

Encouraging and rewarding consumer creativity in new product development processes: How to motivate consumers involved in creative contests?

Recherche et Applications en Marketing

1–23

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DOI: 10.1177/2051570716662411

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Abstract

The integration of consumers into new product development processes is a promising approach that triggers original ideas faster for brands. This research seeks to determine which are the rewards and interactions that enhance creativity in creativity contests. The theoretical framework relies on consumer creativity, brand feedback role during new product development processes and the effects of rewards on creativity. Findings of an experimentation conducted with 180 individuals show that reputation rewards associated with brand feedback can play a role at least as important as monetary rewards. The results show that the feedback of the brand is a moderating variable in the relationship between creativity and rewards and that associating brand feedback with reputation reward strongly stimulates creativity.

Keywords

creativity, creativity contest, feedback, innovation, motivation, new product, rewards

Introduction

Brands increasingly use creativity contests aimed at their communities¹ or at communities linked to co-creation platforms.² Their objective is to stimulate the creativity of internal marketing teams in

terms of new products/services.³ In that respect, Hemonnet-Goujot et al. (2013) show encouraging results: within 3 weeks, ideas proposed by the eYeka community have come as creative as those

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produced by design students or by innovation professionals over a 3-month period.

This research article focuses on consumer creativity, and more particularly on the generating processes of original ideas through creativity contests.⁴ These contests fall within the first stage of the new product development process (NPDP) which is composed of three main stages: the generation of ideas, the development and the marketing of the concept (Crawford and Di Benedetto, 2008). We particularly focus on the first stage: the generation of original ideas through creativity contests in relation to consumer communities, which is unquestionably the most critical stage in the whole innovation process (Hauser et al., 2006).

The purpose of the research is to show that the participation of consumers to the NPDP has to be carefully parameterised to stimulate creativity. This participation is based on complex processes in terms of reward selection, interactions and requested tasks.

Moreover, the management of the consumer integration process is a major challenge for marketing actors since observed solutions show huge discrepancies and best practices are not clearly identified. Indeed, which is the best approach? Encouraging monetary rewards or offering mere tokens of recognition? Encouraging mutual help mechanisms, expert feedback to participants in innovation contests as can be observed in open source communities or favour more individual and competitive mechanisms among contestants? Answering these questions involves a good understanding of the impact and of 'brand-consumer' interactions on consumers' creative experience. Our research model integrates various stimuli such as monetary and non-monetary rewards and brand feedback (BF). Basically, we are trying to address the following question: which types of reward and brand-consumer interaction have to be implemented in order to encourage the creativity of consumers engaged in the process of developing new products?

The issue is interesting from managerial and conceptual viewpoints. On the managerial level, although consumers may express their intention to take part in the development of a new product in a creative contest, nothing obliges them to deliver

original ideas or to produce results (Vermette and Tissier-Desbordes, 2012). Incentives that encourage participation are therefore crucial, and the nature of rewards (monetary vs non-monetary) offered by brands (Afuah and Tucci, 2012) is of primary importance. On the conceptual level, the research aims to bridge a gap in the existing literature with regard to reward effects (specifically, to the possibility of receiving monetary or non-monetary rewards) related to creativity in the context of a creative competition. The study addresses a call launched by various researchers over the last few years (Cadenat et al., 2013; Füller, 2010).

Füller (2010) underlines the paradox between managerial practices, which mostly favour proposing monetary rewards, and academic literature which highlights the wide range of participants' motivations in creation contests: to improve one's competences, gain in reputation, expand one's network, enjoy an unforgettable experience, solve a problem and so on (Füller, 2010; Lakhani and Wolf, 2005; Nambisan and Baron, 2009; Von Hippel, 1986).

These motivations come into two categories: intrinsic and extrinsic motivations (Deci and Ryan, 1985). According to these authors, intrinsic motivations stem from the task to be accomplished, considering that the task is instrumental. On the other hand, in extrinsic motivations, the purpose is different: examples include material, social or personal rewards or payment. Thus, when a company's reward policy limits itself to monetary bonuses, the risk is that it will only attract extrinsically motivated consumers and will cut itself off from the intrinsically motivated ones who are less sensitive to monetary gains. In that respect, we find it of interest to tackle the subject of reputation rewards (RRs) because they are not monetary and they satisfy a need for recognition, a major issue studied in the articles of Füller (2010) and Le Nagard-Assayag and Reniou (2013). As far as we know, no scientific work has yet analysed the impact of RRs⁵ on creativity, especially by resorting to experimentation, a neglected methodology in the field of studies on creativity contests.

Besides, research work on NPDP underlines the centrality of the concept of 'BF' which is defined as a comment emitted by a brand on the quality or

relevance of an idea proposed by a consumer. Thus, most consumers engaged in creativity contests wish to influence the brand's marketing policy by establishing a privileged relationship with the brand (Fuchs and Schreier, 2011; Ramaswamy and Gouillart, 2010). While the literature establishes an obvious link between feedback and creativity, we do not know of any empirical research testing the impact of BF on creativity in an innovation context.

The main result of this research is to show that extrinsic rewards (monetary and non monetary) not only do not reduce creativity but do improve it when they are complemented with the sponsoring brand's feedback.⁶ This research partly answers the call launched by Burroughs et al. (2011) who underline the need to identify a new type of 'moderator' between extrinsic rewards and creativity. We suggest that BF acts as this new 'moderator', and we demonstrate that the choice of rewards is not neutral on creativity. We give evidence that using monetary or non-monetary rewards entails different impacts on creativity. Consequently, our research comes into line with the general question on the effects of extrinsic rewards (including monetary and RRs)

The first section of the article introduces the main concepts we put to use: (1) the creativity of consumers in their participation in creativity contests, (2) the part played by BF in NPDP and (3) reward effects on creativity. We resort to two theories: the self-determination theory (SDT) and the theory of learned industriousness (TLI). The second section presents, on one hand, the theoretical framework of the research on the effects of rewards on creativity in innovation contests, and, on the other hand, hypotheses related to the processed variables (rewards and BF) in the experimentation we carried out. The following sections successively present our methodology and results, and the general discussion.

Conceptual framework

The creativity of consumers in their participation in creativity contests

Creativity is a little-explored subject among marketing researchers, except for work on consumer creativity (Burroughs et al., 2011; Burroughs and

Mick, 2004; Moreau and Dahl, 2005; Salerno, 2009) or on the creative features of the 'lead user' profile (Faullant et al., 2012). Still, creativity is a major and attractive competence for companies and they wish to understand, manage and master it. Indeed, creativity is at the origin of the production of new ideas and it is one of the major determining factors of innovation (Amabile, 1988; Amabile et al., 1996). Innovation and creativity are sister concepts, but they call for further clarification. Innovation is the wider-ranging notion and it is defined as the generation, acceptance and implementation of new ideas, processes, products or services (Thompson, 1965). The concept of creativity applies to the production of new and useful ideas or solutions to a given problem (Amabile, 1996). Both definitions convey the two dimensions that a creative idea has to display. On one hand, it has to be new, which means that it must be original and unexpected (Sternberg and Lubart, 1999). On the other hand, it has to be useful, that is, it has to add appropriate and practical value to the context. The latter aspect is a decisive element in the development of new products.

Previous work on consumer creativity has mainly focused on the preceding factors of creativity and on creative performance. Burroughs and Mick (2004) tackle consumer creativity in a problem-solving context. They identify antecedents that are both situational (time constraints, situational absorption) and personal (locus of control and metaphorical capacity). Moreau and Dahl (2005) confirm that time constraints influence cognitive processes which impact creativity. For example, pleasure felt during one creative experience depends on the feeling of being competent and autonomous (Dahl and Moreau, 2007), and it influences the production of creativity (Salerno, 2009).

