

Influence of team agility and creative capabilities on creative outcomes: a moderated mediation model

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Abstract:

In the video game industry, which is part of the creative industry, organizations should be able to provide new creative ideas. Video game studio development teams usually use agile methods, which aim to improve teams' productivity and creativity. Through a qualitative exploratory study and a quantitative survey of 70 executive managers from firms operating in the video game industry, this research examines the relationship between team agility, organizational creative capability and creative outcomes. First, it shows that team agility has a positive and direct impact on creative outcomes. Second, team agility assists in building organizational creative capability. Finally, organizational creative capability has a positive impact on the generation of creative outcomes, moderated by a relaxed work atmosphere.

Key words: Creative capabilities, organizational creativity, agility, relaxed work atmosphere.

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1. INTRODUCTION

One of the most dynamic and creative industries today is gaming (Zackariasson, Styhre et Wilson, 2006a). In recent years, however, it has faced many challenges. Players have escalating expectations for visuals, scriptwriting, sound quality, and innovative experiences, such as virtual and augmented realities (Darchen et Tremblay, 2015). Video games must now offer players evermore extraordinary experiences (Tschang, 2007), and to do so, their production demands diverse technical and artistic skills in addition to large-scale budgets (Musil *et al.*, 2010). Thus, the video game industry has become a very competitive and risky sector (Koutonen et Leppänen, 2013). In response to these challenges, video game publishers and independent studios have had to rethink their work systems, and some have begun to employ agile methods (Koutonen et Leppänen, 2013 ; Makoto Higuchi et Noboru Nakano, 2017 ; Stacey et Nandhakumar, 2008).

First used in the IT industry, agile methods are characterized by a pragmatic and iterative approach to project management and encourage self-organization and adaptation to change (Rasnacis et Berzisa, 2017). They make it possible to streamline business operations and reduce cycle times, upgrades that are decidedly relevant for the video game industry, which needs to evolve with the shifting requests of its users. Numerous studies have highlighted the beneficial effects of agile methods, especially on business performance (Cegarra-Navarro, Soto-Acosta et Wensley, 2016) as well as customer and employee satisfaction (Lee *et al.*, 2017). The Manifesto for Agile Software Development (2001) indicates that agile methods should also influence teams' creativity. However, the impact of these techniques on organizational creativity has not been thoroughly investigated (Conboy, Wang et Fitzgerald, 2009). This lack of research is particularly problematic for companies in the video game sector that need to be imaginative now more than ever to remain competitive (Eikhof et Haunschild, 2006).

Our research has three objectives: (1) to better understand how companies in the video game industry implement agile methods and practices, (2) to identify an underlying process by which the use of agile methods influences the level of creativity of video games, and (3) to delineate the perimeter of occurrence of this influence. More specifically, we will examine the mediating role of creative organizational capability and the moderating role of a tense (versus relaxed) work atmosphere. The video games sector is distinguished by “crunch times,” namely periods when significant increases in overtime are observed. Therefore, we propose that the tensions

linked to these periods of crisis may lessen the beneficial effects of organizational agility on creative production. Our work will focus on organizational creativity, which has been less studied than individual creativity, and will test the effects of agile methods empirically in an industry where they have not been traditionally utilized: gaming.

The article is organized into five sections. The first section is dedicated to an overview of the relevant concepts, highlighting the tensions in the current literature and outlining the hypotheses. The second section is devoted to presenting the first study of the paper, which consists of qualitative exploratory case studies conducted on five independent video game studios in France and Canada. The third section is about the second study, a quantitative study that analyses the relationships between team creativity, organizational creative capability, relaxed work atmospheres and creative outcomes. A reflection is proposed in the discussion section, to place results in the context of the current literature. Finally, the conclusion presents the theoretical and managerial contributions of this research.

2. THEORETICAL FRAMEWORK

2.1. TEAM AGILITY AND ITS CONSEQUENCES ON CREATIVE OUTCOMES

Agile methods are project management methods that enable the fast, frequent, consistent and continuous delivery of work in a predefined amount of time (Hoda, Noble et Marshall, 2013). Different agile methods can be used – such as scrum, kanban or extreme programming – but common principals can be identified, including short development cycles, small and efficient teams, self-organization, close contact with customers, engaging in planning games, daily stand-up meetings, test-driven design and pair programming, and retrospective reflection (Lindkvist *et al.*, 2017). A longitudinal case study conducted in a Swedish video game development studio considered creative outcomes and highlights a development method very close to agile methods, with short development cycles that lead to testable demos for external clients (Zackariasson, Styhre et Wilson, 2006b). Another study conducted with five Brazilian video game studios indicates that agile methods – in particular, the scrum method – are used in the production phase of a video game (Makoto Higuchi et Noboru Nakano, 2017). Independent video game studios, whose objective is to develop an innovative product integrating creative ‘storylines, gameplay and features (Tschang, 2007) could, thus, rely on agile methods to foster

creativity in their teams. Accordingly, we propose that, when project teams use an agile method, the creative outcomes will be greater.

