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Revisiter l'innovation : la vulnérabilité organisationnelle des TPE et PME innovantes dans le secteur des sports *outdoor*

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Résumé

Au sein de l'industrie des articles de sport, il est convenu d'affirmer que l'innovation est susceptible de procurer un avantage concurrentiel. Il s'agit cependant aussi d'une activité risquée qui peut entraîner des conséquences moins vertueuses pour les entreprises. Quitte à s'inscrire à contre-courant de l'injonction contemporaine à innover, il semble pertinent de s'intéresser aux potentiels effets néfastes des processus d'innovation au sein des petites entreprises du secteur du sport, particulièrement créatives. Dans cet article, nous cherchons donc à savoir si, et le cas échéant comment, l'engagement dans un processus d'innovation conduit à des formes singulières de vulnérabilité organisationnelle.

Des études de cas ont été réalisées dans cinq entreprises françaises spécialisées dans l'*outdoor* (trois PME et deux TPE). Nous avons mené un total de 48 entretiens avec différents acteurs des processus d'innovation, accompagnés d'observations de terrain et d'analyses de données secondaires.

Plusieurs résultats marquants ressortent. La priorité fréquemment donnée à la réponse aux défis techniques est susceptible d'éloigner le produit du client et de son utilisation réelle. Dans certains cas, une forme de « fièvre de l'innovation » génère des déséquilibres internes. Par ailleurs, certaines entreprises sont trop dépendantes de l'inventeur-entrepreneur, acteur clé de leur fonctionnement, mais aussi de son réseau de proximité ; cela peut impliquer un affaiblissement du réseau d'innovation, notamment lors de la phase cruciale de découplage. Enfin, si la création de réseaux d'innovation est nécessaire, elle accentue la dépendance vis-à-vis des parties prenantes et expose à des menaces spécifiques.

En termes d'implications managériales, il ressort qu'une confiance excessive dans les avantages de l'innovation peut s'avérer problématique. Il ne s'agit pas de décourager les innovateurs, mais de rappeler la nature contingente et incertaine des processus dans lesquels ils s'engagent, ce qui nécessite anticipation et mesure. Le défi consiste à gérer à la fois le présent et l'avenir, tout en reconnaissant que l'exploitation d'une routine n'empêche pas l'exploration de nouvelles solutions.

Mots clés : management de l'innovation, vulnérabilité organisationnelle, sports *outdoor*, innovation de produit, petites entreprises.

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Revisiting innovation: the organizational vulnerability of small or medium companies innovating in the outdoor sports sector

Abstract

While it is common thought that innovating is likely to procure competitive advantage within the industry of sports goods, it is also a risky activity which may lead to damaging consequences for companies. It therefore seems relevant to take an interest in the potential detrimental effects of innovation processes within small, particularly creative, companies in the sports sector. In this paper, we seek to know if, and how, engaging in an innovation process leads to singular forms of organizational vulnerability.

Case studies were carried out in five French companies specializing in the outdoors: three small or medium enterprises (SME) and two very small (or micro) enterprises (VSE). We conducted a total of 48 interviews with different actors in the innovation processes, accompanied by field observations and analysis of secondary data.

The priority frequently given to meeting technical challenges is likely to distance the product from the customer and real use. In certain cases, "innovation fever" generates internal imbalance. Second, some companies are too dependent on a key figure in their functioning, the inventor-entrepreneur; it sometimes implies a weakening of the innovation network during its vital decoupling stage. Finally, although the creation of innovation networks is necessary, it heightens the dependence on stakeholders and exposes to specific threats.

Excessive confidence in the benefits of innovation can prove problematic. Innovators should not be discouraged, but reminded of the contingent and uncertain nature of the processes in which they engage, requiring anticipation and measure. The challenge consists in managing both the present and the future, while acknowledging that the exploitation of a routine does not prevent the exploration of new solutions.

Key words: innovation management, organizational vulnerability, outdoor sports, product innovation, small companies

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1. Introduction

This article proposes an original approach to innovation in the industry of sporting goods. Rather than enumerating its virtues, or prescribing the right way to efficiently manage innovation, we intend to disclose the potential detrimental effects of implementing product innovation for very small, and small and medium-sized enterprises (VSE/SME) in this sector. Without denying the interest of launching innovations for these companies, we intend to unveil a less-studied facet of innovation: it can also alter the structure of the company and jeopardize its organizational sustainability (Mignon, 2009).

This way of tackling innovation may seem surprising, since innovation is generally associated with positive representations, and even held up as an ideal (Gaglio, 2011). It constitutes such a strong contemporary imperative that Sveiby (2017) assimilates it to a religious belief, and Oki (2019) to an ideology. Such sacralization is not recent (Godin, 2015): over 50 years ago, Rogers (1962) already underlined the existence, in Western societies, of a pro-innovation bias consisting in considering it as fundamentally and consistently positive for companies, the economy and society. This trend remains significant, pushing to emphasize the virtues of innovation, and to symmetrically neglect the study of its collateral effects; assessing the real induced outputs takes second place (Godin & Vinck, 2017). This may be explained by a further bias (pro-success) consisting of focusing on proven successes, raised as models, rather than analysing uncompleted innovations, which are however the great majority¹.

The sports goods industry is no exception. This increasing and globalized economic sector (Andreff, 2009) is characterized by an international specialization (Andreff & Andreff, 2009). In Europe, in a de-industrialization context, sports companies invest in research and development (R&D) to defend a comparative advantage in equipment-intensive sports goods, facing to emerging countries specialized in trite sports goods and cost battle (ibid.). Thus, according to Gerke and Benson-Rea (2016), European sports goods industry is based on innovation, sport practice renewal and democratization. Product innovation is presented as a necessity to gain competitive advantage (Gerke & Benson-Rea, 2016; Desbordes, 2000) and to reach economic growth (Núñez-Pomar et al., 2016). It is described as a tool for

¹ Even when marketing is effective, it is admitted that a number of products and services fail to find takers or generate their anticipated value (Teece, 2010). More widely, most inventions do not become innovations, as they are not adopted or received positively by society (Vinck, 2017).

differentiation and demand stimulation (Tjonndal, 2016), which are all the more crucial since this industry constitutes a particularly competitive economic sector (Hillairet, 2005).