Cova (2008) defines the participation of consumers as 'the result of competences that are put into play by certain consumers in order to modify or improve the offer of companies, and to arrive thereby at an original creation'. Consumers wish to be invited by brands for several reasons: they think their ideas are good, they want to give evidence of their creativity by using their competences and they wish to express their longing for individual or collective creation. Marketing research has taken great

care to identify the profiles of consumers who are to be involved in NPDP. Three groups have been distinguished: 'lead users'⁷ (Von Hippel, 1986), innovators⁸ (Roehrich, 2004) and creative consumers⁹ (Berthon et al., 2007). These consumers are routinely targeted by companies who want to develop new products. The lead users are in a better position to display creativity and willingness to take part (Hamdi-Kidar, 2013). As a result, they feature relevant profiles for companies, even if identifying them is difficult and their motivations may vary.

One current research considers that creativity results from isolated activities (Amabile, 1996). Yet, collective creativity exists and it provides convincing results (Kozinets et al., 2008). It comes into action when 'social interactions' open up to new inventions that consumers 'who think alone' would not have obtained (Hargadon and Bechky, 2006). This can be observed in virtual communities of consumers (through internet sites), when their various backgrounds lead to synergies and can generate a higher and more differentiated number of ideas (Kozinets et al., 2008).

The creative process that comes into action is similar to that which can be observed in brainstorming sessions when 'one participant comes up with one idea, then urges his imagination almost automatically to find another one while stimulating the power of association of all the other members of the group' (Osborn, 1957). As Chen et al. (2012) suggest, the phenomenon may be seen as akin to a form of collective intelligence in creativity contexts through co-creation platforms: 'in order to capture collective intelligence, companies put in place sponsored online brainstorming sites where individuals can present their ideas, comment on or improve other people's ideas, as is the case in Dell IdeaStorm'. The authors describe these sites as 'Company-Sponsored Online Co-Creation Brainstorming'. In that way, the group dynamics fosters creativity. It may be seen in action in environments such as co-creation platforms where members of consumer communities have access to other members' ideas and comments through totally virtual means. This may be regarded as collective creativity in so far as consumers are not isolated for two main reasons: first, they can access their peers' ideas and second, they regularly exchange views

with the sponsoring brand which provides advice (or feedback).

The BF's role in the development process of new products

Research work in social psychology bearing on a creativity method such as brainstorming (Osborn, 1957) has shown that lack of positive and understandable feedback results in a considerable decrease in the number of ideas generated in creativity sessions (Highsmith, 1978). Seshadri and Shapira (2003) show that feedback improves the quality of ideas.

The literature on innovation management sheds interesting light on the relation between the quantity of contributions, their quality and sponsor firm feedback. Peer or BF has a significant impact on the number of high-quality ideas (Chen et al., 2012). Frey and Lüthje (2011) explore the relation between community innovativeness and the quality of interactions. They give evidence that there is a strong causal relation between these two variables. As they see it, quality interaction is built on three dimensions: the quality of communication, coordination and mutual help. Quality of communication means that information is adapted to context and that individuals are willing to share this information. Coordination means that the members of a community plan tasks and give themselves objectives. Finally, mutual help characterises reciprocity behaviours when proposing solutions, comments or ideas to given problems.

In this research, experimentation simulates an experience of consumer participation in NPDP through a platform and its forum. We reproduce the behaviours observable in consumer communities in terms of quality of communication, coordination and mutual help. While academic work has underlined the effects of feedback on creativity, the most specific effect of BF has not been studied to date.

Reward effects on creativity

Encouraging competent consumers at a time when they are increasingly subjected to pressure from their environments becomes critical for companies who wish to launch ideation projects (Boudreau

Table 1. Main diverging results concerning the effects of tangible rewards on ‘interesting’ tasks.

Type of reward	Effects on intrinsic motivations (interest in task)	Effects on autonomy	Authors
Reward contingent on performance	No effect	Decreasing	Deci et al. (1999)
Offered reward on each unit sold	Increasing	Decreasing	Cameron et al. (2001)
Rewards depending on well-accomplished tasks	No effect	Decreasing	Cameron et al. (2001)
Rewards depending on exceeding a score	Increasing	No effect	Cameron et al. (2001)
Offered reward for overtaking others	Increasing	Increasing	Cameron et al. (2001)
Proposed rewards for well-accomplished tasks	Increasing	Increasing	Eisenberger and Aselage (2009)

et al., 2011). In this context, it is crucial to select rewards that are likely to attract competent consumers in order to stimulate the production of creative ideas. Obviously, the brief’s quality may also play a part on participation and on the quality of the proposed ideas. Insights from the existing literature on links between reward and creativity reveal an interesting theoretical controversy. Two schools of thought have conflicting views: the SDT and the TLI.

The SDT has been developed by Deci and Ryan (1985) and posits that individuals evaluate to what extent the execution of a particular task meets their basic psychological needs. The theory devotes special attention to the task’s contextual factors such as monetary rewards, punishment or verbal reinforcement (positive or negative feedback). These contextual factors have a significant impact on the intrinsic motivations which are at work in the emergence of creativity. The authors show that extrinsic (monetary) rewards have a negative effect on perceived autonomy and intrinsic motivation. Drawing from these observations, other studies identify the negative effects of rewards on performance and creativity (Baard et al., 2004; Hennessey, 2003). The development of products and services is regarded as a creative task (Burroughs et al., 2011). Now, numerous authors underline the nefarious effect of monetary rewards on creativity: these rewards trigger a ‘crowding-out effect’ (contestants give up participating), they diminish task performance (Ariely et al., 2009) and the invested efforts due to

unbridled competition (Boudreau et al., 2011). Moreover, the literature distinguishes between ‘control’ and ‘encouragement rewards’.¹⁰ Control rewards are made of money, gifts, toys and food, whereas encouragement rewards include verbal reinforcement (or positive feedback), social recognition or symbolic rewards.

Conversely, according to the TLI (Eisenberger, 1992), monetary rewards do not reduce autonomy, they reinforce it instead. Indeed, granting rewards signals to individuals that the firm has no other means of encouraging their commitment. The reward-getters are then free to accept or refuse it. The reward indicates to the receiver that the task matters for the sponsoring brand, and this triggers an increase in his intrinsic motivation and therefore in his creativity. Table 1 presents result divergences on rewards during activities deemed ‘interesting’, such as creativity.

These diverging results call for further research on implied mechanisms so as to account for their causes and move beyond the theoretical controversy. These contradictory results may be due to methodological problems: lack of control on the presence or absence of BF, lack of accuracy in the selection of criteria to assess the creativity of ideas or the contingency of rewards on the results.

In order to address these methodological difficulties, our research follows the recommendations of Cadenat et al. (2013) and focuses closely on NPDP and on the way reward and interaction mechanisms operate on a co-creation platform.

More precisely, the objective of the implemented experiment is to provide answers to the following questions:

- Which reward system should come first between monetary and non-monetary (reputation) rewards to obtain better results in terms of creativity?
- What is the impact of brand–consumer interaction on creativity?

Research model and hypotheses

Toubia (2006) has tested the influence of monetary rewards on idea generation and creativity. He concludes that rewarding participants according to their individual and collective performance brings benefits. Burroughs et al. (2011) show that, thanks to specific training, the effects of monetary rewards on creativity become positive. The theory of learning industriousness of Cameron et al. (2001) has apparently renewed the SDT of Deci and Ryan (1985), and it comes up with a more appropriate theoretical framework if the results of work in the field of marketing are to be believed (Burroughs et al., 2011; Toubia, 2006). Along with the presuppositions of the TLI, we posit the following hypothesis on monetary rewards, with proposed rewards contingent¹¹ on the completion of well-accomplished tasks:

H1. When expected monetary rewards are present (vs absence of reward), creativity is higher (vs lower).