H1: *The use of agile methods positively influences creative outcomes.*

2.2. THE MEDIATING ROLE OF FIRMS' CREATIVE CAPABILITIES

In the creative industries, creativity is essential for creating new content and services (Eikhof et Haunschild, 2006). Defined by Amabile as 'the production of novel and useful ideas by an individual or small group of individuals working together' (Amabile, 1988, page 126), *creativity* is also an individual capacity: 'the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)' (Sternberg & Lubart, 1999, p. 3). At the organizational level, Woodman et al. define *organizational creativity* as 'the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system' (Woodman, Sawyer & Griffin, 1993, page 293). They point out the importance of the effect of an organization's social context on their teams' ability to generate new ideas to produce innovation. Therefore, creativity depends both on the abilities of individuals and on an organization's ability to create a climate favourable to the production and expression of ideas. The ability to generate ideas can, therefore, be attributed to the entire organization when it specifically implements processes and routines to foster the creativity of its employees (Napier et Nilsson, 2006). Based on the concept of 'organizational creativity', Amabile's (1988) definition of 'creativity' and Napier and Nielson's (2006) approach, we define an organization's *creative capability* as its ability – with the help of processes and routines – to generate, select and integrate new, applicable, useful and feasible ideas and solutions to improve, change and renew the processes and outputs of an organization. The presence of creative capability can be measured by the generation of a large number of ideas and solutions at all levels of the organization, but also by individuals' perception of the creativity of the organization in which they work. At the individual level, this perception is measured by *creative self-efficacy*: an individual's belief in their ability to generate new ideas and solve problems creatively (Dampérat et al., 2016 ; Tierney et Farmer, 2002). By acting on creative confidence (Kelley et Kelley, 2012), strong perceived creativity plays an important role in creative performance. This notion has been extended to the collective level and refers to 'an individual's belief in the ability

of a team to produce creative results' (Dampérat *et al.*, 2016). We apply this approach at the organizational level by asserting that an individual's belief in an organization's ability to produce creative results can be a measure of *organizational creative capability*. Since the perception of creative efficiency is a good predictor of the originality of creative output (Dampérat *et al.*, 2016) at the organizational level, it is likely that the perception of creative ability is also a good predictor of the originality of an organization's output. Consequently, we propose that an organization with elevated creative capabilities produces more creative outcomes.

H2: *Firms' creative capabilities positively influence creative outcomes.*

The claims of creative support offered by the methods within the agile movement (Highsmith, 2004) establish a conceptual relationship between agile methods and creativity (Conboy et al., 2009). To date, however, few empirical studies have established a direct link between agile methods and teams' creativity. Kakar (2017) shows that teams that use agile methods are more innovative than teams that use a plan-driven method. The effect of agile methods on the innovativeness of teams was tested using a construct of eight questions, which only included two questions about the creativity of the team. However, in video game studios, agile methods – which involve highly motivated teams working in small groups on well-identified problems – could have a direct effect on teams' abilities to produce original ideas and solve problems creatively. Indeed, the research on the creative process and the CPS (creative problem solving) method point to the importance of the clarification stage in the creative process (Amabile, 1988 ; Lubart, 2001 ; Treffinger et Isaksen, 2005). The identification and definition of the problem are the first steps in the creative process and allow teams to direct creativity towards well-identified problems that need creative ideas (Amabile, 1988 ; Lubart, 2001). Agile methods divide the final objective into intermediate stages with well-identified problems. Moreover, in this method, the problem is redefined as the process unfolds. Hence, clarification is an operation integrated into agile methods. Aldave et al. (2019) found, through a systematic literature review, that agile methodologies are preferable for enhancing creativity in the elicitation of requirements (part of the clarification phase). To solve the problems identified during the clarification phase, agile methods bring together multi-disciplinary teams (diverse in terms of functional background), which is favourable to the teams' creativity (Jin Nam, 2007 ; Parmentier et Picq, 2016 ; Shin *et al.*, 2012). These cross-functional teams are self-organizing

groups that decide what work to do and how to do it and are fully responsible for achieving a result. These characteristics are close to the dimension of ‘freedom’, an element of organizational climates that is conducive to creativity (Amabile *et al.*, 1996 ; Ekvall, 1997). The teams perceived as the most creative develop working methods based on self-organization and freedom of action (Isaksen *et al.*, 2001). Thus, the motivation of team members and innovativeness of teams is stronger in projects that are self-organizing (Kakar, 2017). Moreover, the daily and weekly meetings included in agile methods are moments of debate about ideas, which has been identified as one of the elements favourable to a team’s creativity (Isaksen *et al.*, 2001).

