other data sources
Pair_01	1	120	Company website Product catalogue Company LinkedIn page Company Facebook page 3 company/product videos available on Facebook 1 video interview (from the company website and YouTube)
Pair_02	1	120	Company website Company LinkedIn page Company YouTube channel 3 articles published in practitioner industry media (e.g., Industria Italiana, Italy Innovation)
Pair_03	3	180	Email exchanges (15 emails) adding to what emerged from the interviews Company website Company LinkedIn page 14 internal documents (presentations, official archival documents, articles and pictures related to the innovation) 2 internal product videos 7 videos accessible through the company website
Pair_04	2	120	Company website Product catalogue (2018–2019 summer collection) Company Instagram page Company Facebook page 5 articles in national newspapers (e.g., La Repubblica, Il Corriere della Sera, Il Giorno, Il Messaggero) 2 articles in local newspapers (L'Eco di Bergamo, L'Arena di Verona) 1 TV show (Linea Verde) 6 articles in fashion media (e.g., IO Donna, Donna Moderna, Bio Magazine, MF Fashion) 1 article in practitioner media (e.g., Ordine degli Ingegneri) 4 articles in accelerator program media (e.g., PoliHub, La Maison des Startup LVMH, H-Farm)
Pair_05	1	100	Company website Company LinkedIn page 1 video interview on the YouTube Channel of Sanofi 1 TEDx Talk by one of the partners Video recordings (90 min) of the reality show B-Heroes at which the pair took part 1 article in national newspaper (La Repubblica)
Pair_06	1	60	Company website Company YouTube channel 1 white paper (by Eva Krutmeijer) 1 article by Frog Capital (frogcapital.com) 1 article by Sales Force (salesforce.com) 1 article in Forbes
Pair_07	2	120	Company website Monitoring the personal Instagram page of one of the pair members

			4 LinkedIn articles by one of the pair members about their relationship 6 articles in practitioner media (e.g., FastCompany, Harvard Business Review, Inc.) 2 blog articles by sector thought-leaders 2 video interviews on the YouTube channels of Stanford Graduate Business School 3 email exchanges adding to what emerged in the interviews 2 video interviews in national newspapers (e.g., Corriere della Sera, Il Sole 24 ore)
Pair_08	1	90	Company website 1 internal document about the pair's innovation history and development 3 articles in national newspapers (e.g., Corriere della Sera, Il Sole 24 ore) 2 articles in a sports magazine (e.g., Gazzetta dello Sport) 2 video interviews in trade media (e.g., formulapassion.it, dailymotion.com)
Pair_09	1	60	Company website Company LinkedIn page 1 internal document 5 articles in trade magazine and media (e.g., Compositi Magazine, Ingenio-web.it) 8 articles in national newspapers (e.g., Corriere della Sera, Il Giornale, La Stampa, Il Giorno) 3 interviews in fashion media (e.g., Donna Moderna, Millionaire) 1 interview on national news (Tg3) 1 article in innovation media (e.g., Start Up Italia)
Pair_10	1	180	Company website, 20 internal documents (presentations, archive documents, photos) 1 TED Talk by one of the partners 1 video interview in a national newspaper (La Repubblica) 1 video interview on the H-Farm's YouTube channel 6 articles in national newspapers (e.g., Corriere della Sera, Il Messaggero, Il Sole 24 Ore, La Stampa) 1 article in Forbes
	14	1,150	

Table 4. Summary of findings that emerged from coding

Second Order Codes	First Order Codes	Evidence
Liminal suspension	Intimate space of reflection	A space to stay in silence giving the other space and time to reflect
		A space for intimate and direct communication based on gut feelings
		A space to generate new ideas
	Shifting relational rules	Any sort of formal or hierarchical relationship disappears
		The pair alternates in taking the lead over the other and pulling both
Compassionate witnessing	Sharing pain and challenges	Sharing pain to mutually learn about each other
		Sharing pain to create cohesiveness
		Sharing pain to find the confidence to take the next step
	Mutual engagement	Empathy facilitates finding a purpose
		Empathy makes feelings stronger
	Mutually perceiving and providing relief	Perceiving the partner needs full unconditional support
		Receiving unconditional support
Relational redundancy	Internal network	Building a reference group and finding co-conspirators
		Finding the right competences and resources
	External network	Engaging stakeholders to validate the direction
		Engaging stakeholders to know who to avoid
		Engaging stakeholders to know who to overcome