Marketing literature shows that to facilitate consumer participation, firms have to use intangible stimulation tools (or ‘incentives’) or non-monetary ones, such as recognition (Sawhney et al., 2005). For Ezan and Cova (2008), recognition is a major factor in community environments and immaterial production such as creativity. The authors underline the difficulty of the horizontal recognition of some consumers’ work (by their peers), and that the solution is to be found in vertical recognition (by the sponsoring firm). This recognition may appear in various forms: offering enhanced visibility to the best contributors by displaying their ideas on the

brand’s site or by way of monetary gratifications. A person’s reputation is a particular form of recognition. It means that an individual’s image is improved within a community (Nambissan and Baron, 2009). Peer social acceptance or recognition is a reward each individual affords himself depending on his degree of implication in a community. Improved reputation indicates to the individual that his competences are recognised and that his status as an expert is reinforced (Lerner and Tirole, 2002). Research specialising in open source communities has observed that reputational gains may be turned into material gains (employment, monetary bonuses, etc.). Thus, image improvement is monetised (Lakhani and Von Hippel, 2003; Lerner and Tirole, 2002). The contest sponsoring brand or the community manager may propose reputation gains by increasing the number of marks earned or by offering enhanced visibility to the best contributors’ profiles on the co-creation platform or on social media.

Reputation rewards exert major leverage effect to encourage participation in creation projects of new products. Indeed, the quest for peer or sponsor brand recognition are stimulants that lead to knowledge sharing or to the production of strenuous cognitive efforts (Amabile et al., 1986; Dellarocas, 2002). It is a form of ‘ego’ reward (Füller, 2010; Zwass, 2010). Yet, while the role played by RRs is a determining factor in the contexts of creativity contests, it has never been the object of dedicated research. The purpose of this article is to bridge this gap by testing the effect of RRs on creativity. This move enables us to posit the following hypothesis:

H2. When RRs are present (vs absence of RR), creativity is higher (vs lower).

The nature and valence of feedback have an effect on performance. In the case of ‘controlling’ feedback, that is, if instructions are strict, creative results will be less good compared to cases when feedback is ‘informative’ in nature, that is, when advice is proposed (Deci et al., 1999). Similar conclusions are observed in the case of negative feedback compared to positive feedback: negative comments such as ‘your idea is not original’ reduce the individual’s motivation and eventually his creativity.

In creativity contexts, BF consists in assessing the quality of submitted ideas. Such assessment is a major reputation building factor in consumer communities. Because it comes from the brand, the reputation thus acquired by the participant has an 'official' stamp. For example, if contributor A's idea is selected, A's status improves, which is often materialised by a rising score or an increasing number of stars. This score is perceived as a powerful motivation factor (Chen et al., 2012). Feedback granted by firms exerts greater impact to stimulate participation in a consumer community than peer feedback (Jeppesen and Frederiksen, 2006). In brand-hosted community environments, community members have already established relationships with the sponsoring brand. As a result, these consumers are more inclined to share their knowledge and ideas with the firm (Wiertz and De Ruyter, 2007). When the sponsoring firm invests in the construction of a community and interactions are encouraged, consumer trust in the community increases. This facilitates subsequent participation in creativity contests (Porter and Donthu, 2008).

Recent research work highlights the effect of feedback on the generation of ideas. According to Wooten and Ulrich (2011), the average quality of ideas proposed in a creativity contest depends on the accuracy of feedback. Their experimentation is the most advanced: they distinguish between two types of feedback depending on the competences of the judges (designers vs amateurs) who assess the logos created by participants in a creativity contest. However, their experimentation is characterised by two elements: tasks are fairly simple¹² to carry out and feedback is provided by specialists and not by a brand.

In the same line of research, a study on the Dell IdeaStorm community by Chen et al. (2012) shows that sponsor firm feedback has a positive effect on the proposed ideas. In order to control the feedback introduced in our experiment and to avoid introducing a bias linked to the feedback's valence, our research introduces neutral feedback¹³ such as 'Can you clarify your idea?' or 'How do you arrive at ...?' Hence, we can posit the following hypothesis:

H3. When the brand's neutral feedback is present (vs absence of feedback), creativity is higher (vs lower).

The combined effect of BF and monetary rewards is likely to have a beneficial effect on the creativity of a new product. Feedback is observed to have a moderating role on the 'contingent rewards-creativity' relationships (Byron and Khazanchi, 2012). If feedback concerns the task and the quality of contributions and if it tends to be positive, the feedback's moderating effect on this relationship depends on three mechanisms: the clarity of assessment criteria, perceived competence and task-related positive affects.

First, providing feedback enhances the clarity of assessment criteria by informing participants on what is important and valued. This stimulates the individual to focus his attention and efforts on creativity. It also strengthens the role of rewards in so far as the brand may recall the conditions whereby rewards are obtained, independently from their nature (Eisenberger and Cameron, 1996). Second, feedback on the quality of the proposed ideas increases the perceived feeling of competence, especially if it is positive, task-oriented and contingent (Harackiewicz et al., 1985). Encouraging remarks such as 'good' or 'good work', or comments underlining the novel character of an idea, are likely to increase perceived creative competence (Deci and Ryan, 1985). Third, feedback can increase task-related positive affects (Deci et al., 1999). Positive affects can increase cognitive flexibility and general information processing, which generates higher creative performance (Baas et al., 2008). Indeed, when people receive positive feedback on their ideas, the result is a positive affect of joy or pride. The task is then related to this state of happiness, which strengthens the motivation to realise the task. Moreover, because positive feedback suggests the environment is safe and non-threatening, the individual who feels positive affects tends to be more cognitively flexible. He can then engage in larger information processing (Baas et al., 2008). This type of enlarged search for information is conducive to generating more original and disparate ideas (Mumford and Gustafson, 1988). Hence, hypothesis H4a on the interaction between monetary rewards and feedback may be formulated as follows:

H4a. When a monetary reward is associated with neutral feedback, creativity is higher (vs lower).

Reputation rewards are a special case in so far as they are ego-related rewards. They reinforce personal self-esteem and efficiency. Bandura (1978) shows that status or reputation results from recognised mastery and represents one of the four sources of personal efficiency. Furthermore, if reputation is made visible by a sign published on an Internet page, for example, it becomes an additional source of personal efficiency because it is a testimony of recognised mastery. BF reinforces the effect of RRs on the feeling of personal efficiency. Hypothesis H2 focuses on RRs and their positive effect on creativity. Hypothesis H3 deals with brand neutral feedback and its positive impact on creativity. So, it can be expected that the combination of RRs and feedback confirms, or even increases, positive effects on creativity. Hence, hypothesis H4b dealing with the interactions between RRs and feedback may be formulated as follows:

H4b. When a RR is associated with neutral feedback, creativity is higher (vs lower).

Monetary rewards are peculiar in that they channel the search for ideas in a narrower way: attention focuses more easily on a limited number of solutions (Eisenberger and Aselage, 2009; Eysenck et al., 1982). Reputation rewards have different effects. All rewards that include social aspects such as recognition encourage individuals to expand their search for ideas (Kruglanski and Freund, 1983; Tetlock and Boettger, 1989). This stems from the fact that ideas are subjected to public scrutiny from peers or experts, which leads individuals to be more careful and meticulous when looking for information. For example, in the context of an experiment manipulating the presence of RRs versus absence of rewards, Tetlock and Boettger (1989) have shown that the search for solution was wider when participants were subjected to the condition of RRs. As a consequence, RRs promote creativity more than monetary rewards. Hence, Hypothesis H5:

H5. Reputation rewards have more effect on creativity than monetary rewards.

The general model we have to test is presented in Figure 1:

Methodology

An experiment is carried out on respondents who take part in a creativity contest. The general model is tested by manipulating the reward and BF variables. The experiment is privileged because it can highlight causal relations (Evrard et al., 2010) and provide guarantee on the completion of required tasks.