These characteristics of agile methods and their probable effect on the creativity of teams in the video game industry lead us to pose the following hypothesis:

H3: *The use of agile methods positively influences firms’ creative capabilities.*

2.3. MODERATION BY A RELAXED WORK ATMOSPHERE

Agile methods develop a work climate conducive to creativity and could, therefore, affect the creative abilities of video game studios and lead to creative outcomes. A survey of team managers shows that, in the teams considered most creative, managers assess the most important conditions for a creative climate to be ‘challenge and involvement’, ‘trust and openness’, ‘playfulness and humor’ and ‘debate’, based on the categories outlined in the SOQ¹ (Isaksen et Lauer, 2002); it is on these four conditions that there is the greatest gap between the most creative and least creative teams. The clarifying power of agile methods and the motivation of the teams using it are close to the SOQ’s conditions of ‘challenge and involvement’. Moreover, the functional diversity of the teams, daily meetings and retrospective reflection could develop ‘trust and openness’, as well as ‘debate’, two of the conditions of the SOQ. Of these four conditions, ‘playfulness and humor’ appears among the precepts of agile methods. This condition refers to an easy-going and relaxed working atmosphere, in which jokes and laughter would be frequent. A study of 1,536 individuals on the Cambridge University shows that those who consider themselves to be playful (acting playfully) are also those who consider themselves to be the most creative and innovative (Bateson et Nettle, 2014). Furthermore, conflict harms team creativity (Isaksen et Lauer, 2002). A tense atmosphere, as

¹ SOQ stands for ‘situational outlook questionnaire’, used to assess a creative climate.

opposed to a relaxed one, could block the creativity of individuals. These two studies lead us to consider that the extent to which a work team atmosphere is relaxed could have a moderating effect on the influence of agile methods over the creative capacities of teams. Thus, we assume:

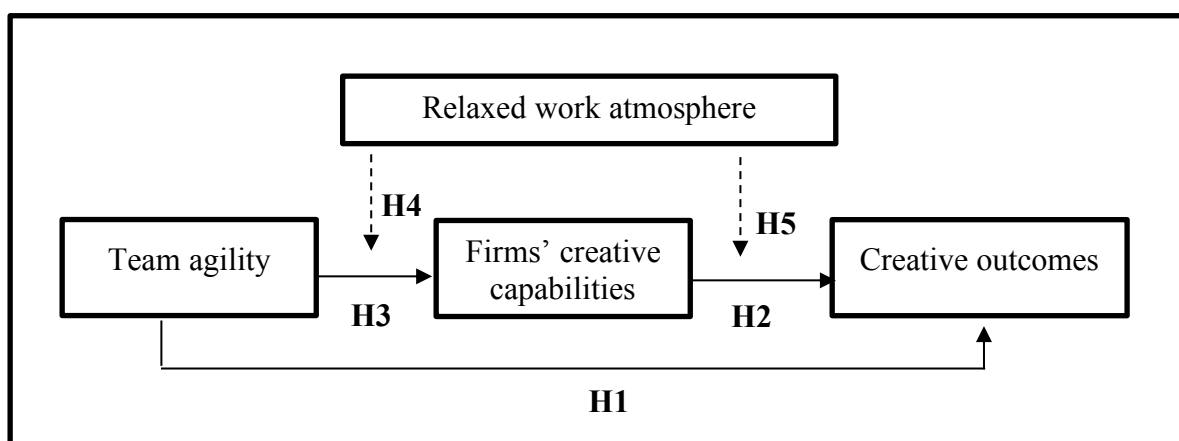
H4: *Work atmosphere moderates the influence of team agility on firms' creative capabilities, such that team agility has a positive impact on firms' creative capabilities when the work atmosphere is relaxed (H4a) but has no effect on firms' creative capabilities when the atmosphere is tense (H4b).*

Creative climate is used to measure both the effect on the creativity of teams and the effect on innovation. A study conducted in the chemical and mechanical industries shows that the playfulness dimension is more present in the most innovative firms (Ekvall, 1997). Therefore, we might expect that a relaxed work atmosphere would moderate the influence of a firm's creative capabilities on creative outcomes:

H5: *Work atmosphere moderates the influence of firms' creative capabilities on creative outcomes, such that firms' creative capabilities have a positive impact on creative outcomes when the work atmosphere is relaxed (H5a) but have no effect on the creative outcomes when the atmosphere is tense (H5b).*

The five hypotheses and their relationships are summarized in Figure 1 below.