Academically speaking, sport innovation is an emerging field of research (Tjonndal, 2016; Ratten, 2016), in spite of the abundance of innovation in the sport industry (Hoerber & Hoerber, 2012). Within this field, a significant proportion of scholars tend to consider innovation less as a phenomenon to study than a remedy to promote (Hammerschmidt et al., 2022). Like most research on technological innovation (De Jong & Marsili, 2006; Schieb-Bienfait & Journé-Michel, 2005), works on innovation in the sports sector focus on large companies and their internal capacity to innovate (Hillairet et al., 2010; Desbordes, 2001; Puthod & Thévenard, 1999), while research on the nonprofit sector emphasizes service innovation (Hoerber et al., 2015; Wemmer et al., 2016; Winand et al., 2016). Other studies have focused on inter-organizational linkage (Gerke 2017; Richard, 2007) or the injunction to align with the ongoing digitalization process (Ratten & Jones, 2020). End users are increasingly described as sources of open innovation. In particular, “lead users” (generally some experts in a given activity, willing to tinker in order to fill an unmet need) are a valuable source of creativity, providing manufacturers with a wealth of information on the contexts of use (Von Hippel, 2005; Franke et al., 2006). Under the prism of value co-creation, increasing relationships between firms and customers is considered as a source of knowledge and competitive advantage (Vargo & Lusch, 2008), especially in sport markets (Kolyperas et al., 2019). On the other hand, the literature remains quite scant concerning the multiple small companies that contribute actively to developing sports products. Innovation at the heart of these VSE/SME is, however, flourishing (Richard, 2007). They are the ones responsible for the dynamism and economic vitality of the sector (Hillairet, 2002), thanks especially to their informational advantage and reactivity (rapid use of innovative ideas) (Shah & Tripsas, 2012).

As stated earlier, innovating, whatever the sector and the size of companies, involves risks: overuse of resources, approximations in market anticipation, uncertainty surrounding the pioneering effect, etc. (Delaigue, 2013). March (1995) considers innovation as an activity both necessary and highly risky, likely to bring destructive consequences. Admittedly, it, and only it, can ensure long-term survival, by attenuating the prioritization of immediate benefits; inertia looms when confinement to the initial field of skills, the lack of long-term projection or strong dependence on the past dominate. Yet, innovation likewise proves to be problematic when it rests on false good ideas, at the root of strategic deviations or forms of blindness; or,

when it turns into a frantic race for action, more particularly when a success spiral emerges temporarily (Denrell & March, 2001). Managing innovation while, at the same time, identifying the risks faced by companies, therefore constitutes a major strategic stake with regard to the managerial impacts on hold throughout this "adventure" (Van de Ven et al., 1999).

Little is known in terms of actual management of innovation in the sports industry (Ratten, 2016), and even less regarding the risks for the organizations involved. Indeed, Ratten (2016) mentions that innovators face challenges while developing new products and services, since innovation is in itself a risky venture (Ratten, 2012). But she does not broaden the considered threats to the stability of organizations, mentioning only the uncertainty of innovation processes, financial risk (insufficient resources can be generated), and the necessity to balance the resources spent on R&D with expected potential benefits (Potts & Ratten, 2016).

The purpose of this article is to help fill this gap in the sport management literature. There is a need for a deeper awareness of the multifaceted implications of the development of sport innovation (Potts & Ratten, 2016). The aim is not to analyze what fragilizes each innovation process, leading to the possible failure of a peculiar project (Soulé & Lefèvre, 2016), but to focus on the consequences potentially endangering the organization (being understood that these two aspects may be embedded). Situated in niches that are sometimes not well established, and with restricted life cycles, VSE/SME in the sports goods industry require attention at all moments, since risk-taking is often an integral part of their functioning and strategy (Richard, 2007). They innovate on the edge of dominant design, at times contributing to breakthrough via major innovations², with the latter essentially expanding within small and particularly exposed companies (Christensen, 1997). Given that innovation always modifies the organizations in which it emerges (Latour, 2003), we seek more precisely to know if, and how, engaging in an innovation project leads to singular forms of organizational vulnerability, understood here as a process likely to lead to a critical situation through the combination of fragility factors. Of course, failure is far from being the only possible outcome, as resilience and coping skills can address these vulnerabilities.

² Minor innovations, also defined as incremental, consist in "reinforcing" a product or service (Garel & Rosier, 2008). They imply simple product improvements, mastery of technical skills and knowledge of an already identified market. A lower level of uncertainty thus exposes the innovating company less to the risk of weakening. On the other hand, major innovations, referred to as radical, disruptive, renewal or even exploration (ibid.), imply more uncertain and engaging processes.

An interdisciplinary literature review first inventories the entrepreneurial risks linked to involvement in innovative projects. It also aims to propose a definition of organizational vulnerability, as a concept. We then present the methodology of our investigations (tracking seven equipment innovation trajectories led by five VSE/SME of the Rhône-Alpes region in France) before putting forward the main results. Finally, we propose a discussion on what these cases confirm and nuance in relation to the literature, as well as recommendations for a cautious management of sport innovation within VSE/SME.

2. Theoretical framework

The first objective of this theoretical framework is to identify and categorize the diverse risks, either organizational or entrepreneurial, associated with innovation for the company. The references used are from the fields of innovation management, socioeconomy and business strategy.

2.1. The pitfalls of the quest for technical perfection

A first series of works highlights vulnerability factors caused by an overvalorization of the invention and/or its exaggerated sophistication. It is motivated by the legitimate wish to be the best or the first on a market (Foster, 1986), and frequently associated with the belief that a competitive advantage will automatically result from this. This quest for perfection is likely to lead to internal imbalances: multiplication of costs, focused efforts on the product to be developed (to the detriment of what may enable innovation to take place). When innovating becomes an objective in itself, neglecting activities considered less crucial may occur, leading to deteriorated marketing, listless promotion, dull products, poor distribution, accounting given less importance, costly production, slapdash planning, etc. (Miller, 1990; Cochoy, 2002). Such creative utopia is characteristic of pioneer companies. It leads to cutting-edge products, sometimes futuristic and/or complex, but achieved at the price of a dilapidation of resources and extended deadlines (technological evasion) (Desbordes, 2001). Ingenuity and obsession for detail moreover frequently produce gaps vis-à-vis clients' needs and purchasing habits. For example, technological overshoot provides clients with highly sophisticated products that can be questioned in terms of real utility (Christensen, 1987). Thomas and Pott (2017) highlighted such flaws of technology-driven competition, leading to equipment overshooting,

a decline in participation, and the eventual collapse of certain segments of the board sports markets. A process that is likely to entail adverse consequences for most sports industries, when subtleties and perfectionism take priority over interest in the clientele and the search for quality (making it possible to attract and satisfy it) (Miller, 1990).