Presentation of the experimental protocol of the research

The simulation of a creativity contest is organised over a period of 4 hours for respondents to carry out all tasks, including reading the brief, forwarding opinion, answering messages, proposing and modifying the idea and the final vote as described in Figure 2.

A mock site is built on the model of the Studyka¹⁴ co-creation platform in order to manipulate rewards while keeping high experimental realism (see Appendix 1).

Participants can freely interact via the forum of the co-creation platform. The contest brief invites them 'to design the scooter of the future for the Piaggio brand' by proposing one single idea on three subjects: safety, energy saving and luggage transport (see brief details in Appendix 2). The submitted idea may address one or several subjects at the same time. A complex product has been chosen because it is highly conducive to the search of new ideas based on innovative functionalities. The choice also answers the call launched by Thompson et al. (2005) who invite the academic community to engage in deeper studies on the enriching strategies of complex products.

So to select a brand that may belong to the category of brands perceived as innovative by the general public, a pre-test was carried out on 112 people. The Piaggio brand is then selected, and the firm is also attractive which is necessary for the commitment of participants. The panel is composed of 180 students from an engineering school who had followed creativity classes prior to the experiment and who were placed in experimental conditions at random¹⁵ ($N=180$, 75% are male and $M_{ageaverage}=23$).

A 2×3 between-subjects design has been chosen: BF \times no feedback \times monetary rewards versus RRs

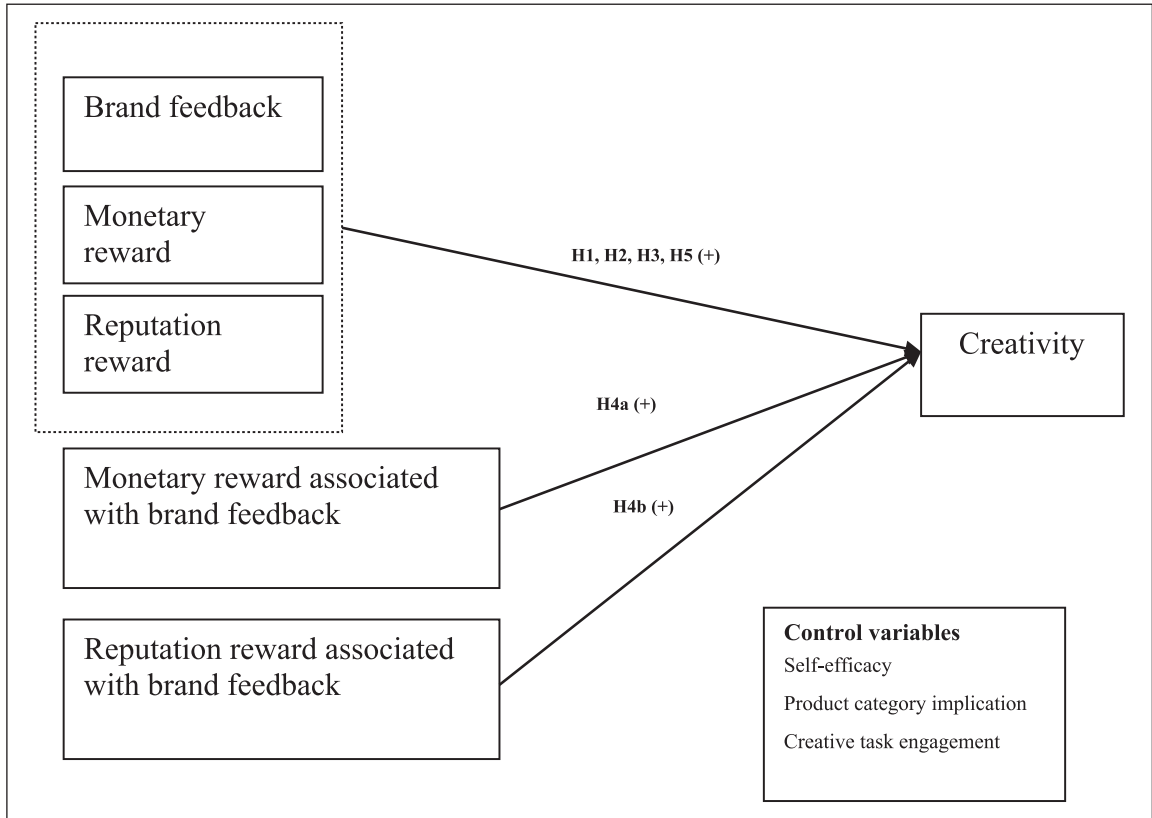


Figure 1. Representation of model to be tested concerning the effects of experiment.

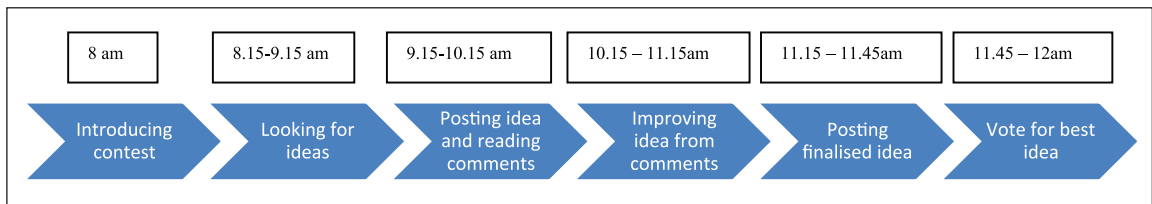


Figure 2. Phase breakdown of Piaggio innovation contest ‘The scooter of the future’ on a duration of 4 hours (e.g. from 8 to 12 am).

versus no reward. Each experimental unit is composed of 30 individuals. After arriving in the working room, the support site of the experiment (<http://www.challengeinnove.fr>¹⁶) is presented so that respondents can be informed of the contest’s rules and proposed rewards.

The operationalisation of the ‘with BF’ condition is formulated as follows: ‘a Piaggio engineer will comment on the relevance of your ideas’. An

industrial design professor is in charge of comments on behalf of Piaggio. His avatar displays the logo of the brand to eliminate any ambiguity on the feedback operator’s identity. To prevent introducing in the experiment any bias linked to the nature of feedback valence, the design expert in charge of comments only provides neutral feedback, neither negative nor positive. Feedback content generally requests clarification on the way the submitted idea

works and recalls the conditions of granting rewards. The monetary reward stimulus has been put in place through three price levels: €500, €250 and €125. Such price structure is routinely proposed in creativity contests. A qualitative pre-test ($n=10$) was carried out to ensure the credibility of rewards and BF. Improvements on the clarity of contest regulations and on the site's ergonomics were made.¹⁷

The 'RR' stimulus works on three levels, from highest to lowest incentive: 'First prize: a four-month unpaid internship as an assistant engineer in the R&D department of Piaggio France'; 'Forum prize: a one-month unpaid internship as an assistant engineer in the R&D department of Piaggio France'; 'School Community prize: a two-week unpaid internship as an assistant engineer in the R&D department of Piaggio France'. In the experimental conditions, the following clarification is added: 'The prize will be awarded during an official ceremony by the CEO of Piaggio France with a special mention posted on the sponsor's and school's sites'. This clarification is crucial because it emphasises the 'reputational' character of the reward over monetary incentives since internships are unpaid.¹⁸ Visuals that illustrate experimental conditions are presented in Appendix 3.

At the end of the experiment, a questionnaire was proposed before publishing the names of the contest winners. The jury circulated the names of winners among participants 1 week following the end of the experiment. A visual with the two contributions that scored highest are presented in Appendix 4. Participants were to propose a drawing or a figure showing their idea with an explanatory text. Idea No. 1 scored 6 on the new product creativity scale, and Idea No. 2 scored 5.77.