Figure 1. Research model



3. STUDY 1: AN EXPLORATORY STUDY

Before collecting quantitative data for testing our research hypotheses, we started to conduct an exploratory study, for two reasons: first, to determine whether and how agile methods are used in the video game industry that we selected for this research; and second, to better understand the role that a relaxed work atmosphere might play in companies operating in this industry. Thus, we examined five independent video game studios using qualitative methodology. Two of these studios were based in Lyon (France) and the three others are in Montreal (Canada). We selected these studios because they were all independent and combined two main activities: outsourcing for other studios and developing their own independent video games. The impact of these two revenue streams on their work methods will be discussed further in this section. The studios we selected were created at different periods of time (1994 for studio 1; 2014 for studio 2; 2007 for studio 3; 1992 for studio 4; and 2009 for studio 5) and employed a larger or smaller number of employees (approximately 40 people for studio 1; 30 for studio 2; 300 for studio 3; 50 for the studio 4; and 33 for studio 5). We collected data in two phases: between 16 July and 27 July 2018 and between 28 October and 14 November 2019. In total, we conducted 44 semi-structured interviews and performed 20 days of observation.

This section is split into two main parts: first, similarities regarding project management methods, then differences in the working atmosphere between four independent studios with approximately the same activities and revenue stream, but with a large gap concerning their experience in the video game industry.

3.1. Similarities regarding project management methods

The four studios we analysed use the same project management methods – namely agile methods – to develop their own independent games. Nevertheless, they also adapt their work methods depending on the nature of the work: they use agile methods to develop their own games and more traditional project management methods when they work for external customers. They justify this choice by the different level of creative freedom a studio has when developing its own video games compared to developing a video game for another studio: *‘In video games, often, it’s because there’re agile and waterfall methods and then, depending on the type of content, we’ll manage it differently’* (studio art manager, studio 4). Studios feel less free to express their creativity when they do not work on their own games because in these

cases the customers are not the players, but another company with predefined needs and wishes. Studios that outsource a part of their developing activities have already defined the main features of the game they need. They do not hire another studio to be creative with their products, but to save time in the production process of their game. Therefore, the management project methods used in these cases are more traditional, such as waterfall. At the beginning of the project, the two studios meet to define a set of specifications according to their needs, which include traditional project constraints, such as a budget, a delivery deadline and a level of quality. The main objective of the outsourced studio is to deliver a product that is as close as possible to specifications, without necessarily being very creative, to avoid deviating too much from the product desired by the customer.

Concerning to the development of their own games, the process is different compared to an outsourcing project: project team have much more creative freedom. Every studio – except for studio 2, which created games based on pre-existing game concepts – has a core team dedicated to generating new games concepts. After approval from the CEO, the core teams share their vision with the department leads. In this case, the project team works based on game insights, instead of having a set of specifications. Thus, the four studios use agile methods such as scrum, with similar process incomes and an internal customer. From our observations, sprint (or iteration) duration is within two to four weeks. The deliverable is always a playable version of the game, to be tested and gather feedback from the internal customer and project teams, which takes place at the end of each sprint. They use agile methods to manage constraints and creativity during the project: *‘we try to work in a more or less agile way, so we can adapt to change, because sometimes we have a good idea, we test it, it doesn’t work, we have to change it’* (producer, studio 5); *‘The way to reach this objective [game improvement] evolves with time, finally you have your initial idea, and once it is implemented in the game, you think ahh it gets a little stuck. I can improve it that way by iteration. If we did it like an airplane, there’s the design, that’s what we’d risk ending up with, features that have been installed without being tested. We really iterate and the question is how to improve [the game], through creativity’* (producer, studio 1). Actually, they have potential creativity when they develop their games, so they use a project management method to organize creativity within the constraints.

This section confirms the importance of agile methods in the video game industry. The data we collected also enables us, however, to highlight the differences in project management methods

between the games that are produced internally and independently by a specific studio and the games that are developed in the context of outsourced activities. Studios tend to use agile methods when a creative outcome is expected.

3.2. Differences in terms of working atmosphere

In this section, the focus is on the atmosphere of the working environment and its effect on employee well-being. In an interview with a lead game designer, for the final question about any other elements relevant to the study, the interviewee replied: *‘the lunch break naps [...] It’s also nice to have this freedom, you see if I see someone on my team who’s tired, I’m not going to tell them to go work. I’ll tell them, you rest for a quarter of an hour and then come back. Creativity is also about taking care of your guys’* (lead game designer, studio 2). There are two main reasons why studios try to attend to employee well-being: the first reason is to retain their employees’ talents and experiences; the second reason is the studio’s willingness to create a working atmosphere in which people can be creative.

Following this vision, the four studios create an area that is dedicated to lunch, discussions and break times, but the size of the rooms and their contents are different. They range from a simple kitchen with a microwave and a sink to a kitchen with free Starbucks coffee available and a chef cooking for the employees. However, it is customary in these places to provide living room consoles and board games. Employees use these forms of entertainment during breaks; they seem to share friendly moments, including burst of laughter. Even though they are in their workplace, they can have fun with their colleagues. For the CEO of studio 2, this notion of creating a relaxed working atmosphere for employees is very important: *‘You know here, we make video games to entertain people. How do you expect my guys to make a fun game if they don’t have fun making it? Sometimes it’s hard to get them back on the job but I think it’s necessary for them to have fun’* (CEO, studio 2). In general, working in a video game studio is not stressful, except when there is a deadline to meet.