2.2. The excess of optimism as to market responses

Approximations in terms of market understanding may also be the cause of difficulties. In particular, in the case of major innovations, the absence of previous references sometimes leads to exaggerated optimism (over-evaluation of the demand, over-estimated price consumers are willing to pay) (Desbordes, 2001); in many cases, forecasts face reduced sales volumes and confidential market segments resulting in delayed return on investment (even non-existent). Limited competitive watch may make it difficult to anticipate the early appearance of a similar product by a competitor, of a new market entry or, even worse, a heavyweight player in the sector (Porter, 1980). To offset this, products may be launched on the market prematurely, bringing with them issues of non-conformity, poor quality and costly after-sales service (which may damage the reputation of the company, the image of its products, even cause a loss of confidence) (Blondel & Gaultier-Gaillard, 2006). Such premature launches sometimes involuntarily prepare the ground for better controlled innovations; consequently, the pioneering effort is a misnomer since once the market has been validated, the errors understood and digested, a follower can emerge (which is even less foreseeable in the case of disruptive innovations). This is all the more true that the defense of industrial property requires skills and resources of which VSE/SME possess little (Richard, 2007; Hillairet et al., 2010). The question of timing constitutes an essential factor to be taken into consideration. Launching the product too early or too late may in fact have important consequences. It may moreover prove problematic if a company lacks awareness of what competitors are developing as a result of being too engrossed in the progress of its own project.

2.3. Inter-organizational dependency, and conflicts in terms of business model

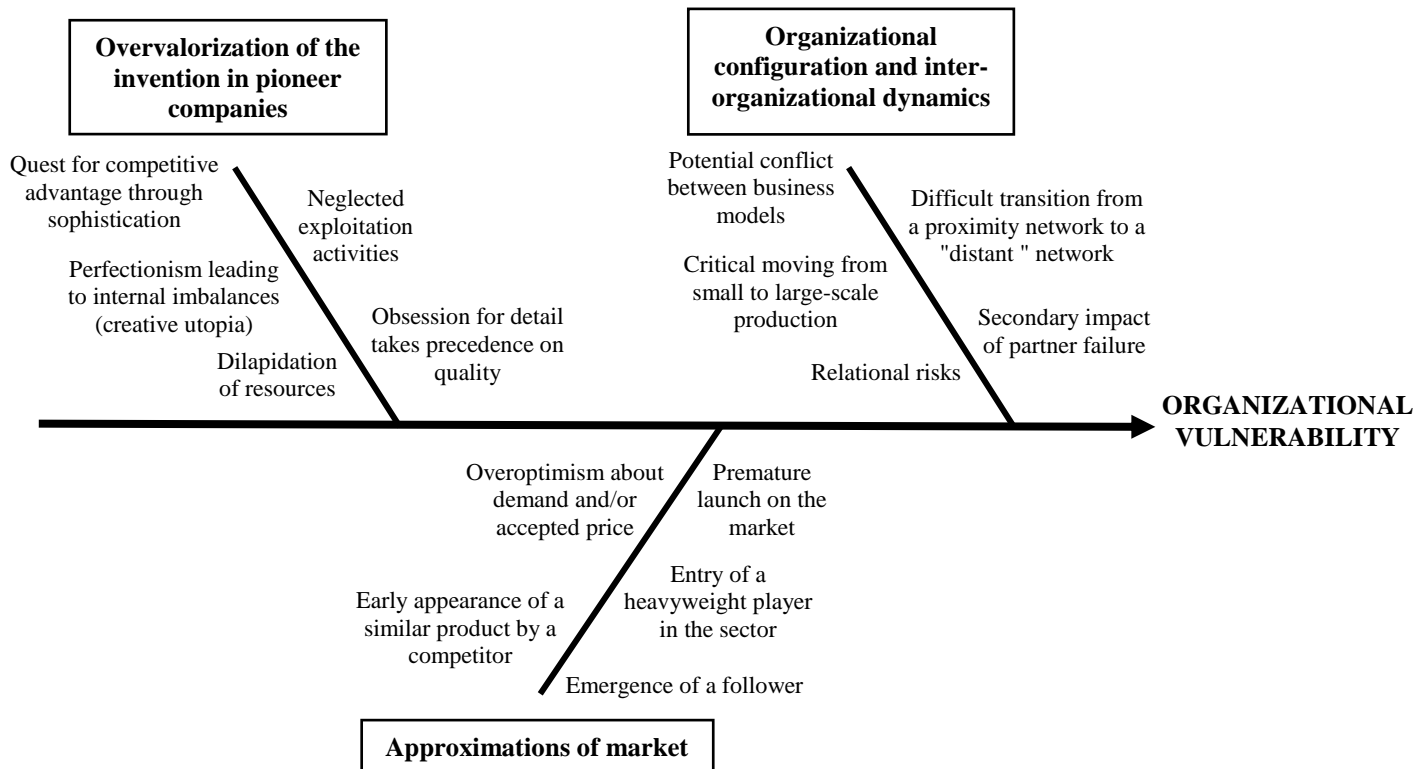
Finally, the organizational configuration and inter-organizational dynamics of innovation (Van de Ven et al., 1999) leave several types of threats on hold. A classic approach highlights the potential conflict between business models, underlining the standard error of attempting to

adapt disruptive innovation to one's own business model and market (rather than the model to the disruptive innovation by creating a new market) (Christensen, 1997). Following this, moving from small to large-scale production, during the rollout phase, may prove critical. For VSE/SME, delinking from initial resources and changing scale is not a given. Socioeconomical studies³ show that, during the move from proximity (interpersonal relationships) to "distant" resources and stakeholders (the "decoupling" process, according to White, 2002), their network is often fragilized following a stage of social and local embeddedness (Grossetti, 2008a). The secondary impact of partner failure (customers, sub-contractors, providers, distributors, transporters, etc.) is sometimes high.

Outsourcing is usually recommended in innovation projects. Nevertheless, it spreads the risks well beyond a partner company in difficulty. Within "society like clusters" (Gerke & Dalla Pria, 2018), some partners are likely to prioritize an escape to avoid the negative rebound consequences linked to reticular interdependence, to the detriment of ongoing innovation projects. More widely, the relational risks relate to potential management problems in the cooperation with other organizations (Nooteboom, 2009; Blondel & Gaultier-Gaillard, 2006). This type of threat is particularly linked to certain entrepreneurial configurations, as well as to contextual dynamics that make the change in scale tricky to manage. The latter family of risks is linked to the inevitable adverse effect of integrating an innovation network made up of multiple stakeholders (Porter, 1980).

³ White (2002) and Granovetter (1985) have shown the role of social network and personal relationships to explain the relations between companies. This embeddedness is both a resource and a constraint for innovative companies (Grossetti, 2008b).

Figure 1: vulnerability factors of innovative organizations – A review of literature



Fortunately, each innovative VSE/SME is not concerned with the entirety of the aforementioned threats. Besides, most of them are resilient enough to overcome these difficulties, if they materialize. Under certain circumstances, they are nonetheless likely to combine and reinforce each other. In the same way as bankruptcy represents the final stage of a progressive degradation of performances and capacities (Charreaux, 1997), the potential failure of innovative companies is here considered through the accumulation of small difficulties that gradually develop and crystallize into more serious problems (Daubie & Meskens, 2002).