The level and nature of rewards were pre-tested ($n=112$) to make sure they were well received by respondents in terms of participation. Statistical pre-tests show that the proposed rewards encourage participation in a creativity contest.¹⁹ Checking experimental manipulations reveals that participants clearly perceived the stimuli and that respondents in feedback conditions clearly remembered the comments of the Piaggio engineer. The results presented in Table 2 underline one main effect of BF on the 'creativity of the new product'. Contributions from the 'BF' experimental group are significantly more

Table 2. Effect of neutral brand feedback on the creativity of the new product (Hypothesis H3).

Manipulation	Mean	Standard deviation	F
With feedback	36.92	14.27	44.36 $p=0.000$
Without feedback	24.98	9.22	

creative than those from the group with no feedback ($M_{feedback}=36.92$ vs $M_{withoutfeedback}=24.98$; $F(1.178)=44.36$, $p<0.001$). Manipulations were also satisfactory as regards the perception of monetary reward. The test is presented in Table 3, and it shows that contributions conditioned by monetary rewards are more creative than those with no reward ($M_{monetaryreward}=34.40$ vs $M_{withoutmonetaryreward}=25.65$; $F(2.177)=3.40$, $p<0.01$). As regards RRs, tests were also conclusive. The experimental manipulation was well perceived by respondents. Contributions from respondents conditioned by RRs are more creative than those from respondents subject to no such condition ($M_{reputationreward}=36.81$ vs $M_{withoutreputationreward}=25.65$; $F(2.177)=46.64$, $p<0.01$, Table 3).

Two control questions were asked in the final questionnaire to validate that manipulations were clearly perceived: 'On the site I visited, I easily found the rewards' and 'In the course of the contest, I identified the feedback from the Piaggio engineer'.

Operationalisation of the model's variables

Creativity of the new product. Creativity is a construct which is complex to manipulate, especially in contests because scales adapted to this context do not exist. It seems appropriate to measure the objective creativity of the consumer or the creativity of the new product as the literature recommends (Burroughs and Mick, 2004; Moreau and Dahl, 2005). The *Creative Product Semantic Scale* (CPSS) of O'Quin and Besemer (1989) has been selected. It is used in an empirical study by (Salerno, 2009) and displays good psychometric qualities while resorting again to the dimensions of 'originality', 'utility' and 'aesthetics quality'.

Two independent evaluators were put in charge of assessing the ideas of participants. As Burroughs

Table 3. Synopsis of main results.

	MR		RR		Absence of reward		Statistics
	BF	No BF	BF	No BF	BF	No BF	
Creativity of the new product (DV)	41.90				28.66		$F(1.116)=9.86; p=0.002; \eta_p^2=0.078$
	41.90	26.90					$F(1.116)=6.67; p=0.01; \eta_p^2=0.160$
			40.50		28.36		$F(1.116)=13.48; p<0.001; \eta_p^2=0.104$
			40.50	25.13			$F(1.116)=6.20; p=0.014; \eta_p^2=0.217$
			36.81		25.65		$F(2.177)=46.64; p<0.01; \eta_p^2=0.160$
	34.40			25.65		$F(2.177)=3.40; p<0.01; \eta_p^2=0.130$	
MR × BF →CNP							$F(1.116)=6.67; p=0.011; \eta_p^2=0.054$
RR × BF →CNP							$F(1.116)=6.20; p=0.014; \eta_p^2=0.051$

MR: monetary rewards; RR: reputation reward; BF: brand feedback; DV: dependent variable; CNP: creativity of the new product.

et al. (2011) recommend, the inter class coefficient (ICC) was calculated. Its high score (0.87) shows that evaluators assessed creativity at the same level. Then, an average score was attributed to participants by averaging the two marks awarded by evaluators A and B (Burroughs and Mick, 2004; White and Smith, 2001).

Three control variables were introduced: creative process engagement (Zhang and Bartol, 2010), product category involvement (Strazzieri, 1994) and self-efficacy (Sherer et al., 1982). The overall reliability and validity of the scales are satisfactory (cf. Appendix 5).

Results

The verification of manipulations is conclusive since the averages of the six experimental cells are significantly different ($F=4.511, p<0.01$). The analysis of variance (ANOVA) carried out during the experiment shows that the set of manipulated variables, monetary reward (MR), RR, and the BF, have a significant impact on the creativity of the new product: $M_{BF}=36.92 > M_{withoutBF}=24.98, F(1.179)=44.36$ (Table 2), $p<0.001$; $M_{MR}=41.90 > M_{withoutMR}=28.66, F(1.116)=9.86, p=0.002$; $M_{RR}=40.50 > M_{withoutRR}=28.38, F(1.116)=13.48, p<0.001$ (Table 3).

The stimuli introduced in the experiment (rewards and BF) have a significant impact on the creativity of the new product in accordance with our research hypotheses. This leads to the validation of hypotheses H1, H2 and H3. Interaction between

monetary rewards and BF has a significant impact on the creativity of the new product, $F(1.116)=6.67, p=0.011$, as shown in Figure 3.

Interaction between RRs and BF also has a significant impact on the creativity of the new product, $F(1.116)=6.20, p=0.014$, as shown in Figure 4. These results lead to the validation of Hypotheses H4a and H4b.

To deal with H5, analyses were founded on the most creative ideas in order to exceed the average scores of the 'creativity of the new product' variable. Indeed, Girotra et al. (2010) postulate that the success of a contest based on the generation of ideas largely depends on the quality of the best proposed ideas. In such a contest, extreme values and not average values are preferably studied (Girotra et al., 2010). That is why an analysis of ideas with scores higher than the median on the creativity scale has been carried out. Respondents subject to RRs are more creative than those subject to monetary rewards (RM): $M_{RR}=54.55 > M_{MR}=48.24; F(2.84)=12.385, p=0.000 (\eta^2=0.228)$.

Moreover, analysing the three modalities of the reward stimulus (monetary reward, RR or absence of reward) is interesting. Planned contrasts confirm that averages are significantly different between 'monetary reward' groups and 'RR' ones, $t(2.84)=4.973, p<0.01$. Besides, the contrast estimate is higher for RRs than for monetary rewards ($11.793 > 5.483$). Thus, the RR stimulus exerts more influence than the monetary reward stimulus for the more creative contributions, as shown in Figure 5.

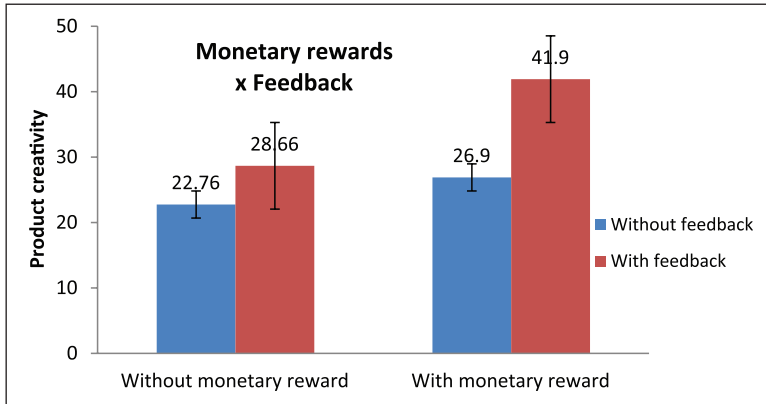


Figure 3. Interaction effect of monetary reward x feedback on creativity.