In all the studio except one, individuals are free to choose when they have a break. In studio 1, break times are set by the executive management and individuals have to strictly respect these break time slots. Similar observations were made regarding flexible working hours: in the other studios, individuals may arrive at the office over a large time frame. However, in studio 1 all the working hours are strictly predefined, with few exceptions for personal or medical reasons.

They embraced this practice to avoid frequent availability problems when planning meetings and organizing teamwork. Now individuals think it is a good idea because everyone takes a break at the same time, so they have group activities and discussions: *‘I like it because I was just saying that I’m a good conversationalist and so it allows me to see people in other contexts too and to talk about other things and have a laugh and go back to a more private way’* (game designer, studio 1). It seems these predefined breaks are good for employees to disconnect from the work and create a more private relationship with colleagues.

In two of the studios, people are used to sharing friendly moments: sometimes they go out for a drink, or a small group of individuals goes to the gym or to the swimming pool during lunch or after work. In studio 4, in Montreal, every Friday after 5 p.m., people are invited to share a convivial moment with some beers, snacks and soft drinks; they play games, make jokes and discuss. Seen from the outside, it looks like an event between friends. In this situation, people spend more time at work than their allotted working hours. In contrast, studio 3 does not want to encourage its employees to stay longer at work: *‘I don’t want to organize an event after work. When people are here, it’s to work. Let them go home and have fun with their families and friends’* (game director, studio 3).

Regarding working atmosphere, the practices differ between studios. On one hand, some studios try to establish an atmosphere with a strong sense of social belonging through after-work events, events during working hours and providing places where people can rest and share moments with colleagues. On the other hand, some studios adopt more traditional ways of managing the workplace atmosphere.

In conclusion, studying these four independent studios demonstrates that they all perceive the need to use agile methods when they want to create a creative outcome, in contrast to the traditional methods they use when a creative outcome is not required. This finding highlights a potential causality between the use of agile methods and organizational creativity. Also, the main difference between studios is their working atmospheres. Two out of four of the studios observed have established a working environment that could be described as a relaxed working atmosphere. Nevertheless, there is still doubt about its potential impact on organizational creativity. Study 2 aims to test these two findings on a larger sample.

4. STUDY 2: A QUANTITATIVE STUDY

4.1. DATA COLLECTION AND MEASURES

We conducted a quantitative study to test the proposed model and hypotheses. We selected the video game industry as a field of study for two reasons. First, this industry has become particularly prosperous and has positioned itself at the heart of the entertainment business by generating increasing global revenues. For example, the US market generated \$36 billion in 2017 (of which 80% came from software sales) compared to \$30.4 billion in 2016 (Wijman, 2019). Second, the exploratory study confirmed that agile methods are particularly relevant to the industry. Further investigations into this sector are required to understand how and when the use of agile methods positively influences the creative outcomes.

The data were collected at three international events that gathered key players from the video game industry: Game Connection Europe in Paris (24–26 October 2018), the Montreal International Game Summit (12–13 November 2018) and Game Connection America in San Francisco (18–22 March 2019). Before the events, we planned meetings with potential respondents using event platforms. Our final sample was composed of 70 executive managers who agreed to answer closed questions measuring the variables included in the proposed model (team agility, firms' creative capabilities, perceived originality of the video games produced and the relaxed aspect of the work environment). All these executive managers worked in firms operating in the sector. We conducted the questionnaires face to face using an iPad. To decrease the social desirability and response bias that may be present in survey responses, we assured respondents that their answers would remain anonymous and asked our questions in different orders for different participants.

Team agility was operationalized using a dichotomous qualitative variable that measured whether each firm utilized agile methods (*Does your company utilize agile methods?* 0: No; 1: Yes). A two-item, five-point scale was used to measure each firm's creative capabilities (*To what extent do you believe that your company has the capabilities to solve problems in a creative manner?* From 1: *Not at all* to 5: *Very much*; *To what extent do you believe that your company has the capabilities to produce new ideas?* From 1: *Not at all* to 5: *Very much*). The creative outcome was measured using a one-item, five-point scale of perceived originality (*How do you evaluate the video games produced by your company?* From 1: *Not at all original* to 5: *Very original*). A dichotomous qualitative variable was used to measure whether each executive

manager considers that their employees worked in a relaxed atmosphere (*Regarding the atmosphere in which your employees work, would you say: 0: This work atmosphere is not playful?; or 1: This work atmosphere is playful?*).

4.2. RESULTS

Seventy executive managers of firms operating in the video game sector participated in this survey.