2.4. Towards a process approach to organizational vulnerability

Settings conducive to the emergence of breakdowns previously experience a more or less long and complex period of destabilization, calling for a process approach to vulnerability (Turner, 1976; Shrivastava, 1992). Gradual forms of imperfections can be differentiated (Roux-Dufort, 2009):

- Anomalies are first degree flaws that originate in daily negligence, gaps and errors; they do not attract attention and usually remain invisible to managers because they do not directly threaten the organization. When they are known, such deviances are mostly tolerated.
- Vulnerabilities constitute a second stage in the development of organizational imperfections; they are produced by an accumulation and a combination of poorly controlled anomalies.
- Breakdowns are points of no return that occur when vulnerabilities have reached a level of saturation over which individuals no longer have power. They take the form of unexpected events coming from inside or outside the organization that transform pre-existing organizational vulnerabilities into crises.

According to Roux-Dufort (2009), a key-component of breakdowns and crises is ignorance to the presence of vulnerabilities, which literally blinds managers until a potential point of rupture. Regarding innovation management, for instance, overconfidence after prior success can entail complacency and lead to failure (Miller, 1990). Revealing vulnerabilities is all but easy, since the boundary between healthy companies and those whose decline is underway is both porous and blurred. Returning to innovative firms, it is for instance difficult to sort things out between consistency, harmony and passionate dedication, which are necessary for outstanding performance, and extremism leading to failure (ibid.).

In the field of sport management, this process approach has mainly been used from a post-event perspective, to study risk and crisis management: among other topics, stadium disasters (Elliott & Smith, 1993), poorly controlled mega-events (Soulé, 2011) or anti-doping policy (Soulé & Lestrelin, 2011). Elliott (2018) recommends applying these principles to sports organizations in a more proactive way, since the impact of interruptions or crises can be significant on a wide range of stakeholders. Business continuity management consists of preventing incidents from escalating into breakdowns. It tackles failures as the output of processes that incubate in time, because of decisions made long before, combined with acceptance of anomalies (inappropriate staffing levels, slow responses to health and safety

reviews, ignorance of near-misses, poor training, unbalanced priorities, inadequate quality of information available, lack of monitoring key indicators, political differences within a group, etc.). These elements are likely to escalate into major problems, if not identified and taken seriously. Together they shape the vulnerability level of the organization (Elliott, 2018). We propose to apply this framework to the case of innovative firms, because in many cases progressive imperfections are paradoxical side effects of growth, progress and innovation (Perrow, 1984).

3. Methods

3.1. General research design

Innovation processes are dynamic and collective phenomena, whose stakeholders act and adapt in the face of uncertainties, disagreements and trade-offs (Hohlm & Araujo, 2011). Accurately reporting such complex trajectories is therefore difficult. In order to approach this goal, we conducted case studies within companies innovating in the outdoor sector and established in the Rhône-Alpes region, one of the European leader territories on this particular market⁴. These were rooted in the sociotechnical analysis of innovations (Akrich et al., 2002), both a theoretical framework and a pragmatic methodology based on a “follow the people”/“follow the object” approach (Callon & Latour, 1992) echoing the tracking strategy (“following the thing”) defined by Marcus (1998). Detailed empirical description of innovation trajectories, each of whom considered a special case (Leonard-Barton, 1990), is thus made possible through the study of concrete objects (Dumez, 2011).

Case studies focus on singularity to account for its complexity. When they become part of a series, they allow for a generalization that concerns processes and relationships, rather than individuals, populations or organizations (Beaud & Weber, 1997). Implementing a range of cases enables to go beyond a purely descriptive approach, which would limit itself to chance interpretation based on a single case; it makes it possible, by replication and contrasts in terms

⁴ Prior to merging with the Auvergne region, following the NOTRe Law, the Rhône-Alpes region was home to almost 60% of national companies in the field of sports goods and equipment manufacturing (Boutroy et al., 2015). This territory has been considered, in the sports goods industry, as an “innovative (micro)milieu” (Richard, 2007). In 2017, the sector of outdoor sports goods in Rhône-Alpes concentrates more than 400 firms (80% are VSE) for almost 4 billion euros in turnover (Observatory of the outdoor sector, 2019). It is very dynamic: 7,5% annual rate of business creation with a majority of small innovative firms, and 11% bi-annual turnover growth. However, this expansion goes hand in hand with sectoral fragility (16% to 19% of companies are in a difficult situation or in cessation of activity), which justifies our focus on organizational vulnerability.

of findings (Eisenhardt & Graebner, 2007), to propose a common explanation for the innovation trajectories studied within different contexts and networks.

Initially intended for the reconstruction of innovative objects' trajectories, these case studies led to supplementary questions related to the transformation of involved companies. Consistently with a contextualist view (Pettigrew, 1990), changes were considered through a long-term, non-linear lens, emphasizing complexity and contradiction. This processual approach takes into consideration both the external environment (economic, politic, social, sectorial) and internal features (structural, political and cultural context), considering that they interpenetrate.

3.2. Data collection

In order to meticulously report diverse innovation trajectories, our research material is made up of 48 interviews with various participants in 7 innovation processes led by 5 companies (cf. Table 1), together with field observations and analysis of secondary data. This sampling is based on the identification, in the specialized press, of innovative products recently put on the market in different sectors (hiking, trail running, climbing activities, winter sports activities and white water sports), targeting various users (from experts to ordinary tourists).

Table 1: Case studies in five companies

Company	Type	Interviews	Innovations
CiLAO	VSE	n=15 Director, prototypist, logistician, procurement and scheduling manager, seamstresses, sales representatives, distributors, customers	Ultralight harness for climbing activities Ultralight climbing backpack
DAG	SME	n=5 R&D manager, production director, designer, users	Ergonomic and foldable kayak seat
Guidetti	VSE	n=13 Designer, former and new managers, graphic designer, marketing and product manager, subcontractors, distributors, users/ testers, IP protection manager	Automatically adjustable walking pole Bow-shaped trail pole
Raidlight	SME	n=5 CEO, R&D managers, prototypist, sales representative	Customizable trail shoe
Yunaska TSL Outdoor	VSE SME	n=10 TSL CEO, Yunaska CEO, promotion & marketing manager, sales representative,	Neo-sledge (<i>Yooner</i>) on a single skate

mid-mountain guide, rental companies,
territorial actors, practitioners

Twelve half-days of direct observation were first carried out within R&D departments and workshops, enabling the investigators to become familiar with the products and material constraints (prototyping, assembly, production, etc.). A documentary analysis was also undertaken through external and internal secondary data: sketches, professional press, patents, technical documentation, packaging, communication visuals, catalogues, websites, etc. We then carried out semi-directive interviews (lasting an average of 75 minutes) which form the core of our corpus. Designed to understand the complex, sinuous and sometimes contingent processes leading from invention to the marketing of each product, they were conducted using a grid based on sociotechnical concepts: invention and emergence of the concept, dynamics of the network, translation efforts and profit-sharing strategies, influences exerted by each stakeholder, compromises and changes made with respect to the initial project, feedback from testers and users, market and customers relations.