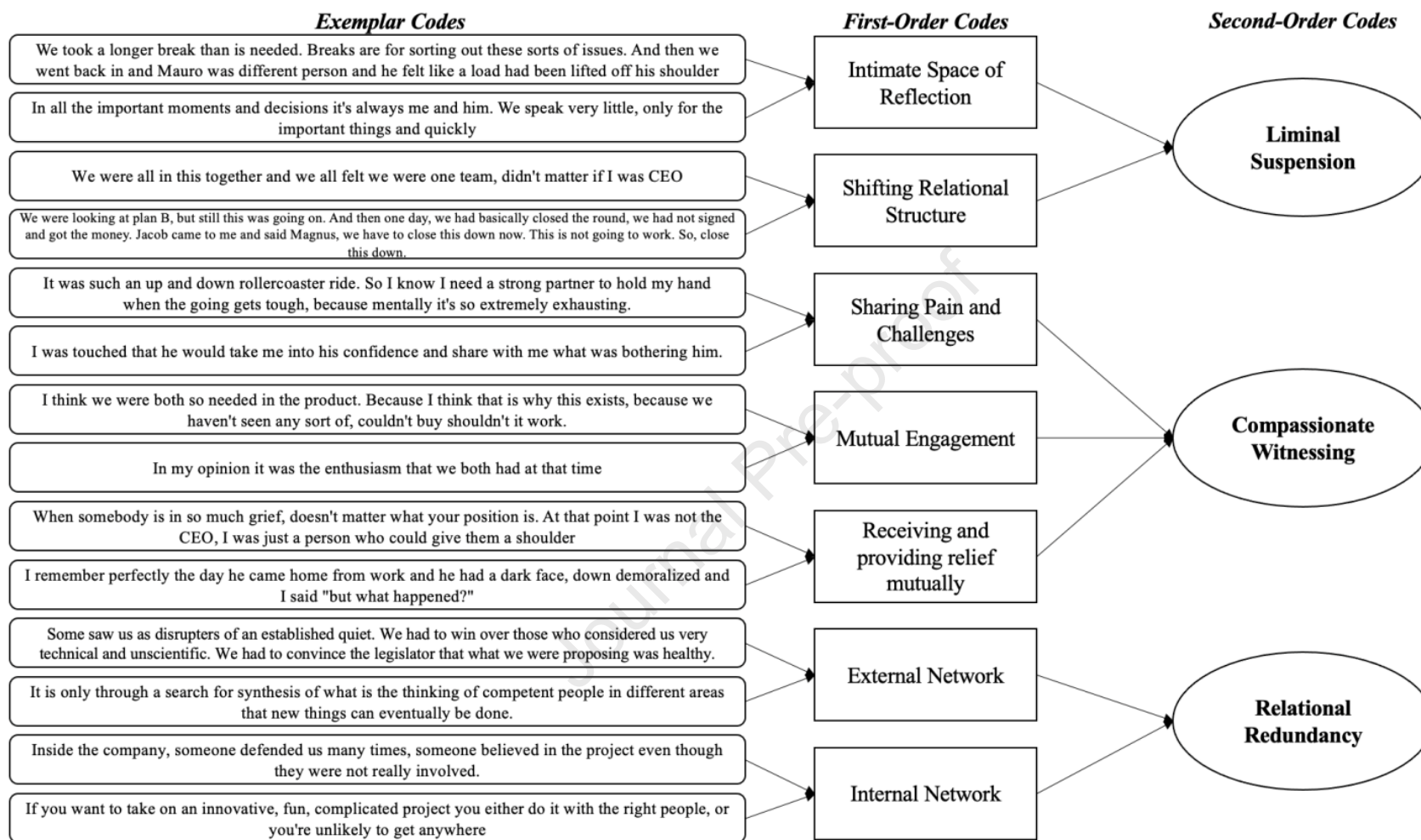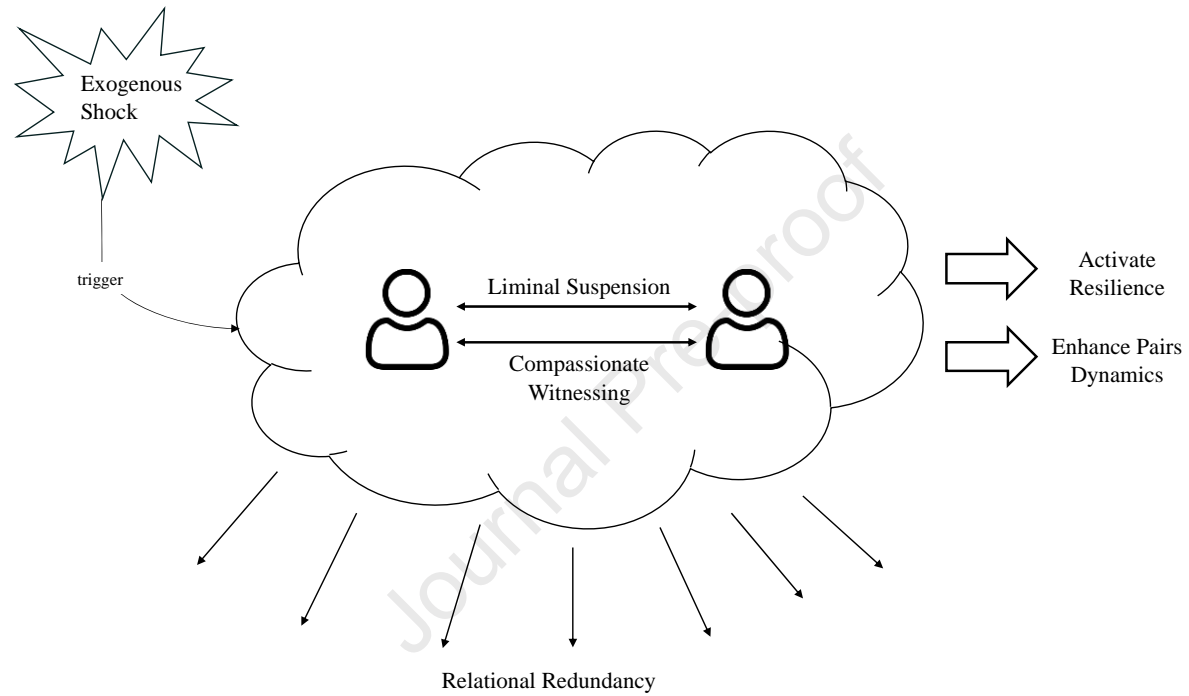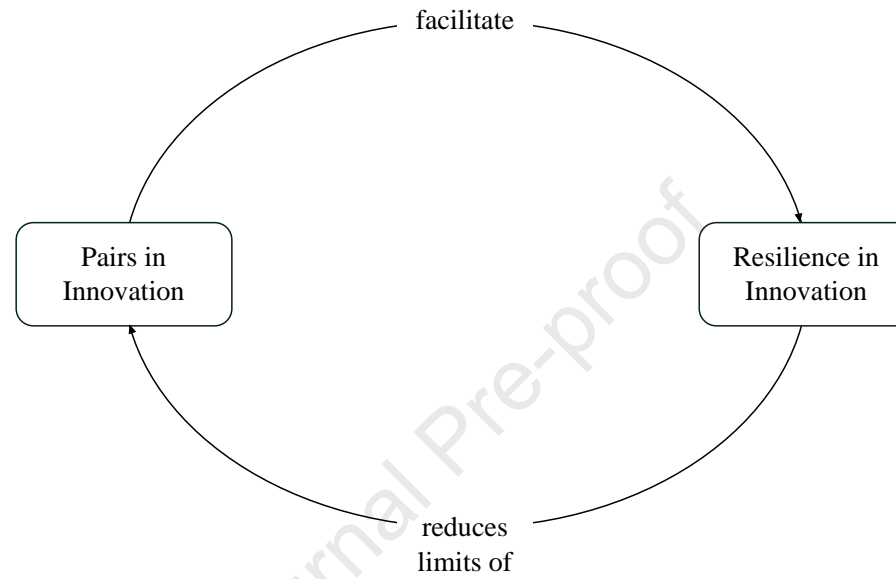**Figure 1.** Adapted from Powley's (2009) resilience activation framework

Figure 2. Coding Tree

Figure 3. Powley's (2009) framework adapted to pairs

Figure 4. Joint effect of pairs in innovation and resilience in innovation