Mediation analysis. We created an index of the firms' creative capabilities (Pearson coefficient = .277; $p < .05$). We used the recommended indirect bootstrapping technique to test the indirect effect model whereby a firm's creative capabilities mediate the effects of the agile method (coded 0: *No* vs 1: *Yes*) on the perceived originality of the video games produced by the firm (Preacher & Hayes, 2004). An analysis was conducted using Hayes's (2013) PROCESS macro with 5,000 bootstraps (model 4). The results of this analysis revealed that the use of agile methods had a statistically significant, positive effect on firms' creative capabilities (see Table 1; $a = .342$; $t(68) = 2.114$; $p < .05$), thus validating H3. Controlling for the effect of agile methods, firms' creative capabilities had a statistically significant, positive effect on the perceived originality of the video games they produced ($b = .609$; $t(67) = 4.104$; $p < .001$). Therefore, H2 was validated. Use of agile methods had a direct statistically significant, positive effect on the perceived originality of these video games as well ($c' = .465$; $t(67) = 2.271$; $p < .05$), thus validating H1. More importantly, use of agile methods also had an indirect statistically significant, positive effect on the perceived originality of these video games through its effect on firms' creative capabilities ($a \times b = .208$), with a 95% confidence interval excluding zero (95% CI: [LL = .050; UL = .443]). This result indicates complementary mediation of the effect of team agility on the perceived originality of video games by firms' creative capabilities (Zhao, Hoeffler et Dahl, 2012).

Table 1. Results of the mediation analysis

		Creative capabilities				Perceived originality		
Antecedent		Coefficient	Standard error	<i>p</i>		Coefficient	Standard error	<i>p</i>
Team agility	<i>a</i>	.342	.161	.038	<i>c'</i>	.465	.204	.026
Creative capabilities		—	—	—	<i>b</i>	.609	.148	.000
		R ² = .062				R ² = .297		
		F(1,68) = 4.470; p = .038				F(1,67) = 14.195; p = .000		

Moderation analysis. The Chi 2 analysis revealed no influence of the relaxed aspect of the work atmosphere on team agility ($\chi^2(68) = 3.248, p > .05$). Then, an analysis was conducted using Hayes's (2013) PROCESS macro with 5000 bootstraps (model 1). We computed a regression model to test the effects of use of agile methods (coded 0: *No* vs 1: *Yes*), the relaxed aspect of the work atmosphere (coded 0: *No* vs 1: *Yes*) and the interaction of these two variables on a firm's creative capabilities. The results of the regression analysis showed that team agility had a significant effect on a firm's creative capabilities ($t(66) = 2.023; p < .05$). However, the relaxed aspect of the work atmosphere had no effect on a firm's creative capabilities ($t(66) = -1.409; p = \text{NS}$). The interaction of team agility and the relaxed aspect of the work atmosphere was also not significant ($t(66) = -1.691; p = \text{NS}$). Thus, the hypothesis H4 was not supported.

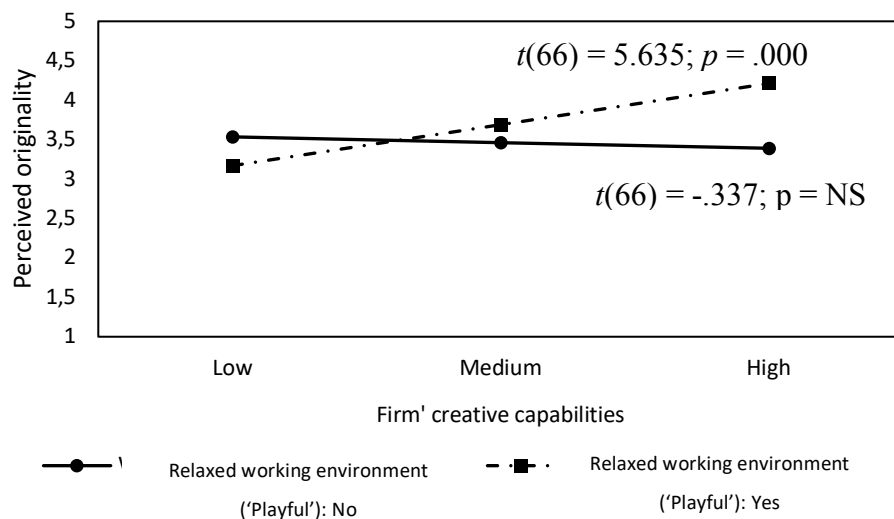
Regarding the hypothesis H5, the *t*-test revealed no influence of the relaxed aspect of the work atmosphere on the firms' creative capabilities ($t(68) = .322, p > .05$). Following the *t*-test, we computed a regression model to test the effects of firms' creative capabilities ($M_{CA} = 3.93; SD = .595$), the relaxed aspect of the work atmosphere (coded 0: *No* vs 1: *Yes*) and the interaction of these two variables on the perceived originality of the video games produced by the companies (see Table 2, Figure 2). The results of the regression analysis showed that the relaxed aspect of the work atmosphere had no statistically significant effect on the perceived originality of the video games ($t(66) = .941; p = \text{NS}$). However, the firms' creative capabilities did have a statistically significant, positive effect on the perceived originality of the video games ($t(66) = 5.349; p < .001$). More importantly, there was a statistically significant interaction effect on perceived originality ($t(66) = 2.723; p < .01$). The analysis revealed that firms' creative capabilities significantly and positively influenced the perceived originality of the video games they produced when the work atmosphere was relaxed ($t(66) = 5.635; p < .001; 95\% \text{ CI: } [LL =$