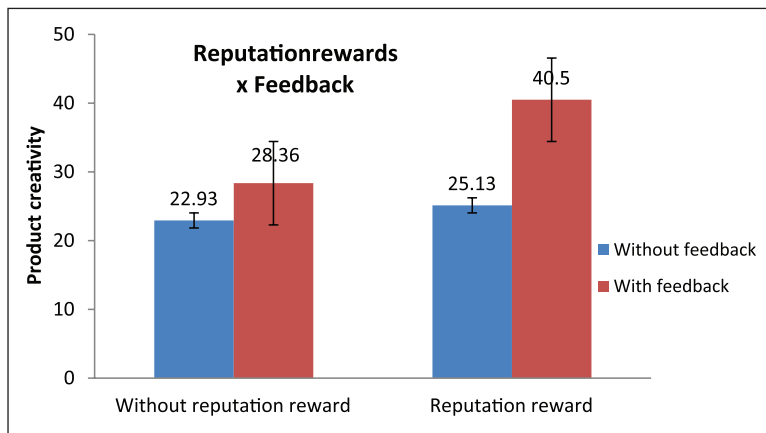


Figure 4. Interaction effect of reputation reward x feedback on creativity.

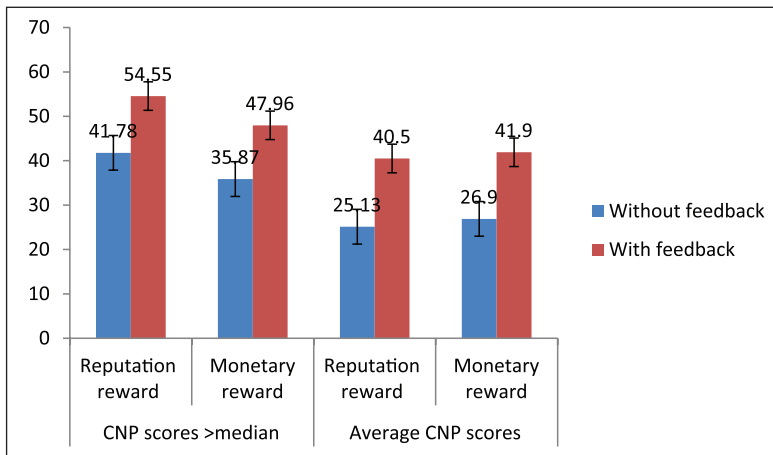


Figure 5. Synthesis of creativity score (CNP) depending on stimuli type.

Yet, these results do not allow for a complete validation of Hypothesis H5.²⁰

The introduction of control variables in our model shows that our results are duly caused by the main effects of our stimuli and not by co-variables. Control variables such as ‘commitment to product category’, ‘general efficiency’ and ‘commitment to creative task’ have no effect on the ‘creativity of the new product’ variable, that is, respectively: $F=1.188$, $p=0.172$; $F=0.106$, $p=0.746$; $F=0.976$, $p=0.325$.

Conclusion of experiment

The results of the experiment open up to a major lesson: monetary and non-monetary (reputational) extrinsic rewards play a central role in NPDP. They have a positive impact on creativity. Potentially, RRs play as important a role as monetary rewards on the creativity of the new product. Besides, when rewards (either monetary or reputation ones) are associated with BF, creativity is improved. Therefore, BF also has a very powerful impact on the quality of contributions.

The overall results are presented in Table 3.

Discussion – conclusion

This research produces advances on theoretical, methodological and managerial levels. On the theoretical level, these results shed new light on the theoretical controversy as to what is the impact of rewards on creativity. According to the SDT (Deci and Ryan, 2000), rewards generally reduce intrinsic motivation, and hence eventually reduce creativity because participants feel ‘controlled’ (Deci and Ryan, 2000). On the other hand, the followers of the learned industriousness theory (Eisenberger, 1992) think that rewards may encourage creativity because they signal that the task is important. Now, this mechanism operates on three conditions: (1) the task cannot be ordinary (which is the case in creativity contests), (2) the reward has to be related to the realisation of a performance and (3) the criteria for reward allocation have to be clear (Eisenberger and Shanock, 2003).

The first theoretical advance of the research enriches the learned industriousness theory on a specific point: when the criteria for allocating

rewards are made clear, thanks to the feedback granted in the course of the contest, intrinsic motivation improves as a result. This questions the idea that there exists a continuum between two extremes: intrinsic versus extrinsic. An individual may have pleasure participating in a creativity contest while also being motivated by the prospect of receiving a reward. As a result, extrinsic motivations may have an additional effect on intrinsic motivations and in that manner they may significantly influence those results that depend on intrinsic motivations. This research converges with the meta-analysis of Byron and Khazanchi (2012), and it is the first empirical study which tests the link between rewards and creativity in a context of new product development.

The second theoretical advance of the research concerns the role of BF on creativity. In response to the call of Burroughs et al. (2011), we suggest a new variable moderates the relation between rewards and creativity: BF. We show that feedback provided by brands is a powerful stimulus to creativity when associated with rewards. This result is crucial because this study is the first one carried out in an innovation context that gives evidence of the positive and significant effect of BF on creativity.

This research partly vindicates the conclusions of Amabile (1996) that individuals have to be encouraged. However, our conclusions differ as to the negative impact of monetary rewards and competition on creative performance. We show that rewards that are regarded as extrinsic (monetary or reputational) have a favourable influence on the creativity of the new product. Hence, our research rather follows the prospects opened by Eisenberger et al. (1999). These authors propose to reward creative tasks because it encourages commitment and highlights the importance of the tasks. The behaviourist approach – the TLI is one of its offshoots – is as convincing in its account of creativity as the SDT. The latter stems from a cognitivist approach which is generally harnessed in research studies on creativity.

Finally, this research complements and clarifies the still rare attempts to explore the field of consumer creativity. One of the limitations of works on consumer psychology and behaviour is to tackle creativity from the individual perspective while it has long been admitted that the creative approach is

not an isolated act, but one that is heavily interdependent on an external context. The latter trend has developed, thanks to new habits induced by web 2.0 practice (Füller et al., 2011).

On the methodological level, our research is characterised by fine-tuning how we measure creativity and by controlling numerous variables. Contrary to the study of Chen et al. (2012) carried out on a community of brands, we do not operationalise creativity in terms of brand response whereby an idea selected by the firm is regarded as more creative than a rejected idea. We operationalise creativity in a refined way by assessing its level of originality, usefulness and aesthetic beauty. Similarly, we do not follow the line of works by Frey and Lüthje (2011) who devote more attention to innovativeness than to 'creativity'. Finally, the latest study which explored the impact of expert feedback on the quality of proposed ideas in the context of a creativity contest (Wooten and Ulrich, 2011) is partly biased: feedback data are extremely limited and cannot enrich ideas in a practical way nor solve problems; they only grant stars which indicate whether the idea is good or not. Similarly, the quality of proposed ideas is graded by allotting a growing number of stars (from 1 to 5). This type of feedback analysis is too poor to study feedback impact on creativity. Our experiment offers an attempt to control these variables to provide stable ground for results.

On the managerial level, this research provides practitioners with operational insights on how to design the consumer integration process in the NPDP. It shows that interactions between consumers and brands lead to good results in terms of creativity. This comes in contradiction with large co-creation platforms such as Studyka or eYeka which are based on a confidential model where feedback is rare since ideas are not visible. This article shows that a platform which is based on interactions between consumers and brands and on sharing ideas is relevant to generate creativity. Clearly, this is the option followed by the localmoters site.²¹ Its interactions are richer, and they stem from the capacity to nourish a deeper form of dialogue between consumers and brands. The dialogue gets its support from active collaboration between actors, ranging from mere votes on the co-creation

platform to lively exchanges about envisaged technical solutions. The firm provides various resources such as software, accurate specification requirements, three-dimensional (3D) viewing devices, ideas, and so on. In certain cases, the dialogue may materialise into an invitation to take part in the idea follow-up phase at the development stage or into a several-day visit on the production site.