This set of methods has made it possible to gather contrasting information, including from peripheral players who do not *a priori* play a decisive role, while remaining close to the phenomenon (Huberman & Miles, 1994). This broadening is in line with our approach to innovation as resulting from the dynamics of a network of diversified stakeholders, all of whom ultimately have an influence on the future and the transformations of the original concept.

3.3. Data analysis

In qualitative research, Mukamurera et al. (2006) suggest controlling for residual material, so that the interpretations do not depend too heavily on the initial framing (to the detriment of part of the corpus). In the course of our socio-technical analyses, the issue of corporate vulnerability proved to be particularly salient. We then decided to emphasize this dimension that became evident in most of our case studies, to the point of constituting a new theme in itself (Creswell, 2013). We explored this emerging aspect of our materials in greater detail, searching each interview transcript for key risk factors that could lead to organizational vulnerability (as summarized in Figure 1), while being able to identify new ones. In line with the methodological recommendations of Alter (2000), Van de Ven et al. (1999) and Leonard-

Barton (1990) (longitudinal and long-term follow-up; casuistic, detailed and clinical studies of innovation), we therefore jointly monitored the innovation processes and evolution of the organizations implementing them.

After a thematic coding, the analysis and interpretation were carried out collectively by the team members. Thanks to the complementarity of the points of view, this intersubjectivity allowed for a broader vision and ultimately ensured reliability through inter-judge validation of the meaning of the data. In the end, a plausible and coherent organisation of the results and their interpretation, ensuring the intelligibility of the phenomenon under study, made it possible to conclude a form of saturation with regard to the different codified meanings (Huberman & Miles, 1994).

4. Results

Several identified vulnerability factors directly relate to the literature review proposed above, such as the quest for sophistication and perfectionism that leads to hard-line techno-centrism, or the reduced margins for manoeuvre originating in the network extension. Others were not observed in the field, or merely in a modified form: the potential conflict between business models, the emergence of a follower or a similar product by a competitor, or the entry of a heavyweight player in the sector. Finally, several elements not featuring in our state of the art appeared through our research results: the vulnerability rooted in the forced creation of a company, the ambiguity related to social embeddedness and strong ties with users, and the feeling of invulnerability among some entrepreneur-inventors. They are likely to somewhat enrich the theory.

4.1. Initial vulnerability and forced creation of a company

For innovation to materialize, the invention must be adopted by different categories of actors. This socialization (or diffusion) of an initial idea usually starts with partners and stakeholders who need to be convinced of its potential benefits. To this regard, the marketing of an invention is far from being sufficient to talk about innovation: first, it does not relate the early enrolments within innovation networks; second, it does not guarantee users and/or final customers' appropriation. Several inventors who failed to socialize their invention (by selling a patent, convincing or keeping an industrial partner) resolved to produce and market their

product themselves. Taking on the role of company head, without necessarily having the entrepreneurial skills or experience necessary, is not a given. Doing so exposes the structure implemented, more particularly since its future, generally not fully anticipated, rests on a central project that is itself uncertain (as shown by the initial difficulty to engage other actors). In several of the cases studied, this *a posteriori* finalization of the invention, "by default" more than through conviction and projection, rapidly led to difficulties in terms of planning, resource management and internal balance of the company. This state of affairs often leads companies to centralize management solely around the leader/inventor who, most of the time, lacks or has insufficient specific resources for the entrepreneurial approach. Such focalization on a first innovation questions the company's mission, the possibilities of new markets, as well as the ability to implement further innovations. From the outset, it raises interrogation regarding the more global future of the company.

The case of *Guidetti* clearly illustrates this process where the inventor, in order to launch his innovation on the market, had to put on his company manager cap, while what motivated him was not the entrepreneurial challenge, but rather the challenge of inventing. As a result, the success of the automatically adjustable walking pole caused a series of operational and organizational dysfunctions that led to profound changes in the company's capacities. Faced with growth that was too rapid and uncontrolled, the company was unable to meet the market's demands. It had to deal with the banks' loss of confidence, lack of cashflow and over-indebtedness. It also experienced problems of stock management and extended production time, linked to outsourced manufacturing. To meet the demands of long supply deadlines, large stocks and solid cashflow were necessary. Finally, numerous defects were the result of production that was fast and too high. To such a point that the company was taken over and its management completely reorganized and rationalized.

4.2. Social embeddedness: somewhere between similarity and social contiguity

At the heart of decisions and a network characterized by personal relationships, the inventor-entrepreneur sometimes assimilates his or her person, the promoted innovation and the company proposing it. In the first stages of exploration, informal, personal and proxemic enrolment dominates in the constitution of an innovation network. The interpersonal relationships of the inventor-entrepreneur and those close to him are highly solicited. Combined with geographical proximity, they facilitate engagement, trust and cooperation. As

part of a short-term dynamic, both tinkered and utilitarian, this operating mode limits the possibility of building a stable, solid and long-term network. The efficiency of such a strategy diminishes quickly when the symbolic or financial contributions attributed to the stakeholders are perceived as weak or unbalanced. In fact, several observations indicate an under-evaluation of the collective nature of the innovation process by the entrepreneurs, which leads to the gradual wearing of initial cooperation.

The *Yunaska* company is a perfect illustration of this particular case. In 2008, the inventor of *Yooner*⁵, Yoann, sought to market it. He met Cyril, skipper, medium-altitude guide and inventor of a similar product; also a talented negotiator and salesman, Cyril joined *Yunaska* (with 10% of the shares) as promotion manager. In charge of obtaining and implementing authorizations for using the product in ski resorts, he organized numerous *Yooner* trips, mainly for the tourist offices, as an effective entry point towards the decision-makers. Yet, both costly and time-consuming, the endeavour gradually created tension among colleagues. As Yoann explained: "In 2010, we were running out of steam, Cyril had put a lot of energy into everything, he wasn't paid as much as he expected. He hoped for more... Things were becoming tense, I was worried there'd be a clash".

During the development stage, dependence on the links established can represent a threat. Social embeddedness that is too dependent thus becomes a hindering factor, making difficult the decoupling necessary for the acquisition of new resources to exploit the innovation (change in scale, mass production and marketing, etc.). Interpersonal relations imply compromises that can endanger the structure, fixing it in a system that does not allow it to develop or socialize the innovation. Conversely, an inward focus may prevent any openness or compromise greater enrolment of partners, distributors and customers.