.621; UL = 1.143]). However, this influence was not statistically significant when the work atmosphere was not relaxed ($t(66) = -.337$; $p = \text{NS}$; 95% CI: [LL = -.660; UL = .438]). In line with H5, these results indicate that the influence of firms' creative capabilities on the perceived originality of the video games they produce depends on whether the work atmosphere is relaxed or not. Thus, the hypothesis H5 was validated.

Table 2. Results of the moderation analysis

	Perceived originality		
	Model 1		
	Coef.	SE	p
Creative capabilities	.769	.143	.000
Relaxed atmosphere	.248	.263	.349
Interaction	.993	.364	.008
R ²	.331		

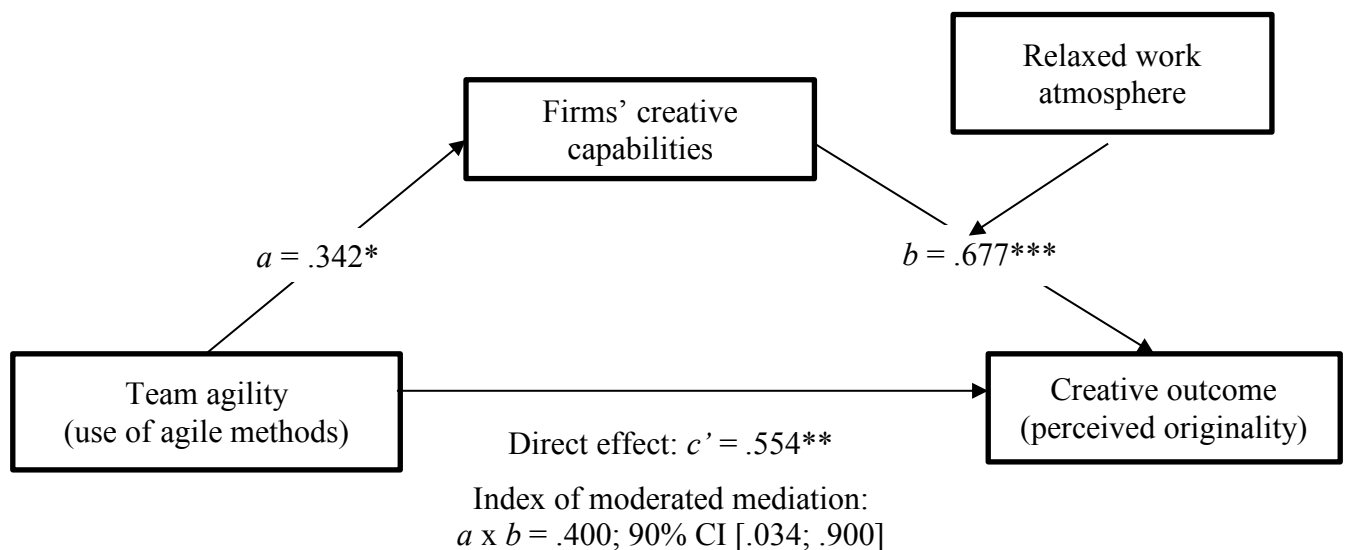
Figure 2. The moderating role of the relaxed atmosphere



Moderated mediation analysis. A simple mediation analysis provided evidence of a mechanism carrying the effect of agile methods on the perceived originality of the video games produced by a firm through the firm's creative capabilities. Next, a moderation analysis revealed that the influence of firms' creative capabilities on the perceived originality of the video games they produced depended on whether the work atmosphere was relaxed or not. These results suggested that the indirect effect of team agility on the perceived originality of the video games

produced by a firm, mediated by the firm's creative capabilities (mediator), depended on the relaxed aspect of the work atmosphere (moderator). We tested a model of moderated mediation whereby the mediating effect of creative capabilities was moderated by the relaxed aspect of the work atmosphere in the relationship between team agility and the perceived originality of the video games produced by a firm. This analysis was conducted using Hayes' (2013) PROCESS macro with 5000 bootstraps (model 14). The results confirmed a statistically significant interaction effect between firms' creative capabilities and a relaxed atmosphere on the perceived originality of video games ($t(65) = 3.306$; $p < .01$). Bootstrap results indicated that the index of moderated mediation did not include zero (90% CI: [LL = .034; UL = .900]). The indirect effect of team agility on perceived originality was not statistically significant when the work atmosphere was not relaxed (90% CI: [LL = -.559; UL = .030]), but it was statistically significant when the work atmosphere was relaxed (90% CI: [LL = .046; UL = .551]). As shown in Figure 3, these results validated the prediction that the indirect effect of team agility on the perceived originality of the video games produced by a firm would be moderated by the relaxed aspect of the work atmosphere.