The second managerial advance of this research concerns the type of reward proposed in creativity contests, and notably the role played by non-monetary rewards. Rewards that emphasise reputation mechanisms are powerful vehicles of motivation and hence of creativity. They have a positive effect on individuals, on their reputation and their valorisation within a community (Suls et al., 2002). Thus, it is recommended to support the reputation of co-creators by following the model of eBay, an online auction site, where the profile of each member of the community is linked to a confidence index. Reputation rewards improve the status and visibility of contributors and they take part in a 'signal incentive' mechanism (Lerner and Tirole, 2002) in two different ways: either they improve the career opportunities of participants or they boost their egos. Even if the two forms of incentive are not sought with the same determination, firms have an interest in highlighting these mechanisms on their co-creation platforms. For example, prestige rewards may be allocated, such as 'year's best contributor', 'most creative contributor' or 'most influential co-creator'.

However, this research has its limitations, which is all the better to open numerous prospects for future investigation. Intrinsic motivations play a determining role in the accomplishment of creative tasks. Evidence shows that extrinsic motivations have no negative effect on creativity when associated with feedback from the sponsoring brand. In that respect, extrinsic motivations are 'at the service' of intrinsic motivations. It seems obvious that there have to be dynamic effects that depend on the level of these motivations. For individuals with high levels of intrinsic motivation, rewards may have an additional effect on intrinsic motivations, whereas for individuals with low levels of intrinsic motivation, rewards would have limited impact on expected outcome. Investigations on interactions

between motivation are open for future research ventures. Another prospect for future exploration concerns the producer of feedback and its valence. Introducing variations in the origins of feedback (from brands, peers, experts or amateurs) and in its valence to test its impact on intrinsic and extrinsic motivations and on creativity would shed light on combined effects.

In the course of the experiment, RRs offered unpaid internships to winners, with relevant information available on the sponsoring brand's website and the school's site. Future research could limit itself to testing the information available on the sponsoring brand's website in order to check whether the 'visibility' dimension of the reward has an effect on creativity. Indeed, an internship is a form of delayed payment that the winner may turn into cash at a later date, and that brings some confusion into the visible aspect of the RR.

This research used a panel composed of students, which is acceptable to test a theory but not to generalise results. This piece of research may be duplicated on a real community in order to confirm the stability of our results, or conversely to reveal differences that might be related to a feeling of belonging in the community. Moreover, in order to reduce the bias induced by social desirability, the questionnaire might be proposed after the results are announced.

Finally, one last promising research prospect consists in studying the impact of the cultural factor on commitment or creativity. A recent research study proposes a framework where creativity or commitment depends on 'cultural narrowness', that is, the propensity of one country to tolerate deviant attitudes and the cultural distance between the country of the co-creators and that of the sponsoring brand (Chua et al., 2014). In this line of inquiry, research on the impact of the country of origin on participation and creativity is an open investigation prospect.

Acknowledgements

The authors wish to thank invited editors Hubert Gatignon, David Gotteland and Christophe Haon, together with the three anonymous reviewers, for the quality of their comments and their valuable recommendations. They also express their grateful thanks to Fabienne Chameroy, a Senior Lecturer at Aix-Marseille University, for her support and assistance.

Notes

1. Brand communities are defined as 'groups of consumers who share the same enthusiasm for a brand and a highly developed social identity. These groups engage in collective actions driven by collective goals, and/or express a commitment or shared emotions' (Bagozzi and Dholakia, 2006).
2. For the sake of information, the best-known platforms in France are the following: <http://www.eyeka.com>, <http://www.studyka.com>, www.creads.com.
3. A eYeka survey published in 2015 shows a 48% increase in co-creation investments by big food brands between 2013 and 2014. These brands mostly seek video content and ideas of new products ('The state of crowdsourcing in 2015. How the biggest brands and companies are opening up to consumer creativity').
4. A creativity contest is a competition organised by a firm or by any other organisation through a website and limited in time whose aim is to reward the most creative idea that meets a brand brief (definition adapted from Adamczyk et al., 2012). The creativity contests mentioned in this research exclusively concern competitions to develop new products/services.
5. RRs are intended to increase the reputational capital of consumers. It is a form of social capital which is defined as an intangible resource from which flow instrumental benefits and expression, these benefits accrue in a specific social structure governed by relational norms as volunteering, reciprocity, and confidence (adapted from Mathwick et al. 2008). These gains "reputational" can materialize by stars or notes that show the involvement or relevance feedback in a virtual community of consumers.
6. Sponsoring brand gives its feedbacks on ideas and support the financial costs of the creativity contest.
7. Lead users face needs that will be general in a marketplace – but face them months or years before the bulk of that marketplace encounters them. Lead users are positioned to benefit significantly by obtaining a solution to their needs.
8. Innovative consumers are early adopters of new products.
9. They are consumers who adapt, modify or transform their own production.
10. An encouragement reward is honorific as a diploma, a medal; it can also take the form of "best seller of the month", "Employee of the Year" etc.
11. A reward is said to be 'contingent' when attributing it is conditioned in a non-ambiguous way by reaching one result, creativity is this case.

12. Tasks are considered to be simple because they imply drawing logos of ordinary consumer products. These are a priori simpler tasks than drawing more complex objects such as a car or a plane, which requires higher technical competences.
13. All forms of emphasis such as 'superb!' or 'your idea is poor, sucks!' are banned.
14. <http://www.studyka.com>.
15. Respondents are placed in the experimental conditions such as to avoid all communication between groups (this helps to control the contamination effect).
16. The site's ergonomics has changed since this study which took place in February 2013.
17. The forum has been improved placing the latest posts on top of the list with the photo of the idea. The points system has been improved.
18. The contest's general conditions specify that the internship will take place partly in the Piaggio group's historical plant in Italy on the Pondera site where unpaid internships exceeding 3 months are authorised.
19. Monetary rewards have a significant effect on intentions to take part, $F(1,110)=309.91$; $p=0.000$, a reward for an unpaid internship in an R&D department of the Piaggio firm has a significant effect on intentions to take part, $F(1,110)=6.69$; $p<0.05$.
20. We cannot conclude that RRs have more effect on creativity than monetary rewards because that is observed only on scores higher than the median and not on average scores.
21. <http://www.localmotors.com> is a co-creation platform specialised in creativity contests in the mechanical sector. It is 40,000-contributor strong and favours interactions among sponsor brands, consumers and moderators. Besides, all ideas are visible, which encourages inspiration and collaboration.

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Appendix I. Screen capture of the co-creation platform on which experiment is based.



Appendix 2

Presentation of the brief on the 'Motor-scooter of the future'

Ready to impress Piaggio engineers? Which candidate will come ahead in creativity? What will the motor-scooter of the future look like? Can you figure out the shape of scooters driving around our towns in the 2030s? How can we face the challenge of moving in congested cities? How shall we transport our luggage, our shopping, our office clutter? How can we tackle the growing problems of energy scarcity and price?

Your mission is to design an innovative motor-scooter starting from a Piaggio model (MP3, Vespa or other). You are free to design the machine of your dreams while trying to tackle the challenges of energy, luggage transport and fluid motion in urban contexts.

Your final delivery will be presented in PowerPoint format composed of a small-scale model which best expresses your idea (or your ideas because you may post several ideas to increase your opportunities to win!). The model may be digitalised or not.

If you take up the challenge, please carefully read the instructions below!

1. Before starting, make sure you read the documents on the 'Piaggio MP3 case' and the 'Challenges of Piaggio innovation' to be familiar with Piaggio's marketing/innovation policy.
 2. Then go to site www.challengeinnove.fr (and click on 'Brief challenge innovation'), to find relevant information to succeed in this innovation contest. Please make sure you respect the style of the forum and keep a positive mindset.
- **Step 1: read information accessible on site**
 - **Step 2: use the creativity method of your choice, you may post several ideas to receive the reaction of the members of the community, you have to post at least one idea between 9.30 and 10.15 am (forum menu 'On-going idea-solution')**
 - **Step 3: keep one idea and improve it between 10.15 and 11.15 am, take a photograph of final draft and post it on the forum (menu 'Finalised idea') with a descriptive comment of the idea, post finalised idea at 11.45 am final deadline**
 - **Step 4: vote for best idea on forum, menu 'Finalised idea' at 12 am final deadline**
 - **Step 5: answer questionnaire below:**

<http://enquete-sphinx.ensam.eu/ChallengePiaggio/index.htm>

Please feel free to contact me via the forum for further information.