In the case of *CiLAO*, the inventors gave priority to social proximity for marketing purposes, to the detriment of engaging more distant stakeholders: distribution was organized in-house (online selling, with the problem of making a name for the company) and entrusted to hyperspecialized shops. Opening up marketing to other distributors (with greater market area) was seen as a too big compromise. Confined through choice to niche positioning, the company was only able to subsist.

⁵ <https://www.tsloutdoor.fr/yooner.html>

In other cases, extending the network may generate a feeling of betrayal or resistance among the initial actors of the innovation network, or lead to their departure. Following a semi-successful attempt at rolling out *Yooner*, the manager of *Yunaska* had to sell (himself) to the company *TSL*. Cyril, who had laboriously negotiated access to around fifty mountain resorts, felt betrayed and left the company. He then called upon his own network and offered a competitive product (the *Snooc*⁶), thus fragilizing the development of *Yunaska-TSL*. The change of scale also temporarily endangered *Guidetti*, resting on strong embeddedness (family, friends, interpersonal networks). In fact, the company was forced into a stage of decoupling when the innovation began to be popular on the market. This phase greatly destabilized the company, to the point of putting it at risk economically.

4.3. Network extension and reduced margins for manoeuvre

Design or co-development alliances are advocated in order to share, even externalize, the risks linked to innovation. More widely, developing an innovation project implies building an increasingly dense and extended network, in order to add specific and heterogeneous know-how. This very sine qua none condition for the success of an innovation, often presented as a means to reduce uncertainty (for example, thanks to technological expertise), lends itself to the failure of these stakeholders. Such failure may occur in the case of new suppliers (sometimes far away), increased financial capacity (rise in capital stock, loan) or quality control for services, without initial trust.

The company *DAG*, which endeavoured to establish geographical and relational proximity with its suppliers, had to resign itself to ordering part of the thermoformed piece of an adjustable kayak seat from Asia, because of unsuccessful attempts to engage a French subcontractor. Poor translations and non-compliance with commitments (material quality, delivery dates) fragilized the innovation's market entry. Consumers were still waiting for the products already sold by the sales representatives: the company damaged its value chain and customer satisfaction.

⁶ <https://snooc.ski/fr/>

The company *Raidlight* was likewise faced with the problem of time to market in the context of developing a new value chain (partnership and subcontracting related to shoe design/production). Multiple difficulties resulted from the loss of control over exchange (prototype errors, excessively long supplier response time, etc.). Such forms of fragility in control of the network are exacerbated for companies having to rely on a tight network.

Guidetti also found itself in a tricky situation when its solutions for managing shortages, relying on an essentially proxemic network, failed to work one by one. The company's fabric parts (for pole handles) were being made by prison inmates until the factory burnt down and forced it to subcontract in North Africa. In addition, when the French company supplying quality aluminium tubes decided to stop working with small companies, *Guidetti* turned towards Asia (with unreliable quality, stock taxation implying heavy investment and extended delivery deadlines). The combination of these factors led the company to bankruptcy at the very time that pole sales were booming.

4.4. Hard-line techno-centrism

Most of the innovation processes studied spread over the long-term. This singular temporality generates organizational or strategic difficulties for the small companies involved. Aiming to move closer to the market, innovation overconsumes financial resources and may lead to cashflow problems, with no guarantee of any return on investment.

In this respect, the organization's future is called into question all the more since a wave of perfectionism drives it into a sometimes exaggerated quest for refinement. Focusing on technical development causes perpetual evolution and products only become "black boxes" (in the sense of Latour, 1995) at a much later stage. *Guidetti's* automatic pole is a reflection of this quest for the perfect object, continuously modified for over a decade, at the price of the company's concomitant weakening. The process caused a loss of initial iteration capacity (present during the ideation and invention stages) and loosened ties with the market and consumers. In this particular case, the inventor's blinkered focus on the functionality of his automatic pole resulted in the low reversibility of initial choices. The manufacturing of a very costly and practically unmodifiable mold well before the marketing process, for example, caused the weight requirement to be overlooked, an important consumer trend when the product was launched. The final product was therefore much heavier than that of competitors,

yet further adjustments were nonetheless blocked. Following the company's takeover due to financial difficulties, the new management gave impetus to a new approach focusing on efficiency and profitability. A certain "resistance to innovation" was thus established within the company culture. Technological development of goods was stopped to better focus on minor adjustments, such as packaging, pole design (carbon visual effect) or logo redesign; elements that made it possible to better sell the innovation.

Conversely, *DAG* adopted a "clever" and "resourceful" approach to enable the reduction of time and resources engaged. Aware of its means and constraints, the company director often thought up recycling strategies during the ideation stage of his innovations. He thus convinced the designer to work in an "old school" way (shape a form) from a previous prototype. This enabled him to reduce initial investments and often to shorten deadlines. For example, he suggested reusing the mold of a kayak part (the bottom part, the hull that was already effective and possessed the required qualities) and focusing on evolutions for the other part (the top part, the deck) in order to save time and continue offering one innovation per year.

The inventor's techno-centred proposal is sometimes too far (culturally, pedagogically) from the final consumer, who ends up being a distant entity. As a result, certain important considerations are forgotten: user-friendliness, maintenance simplicity, lightweightness, etc. The user may thus question the use foreseen by the designer (ability to become accustomed to the product, to reinvent a manipulation gesture, etc). Although having initially considered weight as an important component of its ultralight harness, *CiLAO*, for example, overlooked support for the final user (lack of instruction leaflet, support in choosing, reassuring packaging), marketing strategy and distribution. Although well-finished, this minimalist product was not easily compatible with the dominating safety concerns of the practitioners: a harness should above all be reassuring.

Over and above the final customers, the distributors and influencers may also be confused and unequipped to convince customers to make the purchase, even if a product arouses their curiosity. *Guidetti's Arc* (trail running pole) is an illustration of this. Far from leaving customers indifferent through its original shape and carry system, it struggled to attract as it altered habitual use while being too expensive with regard to the competition, as one seller explained: "People are interested, they're curious more than anything else. Curiosity is what they show when we've demonstrated how it works, they say: 'Ah yes, what a clever idea'.

But they don't buy it, that's a different matter (...) the price is 149 Euros a pair, it's a bit expensive (...) today people think in terms of price, 149 euros, it's not cheap".

The question of price is regularly affected by this techno-centred focus. At times, it is not in line with the investment a customer is willing to make, even an expert. The erroneous anticipation of the variables to be included in the price thus rapidly generates high prices, fixed a posteriori (East-European manufacturing, time-consuming assembly, fastidious quality concerns, etc.). The issue of profitability takes second place, endangering companies that are often obliged to reduce their margins to enable sales.