Figure 3. Graphic model showing the results of moderated mediation



* Statistically significant at the threshold of .05

** Statistically significant at the threshold of .01

*** Statistically significant at the threshold of .001

5. DISCUSSION

This research aimed, first, to better understand the mechanism through which the use of agile methods influences the creative outcomes of firms operating in the creative industries and, second, to identify a boundary condition of this influence. The results showed that the use of agile methods had a direct and positive effect on creative outcomes. This result is consistent with studies that highlight the benefits for companies in the creative industries to rely on agile methods to increase their creative production (Makoto Higuchi et Noboru Nakano, 2017 ; Zackariasson, Styhre et Wilson, 2006b). More importantly, our results demonstrate that the creative capabilities of a company are decisive in the creative industries because they underlie the influence of agile methods on creative production. To our knowledge, this research is the first to provide empirical proof of the mediating effect of firms' creative capabilities. In addition, the literature provides only rare explanations of how the relaxed nature of a work atmosphere affects the creative production of an organization. Contrary to what we had assumed, the influence of the agility of methods on the creative capabilities of companies does not depend on a relaxed atmosphere. In other words, agile methods are effective in increasing creative capabilities whatever the level of relaxation of the work atmosphere. However, a relaxed work atmosphere is critical for the impact of firms' creative capabilities on creative outcomes. The atmosphere intervenes at the level of the creative outcome by being a condition for creative capabilities to lead to perceived originality. A not relaxed atmosphere, as opposed to a relaxed one, is a barrier to the expression of creative capabilities.

Creativity is recognized as a key moment in the upstream phase of the development process for new products (Hauser, Tellis et Griffin, 2006). During this phase, practitioners must enact tools to stimulate creativity within the development team to find new, original ideas for products or services. This research validates the beneficial effects of agile methods; however, it also warns managers about the conditions for using these methods. A relaxed work environment is an important condition for achieving creative results. Certain management methods and office layouts in workspaces can favour the perception of relaxation by the employees.

According to our results, the proposed model explains six per cent of the variance in creative capabilities and about thirty per cent of the variance in perceived originality of creative outcome. This result is encouraging, given the exploratory nature of the research, but it also encourages the consideration of additional variables in the model. In particular, we used

perceived originality as a measure of firms' creative outcomes. In social and organizational psychology, there are three main measures of creativity: fluidity, flexibility and originality (De Dreu, Baas et Nijstad, 2008). *Fluency* refers to the number of (non-redundant) ideas for products or solutions generated during the creative process. *Flexibility* is a measure of an individual's ability to go beyond traditional product categories and to integrate divergent perspectives into their thinking. Finally, (*perceived*) *originality* characterizes the unusual and differentiating side of an idea or solution. This indicator of creativity is, in fact, used in various research articles on creativity, notably Dahl et al. (1999). Perceived originality is also used in the literature to distinguish between incrementally new products (INP) and radical or 'completely new' innovations (Really New Product). Researchers such as Zhenfeng et al. (2014) or Zhao, Hoeffler et Dahl (2012) use the criterion of perceived originality to assess the degree of novelty of products. Like Dahl et al. (1999), we could also have considered utility a measure of creative performance. Concerning the choice of the evaluator of creative production, several subjects of debate exist in research articles on creativity, in particular, the number of evaluators to be considered. Some researchers mobilized several evaluators to judge creative outcomes. Others, however, focused on the assessment of a team's creative performance by one person. This type of evaluation is widely used and accepted in the innovation literature. In work on team creativity, this assessment is made by the team manager (or direct supervisor). In our study, we used the company's executive managers. Other methods for measuring creative outcomes could be considered in future research. For example, multi-level analyses (Tu, 2009; Wang, Kim & Lee, 2016) would make it possible to combine teams' points of view and managers' points of view. Using test markets could also be a relevant way to test the creativity of ideas or solutions (Soukhoroukova, Spann et Skiera, 2012).

6. CONCLUSION

The theoretical contribution is twofold: (1) identification of a positive link between using agile methods and the creative outcomes of the project; (2) organizational creative capability has a positive effect on the creative outcomes when it is moderated by a relaxed atmosphere. Finally, some recommendations to video game studio managers. First, they should use agile methods to develop their games. Second, managers should try to create a relaxed work atmosphere for their employees. To build this atmosphere, they can refer to the dimension of playfulness of the SOQ (Ekvall, 1997).

7. BIBLIOGRAPHY

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