All the best and best of creativity!

Yours truly,

Eureka, contest moderator

Pour la variable manipulée "Récompense en réputation":

Premier prix : Un stage assistant ingénieur de 4 mois (non rémunéré) dans le département de R&D Piaggio France.

Le jury est composé d'un ingénieur Piaggio et d'un professeur Arts et Métiers ParisTech.

Le prix sera remis lors d'une cérémonie officielle par le PDG de Piaggio France avec une information sur le site du sponsor et du site Arts et Métiers ParisTech.



Prix Forum : Un stage assistant ingénieur de 1 mois (non rémunéré) dans le département de R&D Piaggio France.

Le prix sera remis lors d'une cérémonie officielle par le PDG de Piaggio France avec une information sur le site du sponsor et du site Arts et Métiers ParisTech.

Le "Prix Forum" sera attribué à celui qui aura le plus de points sur le forum.

Prix Communauté Arts et Métiers : Un stage assistant ingénieur de deux semaines (non rémunéré) dans le département de R&D Piaggio France.

Le prix sera remis lors d'une cérémonie officielle par le PDG de Piaggio France avec une information sur le site du sponsor et du site Arts et Métiers ParisTech.

Le "Prix Communauté Arts et Métiers" sera attribué à celui qui aura le plus de votes lors de la sélection du vainqueur.

Pour la variable manipulée "Récompense monétaire"

Premier prix : 500 €

Le jury est composé d'un ingénieur Piaggio et d'un professeur Arts et Métiers ParisTech.



Prix Forum : 250 €

Le "Prix Forum" sera attribué à celui qui aura le plus de points sur le forum.

Prix Communauté Arts et Métiers : 150 €

Le "Prix Communauté Arts et Métiers" sera attribué à celui qui aura le plus de votes lors de la sélection du vainqueur.

Appendix 3. Representation of rewards experimental conditions.

Appendix 4. The winning ideas of the Piaggio 'Scooter of the future' challenge – Idea No. 1.

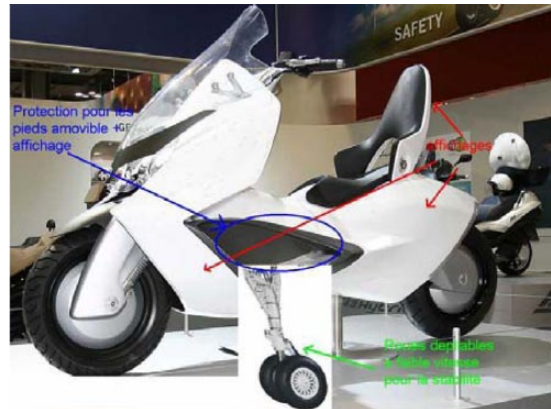
Stability/safety/traffic jams:

2 collapsible wheels similar to a plane's landing gear. Wheels pop out automatically at slow speed (no need to put your foot on the ground when stopping) + collapsible bodywork to protect lower legs (many get crushed in traffic jams).

Screens/bodywork:

2 Solutions:

Flexible OLED screens on sides and front or Led micro-projector boxed in transparent bodywork (Opel Monza type) + transparent solar panels pasted on screens (wysips Cameleon) for screen self-powering.



Screen use:

- Model your own bodywork at all times
- Advert displays on scooter's side (as on a Smart car)
 - > Rider will make money by streaming adverts.
- Signpost displays for safety: speed limits (GPS-detected), alert messaging, e.g., if you overspeed or warning in case of rain, fog.
- Better lighting at night: solving the problem of riders' low visibility at night.

Appendix 4. The winning ideas of the Piaggio 'Scooter of the future' challenge – Idea No. 2.

I opted to work on a small 2-wheel model (Vespa) which will be more manoeuvrable and more practical for town use. We are targeting tech-smart city dwellers.

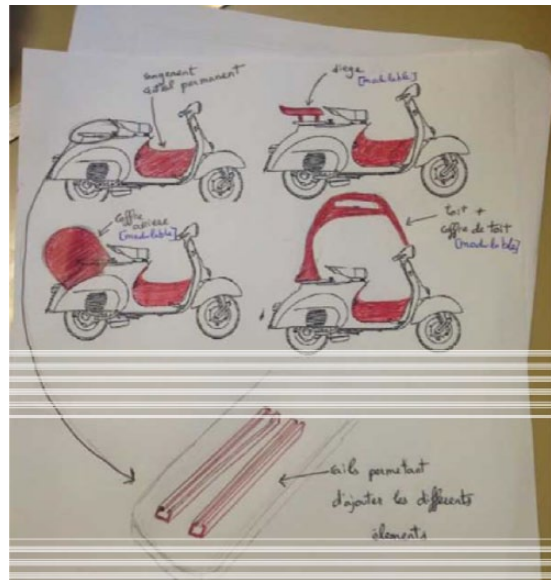
The two main features of our scooter are its technology and ergonomics.

Technology:

- Smartphone plug to interact with it (traffic information, nearby services, GPS, monuments) – screen on driving display and Bluetooth headset.

Ergonomics

- Additional central luggage rack, between rider's 2 footrests
- Railing behind main seat to fix equipment depending on rider's will/use
- A second seat
- A middle-sized tailboot
- A large-size roof
- Shaped boot

Manufacturing

- The various components will be clipped on scooter's main structure and will be made of carbon fibre to reduce vehicle weight and facilitate fitting.
- 2 rail fastening components will be fixed behind main seat for other components to slide into place.
- Rails will be long-sized to make structure stable and safe.
- The smartphone will be connected to a touchscreen dashboard display and to a headset for the rider. That will allow interaction between rider and device.

Appendix 5. Synthesis of the reliability and validity of measure scales of the latent variables of the model.

Scales	Items	B stand st *	Reliability		Convergent validity	% Of restituted variance
			α of Cronbach's	ρ of Jöreskog	ρ vc	
Intrinsic motivation						
	Item 1 – engaging in these co-creation tasks has been fun	0.815	0.895	0.941	0.667	0.641
	Item 2 – I have been very pleased to realise these co-creation tasks	0.694				
	Item 3 – I found the co-creation tasks were very interesting	0.806				
	Item 4 – I would describe this co-creation task as very pleasant	0.627				
	Item 5 – I think I have been rather good on that activity, compared to other engineering students	0.851				
	Item 6 – I have been rather competent on this co-creation task	0.833				
General efficiency						
	Item 1 – I try not to face difficulties	0.742	0.771	0.748	0.498	0.536
	Item 2 – I try not to learn new things when they look difficult to me	0.695				
	Item 3 – I give up easily	0.688				
Commitment in creative process						
	Item 1 – I take a long time to understand the nature of the problem I have to solve	0.632	0.865	0.874	0.538	0.613
	Item 2 – I think about the problem by tackling it from different angles	0.734				
	Item 3 – I divide the problem into sub-parts in order to understand it better	0.746				
	Item 4 – I use several sources of information to generate new ideas	0.862				
	Item 5 – I look for connections with similar solutions in neighbouring domains	0.700				
	Item 6 – I try to examine potential solutions which are different from usual ways of doing things	0.731				
Commitment in product category						
	Item 1 – scooters are very important to me	0.963	0.977	0.950	0.794	0.914
	Item 2 – I am very keen on scooters	0.979				
	Item 3 – I enjoy talking about scooters	0.921				
Attitude towards brand						
	Item 1 – I am fond of this brand	0.874	0.956	0.946	0.855	0.849
	Item 2 – I think it's a good brand	0.937				
	Item 3 – I am in favour of this brand	0.961				

*Significant for $p=0.01$.