4.5. Strong user influences: somewhere between risk and dependence

The companies that were studied are characterized by their small size, a flexible internal organization and a strong sports culture (sporty managers/employees, sometimes of a high level) enabling a certain proximity (social, cultural, geographical, cognitive) with practitioners, especially experts. This structural identity encourages links with the field and stimulates a co-creation approach. But the strongly induced iteration capacity (frequent at different stages of the process: ideation, testing concepts, prototypes, etc.) may turn into a threat if the company fails to free itself from it. Such excessive accumulation of only slightly filtered information thus loses its relevance and efficiency. It generates surplus and forms of wasted knowledge (through rapid obsolescence or integration incapacity), as well as innovation excesses, even collapses of value (including dissatisfaction of users who expressed themselves without really being taken into account).

The example of *CiLAO* (with the *Izi 33* backpack) is a striking one since it continued to use up its internal resources while the object itself was technically finished and present on the market. Under the influence of the quest for the perfect object, the backpack underwent multiple improvements after being marketed, including modified pocket positioning, improved carry system for skis/ice axes, reinforced waterproofness, etc. Such marginal enhancements in response to experts' expectations (friends, technical advisors) had no real impact on sales volumes. Thus, interactions with consumers can generate a symmetrical phenomenon of value co-destruction likely to weaken the company⁸.

⁸ As stated by Echeverri and Skålén (2011), Plé and Chumpitas-Cáceres (2010) or Stieler et al. (2014).

Spokespeople's choices and transcription of their feedback are particularly sensitive at several stages of product development. During the initial stage (design-prototyping), the involvement of technical advisors accentuates usage projection on expert users and leads the object towards a trajectory aimed at sophistication. Cognitive proximity⁹ and that of practice create gaps between products and potential consumers. It cultivates and sustains the idea of innovations made by experts for experts and consequently fragilizes the possibilities of extensive appropriation by ordinary consumers. In the case of *Raidlight*, this situation is accentuated by the fact that the CEO is also an elite trail runner who promotes a corporate culture based on performance among his employees (mostly trail runners themselves). The absence of compromise surrounding high-performing inventions leads the company to position itself on specific uses, at best related to a niche, when overall failure does not occur. This deviation appears to be accentuated, in certain cases, when the entrepreneurs are in search of legitimacy, recognition and adoption within a restricted environment.

Paradoxically, with regard to this overvalorization of experts' expectations, the tests conducted among target users are sometimes "forgotten" or not followed-up, leading to premature marketing of an object based on a technological challenge, yet unfinished in terms of real use. There are several reasons for this: lack of time, means or excessive confidence in the product which leads to quick tests in-house or within a close group.

Excessive integration of customer feedback, with a view to optimizing the quality of the product through strong ties, at times triggers a non-prioritization of this feedback between the different segments. Fredberg and Piller (2011) already noticed this tendency in some cases of sport innovation.

4.6. Blindness or the feeling of invulnerability among entrepreneur-inventors

Engagement in innovation projects implies exposure to what Lorsch (1986) coined "strategic myopia". The emphasis on rupture, mixed at times with lack of preparation and incomplete

⁹ In the sense of Bouba-Olga and Grossetti (2008). The study of innovation clusters has shown the existence of different proximity effects (geographical, social, cognitive) favoring the production and transfer of knowledge between actors (Boschma, 2004). These proximities are not necessarily positive; they can entail negative effects on organizations and their projects (Olosutean, 2011).

mastery of strategic dimensions, threatens to turn itself into a headlong rush or result in a feeling of invulnerability, leading companies into a risky spiral.

Raidlight cultivates an image of innovation and hyper-technicity. With proven success on traditional markets, the company has been driven, since 2009-2010, by a desire for breakthrough innovations in the market of trail running shoes. At the end of a whirlwind co-creative development engaged with its brand community, *Raidlight* strove to "revolutionize the trail shoe and revolutionize the way to sell them" (R&D Manager). To such a point that it threw itself into technological overshooting, producing a shoe that was too radically different (customizable, adaptable) and a set of accessories offering additional options that were too complex (shock absorber pad, interchangeable soles, exclusive gaiters and snowshoes). In spite of the induced necessity to explain its use (for the innovation was radically different), the company failed to give a key role to building demand or the enrolment of distributors and other intermediaries¹⁰. Convinced it would all be self-explanatory, the company considered this innovation through the prism of its beliefs and past success on other markets.

When a product is hyperspecialized or disruptive vis-à-vis what already exists, it should be "explained" to the final customers. Yet, the various related problems facing distributors for an effective promotion are frequently ignored. In the same vein, the ability of final customers to understand and appreciate the advantages of a product (technicity, robustness, etc.) is at times overestimated. With regard to *CiLAO*'s backpack, apart from the high price, the seller-advisor was the only aid available to help the customer choose. He alone had to convince the customer of less visible quality elements, such as the light weight and usefulness of the accessory carry system, which was not that obvious at first glance. Yet, in order to circumvent intermediaries and maintain control of distribution, *CiLAO* prioritized direct online selling making it consequently difficult to accompany final customers and convince them of the product's relative advantage.

The risk here is to suppose that once technically irreproachable products have been achieved, they will sell naturally thanks to "word of mouth", market recognition of the quality or the object's own persuasion power. While an inherent part of the innovation process, the consumer, if not involved, may experience difficulties in singularizing a product and giving it

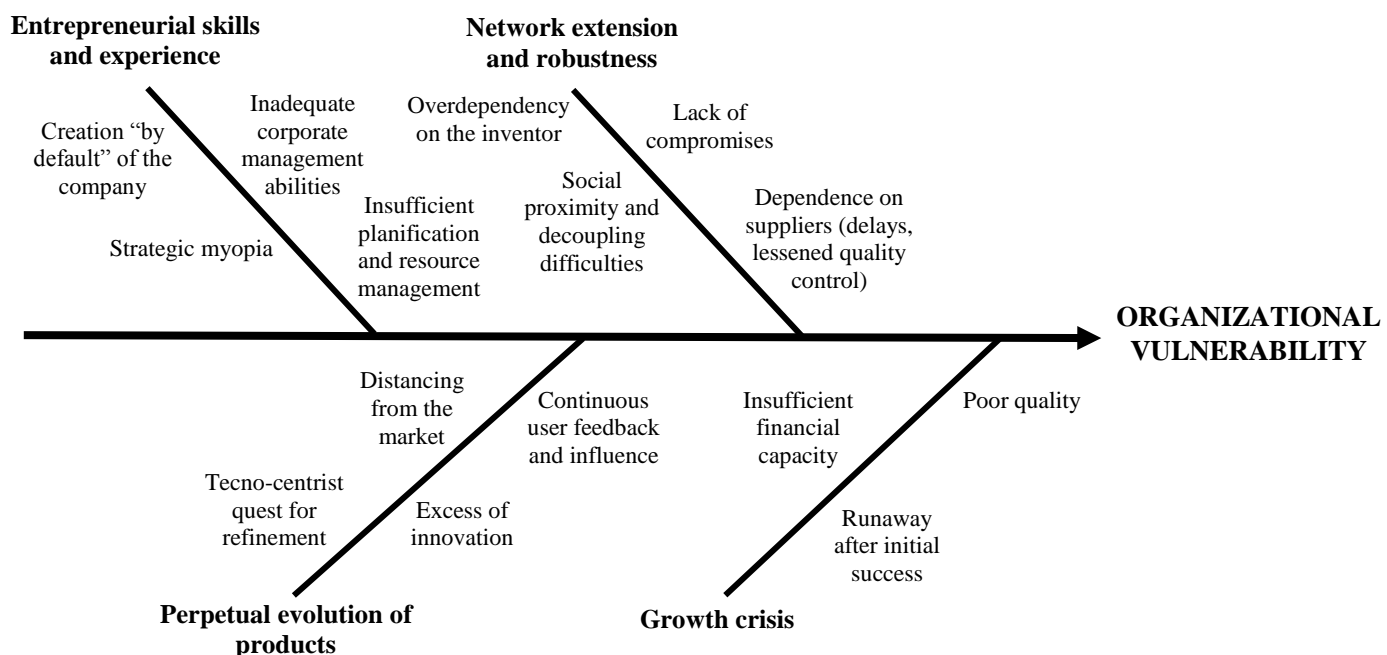
¹⁰ Final sellers resisted the concept of a longlife shoe that was too complicated to promote (on a market based on wear and tear and renewal).

value, especially when the technology is complex and/or its value may only be felt during use (such as robustness). Excessive confidence in other elements of the value chain seems to be one of the reasons for such blindness. Design, for example, is crucial in highlighting the innovative nature of an object. It enables visibility of product differentiation by playing on perceived quality (integration of esthetic tendencies, serigraphy, etc.). Neglecting or considering it as accessory, or then again integrating it into the innovation process at a late stage, has placed several companies in difficulty. "Forgetting about design" in the case of the *Izi 33* rucksack was highlighted by many interviewees as a factor explaining its limited diffusion. Distributors were the quickest to deplore its appearance that left much to be desired, although appearance conditions as much the purchases of certain users (trekkers, women) as strictly practical aspects (hard to appreciate in the space of a few minutes).

5. Discussion

Within our panel VSE/SME, engaging in innovation systematically generated threats to organizational sustainability, even when the created products experience a certain amount of success. Many risk factors (summarized in figure 2) have been identified.

Figure 2: main vulnerability factors of VSE/SME committed in sport innovation



Innovative organizations become endangered if they combine too many of these interdependent risk factors, and/or if they are blind to these weaknesses. Crisis actually looms especially when an accumulation of fragilities combines with ignorance about them, in other words the inability to take into account the cumulative effect of the organizational imperfections described above.

Ignorance is hidden under the guise of complacency or the invulnerability syndrome.

The bias referred to in the introduction (pro-innovation and pro-success) prove problematic insofar as they contribute to developing excessive confidence in the benefits of the innovation and to exaggerating control over the various processes, to the detriment of understanding complex, contingent and risky processes requiring anticipation and preparation. Furthermore, while the attitude of managers towards innovation and change is described as paramount in the fate of sports innovations (Winand et al., 2013) (even the main driving force in such processes according to Hoerber and Hoerber, 2012), our results nuance this observation: they point out some contrasted and paradoxical effects of the entrepreneurs' willingness and commitment to innovate "at any cost".

Within the sports management research community, the virtuous vision of innovation remains particularly prevalent. Future research should be in line with the trend calling for more reflexivity, for a more balanced approach that is less positivist and leaves rooms for nuance in innovation studies (Godin & Vinck, 2017).

6. Conclusion and recommendations

March's call for caution can be reiterated: innovating should not become an objective in itself. The intention is in no way to develop a new bias (anti-innovation): innovation remains a driving force of economic development and an important element of companies' competitive strategy. A cautious approach to innovation management seems nonetheless necessary. In view of our results, four major recommendations can be made.

First, neither should innovating occur "in-house" and be restricted to a limited circle of experts. While implementing co-creative processes of innovation, it is advisable not to focus

only on firm-consumer dyad and to take into consideration the other stakeholders who are partaking in the network (Grohs et al., 2020), shaping the possible market (Spencer & Cova, 2012).

Second, in order to guarantee the company's future, while innovating at the same time, the constitution of a sociotechnical network should be ensured, as well as its gradual extension and solidification. This sometimes has a painful consequence: compromises must be made and adjustments to the initial object, as "imagined" by the inventor, accepted. This is all the trickier since "the project-entrepreneur" of small companies valorizes singularity.

Third, neglecting the organization's regular operations is quite frequent. Davila, Foster, and Oyon (2009) refer to the entrepreneurial crisis, a characteristic stage during which the entrepreneur becomes a manager to deal with the organizational paradox between innovation and formalization, particularly through the need to introduce financial control within innovating SME/VSEs. It is therefore important to develop capacities and resources in terms of programming. They are necessary for the unification, involvement, intervention and regulation of the many project stakeholders. More widely, the classic management and project management tools are a necessity (Asquin, 2012).

Finally, although indispensable, cooperation can also have detrimental effects. The selection of partners and suppliers, the ability to lead the project correctly and find "contingency" solutions to deal with the unexpected (Blondel & Gaultier-Gaillard, 2006) constitute further crucial aspects in the management of innovative organizations.

This brings us back to the classic dilemma of exploitation *versus* exploration¹¹. Does involvement in innovation processes take on too much importance vis-à-vis the company's operational needs, thus endangering the future of the organization? At the same time as the potential failures of each innovation trajectory, too great a focus on innovation is likely to make certain organizations vulnerable. Through the concept of organizational ambidexterity, Duncan (1976) suggests reaching a balance between the impetus of creative processes (to prepare for upcoming environmental changes) and sustainability of the organization

¹¹ Exploitation refers to efficacy and aims for short-term improvements in terms of production, implementation conditions and marketing. It is a question of "doing business". As for exploration, it prioritizes research, risk-taking, experimentation, discovery and innovation. It aims ultimately to replace existing routines and knowledge by new ones, with a view to improving the running of the company (March, 1991).

(managing regular operations in a stable and predictable context) (Brown & Duguid, 1991). The challenge consists in managing both the present and the future, two imperatives long considered as irreconcilable; yet, the exploitation of a routine (operational efficiency) does not prevent the exploration of new solutions (strategic flexibility) (Mothe & Brion, 2008).

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