

Fabrizia Fontana^(a), Chiara D'Alise^(b), Maria Azzurra Marzano^(c)

Uncovering the hidden source of innovation

(a) University "G. D'Annunzio" of Chieti-Pescara, Pescara, Italy
Via Copenhagen, 40
00144 Rome

(b)(c) LUISS Guido Carli University
Via Giulio Alberoni, 7
00198 Rome

(b) Corresponding author:
e-mail: cdalise@luiss.it;
Ph. 0685222241; Fax. 0685222400

Abstract

The paper explores how firms can promote new idea generation through staff motivation, by introducing incentives. Incentives can spur an evolution in the staff attitude from “productive” behaviours (result achievement) to “innovative” and “cooperative” behaviours which make the difference for idea generation.

However the impact of individual and group incentives on the individual innovative propensity of R&D professionals is still unclear, with a huge debate in the literature on the role of extrinsic and intrinsic incentives and motivation. The paper tries to shed lights on this topic by identifying intermediate motivational factors as well as other organisational elements that moderate the main relation between incentives and innovative propensity. The empirical part of the paper is a qualitative study consisting in the analysis of case studies. The results show that intrinsic incentives and motivation, in the form of acknowledgement and actual implementation of ideas of innovators, are the main factors that positively affect innovative propensity. The group dimension in rewarding and the overlapping of regulation and personal goals are also very important. The main organisational characteristics that positively moderate the relation between incentives and innovative propensity are managerial support, task stability and width of role.

Keywords: *incentives, motivation, innovative propensity, innovation*

1. Introduction

Innovation is a fundamental strategic asset for all organisations (Barsh et al. 2007). Ideas for innovation are important for the long-term survival and competitiveness of firms. Large corporations all over the world are increasingly trying to adopt special solutions for idea management in order to detect, fertilize, evaluate and promote new idea generation within the internal boundaries (Fairbanks and Williams, 2001; Frese, Teng and Wijnen, 1999; van Dijk and van den Ende, 2002). Amabile (1996, 1997) argues that innovation is the successful implementation of creative ideas within each organisation. The ability to devise innovative solutions and answers promptly is a priority for any organisation, mostly in conditions of low intelligibility of information and limited ability to forecast.

Despite the extended attention paid by the literature to the topic of innovation management practices, it still presents some grey areas and it is rarely linked to human resource management practices. However we posit that the usage of rewards, such as formal recognition or monetary incentives, has an impact on new idea generation management and the managerial practice concerning innovation management processes could benefit from the understanding of this impact. For instance a greater awareness of the counterintuitive effects of extrinsic incentives could be helpful. We aim to shed lights on this connection between innovation management and human resource management and a critical analysis concerning the impact of extrinsic and intrinsic incentives, both at an individual and group level, on innovation processes, represents the main contribution of the analysis.

The paper sees its ultimate aim in uncovering the dynamics of individual and collective motivation related to innovative propensity, considered as the main source for substantial innovation. In particular, we explore the potential impact of individual and collective incentives on innovative behaviours. In doing that our contribution copes with the understanding of the intermediate motivational drivers and it acknowledges the importance of the organisational settings on the individual learning behaviour and idea generation; in this composed framework, incentives might stimulate the individual behaviour and characterize the organisational setting (Alexy, Criscuolo and Salter, 2012; Axtell et al., 2000; Deichmann and van den Ende, 2014). In sum, we aim to investigate how companies can nurture and support ideation process through the motivation of employees, by introducing effective incentives and rewards.

2. Theoretical foundations of innovative propensity

When it comes to the organisational generation of innovation, we adopt the hypothesis that creativity (C) or innovative propensity results from the synergic combination of three main elements: employees' motivation (M), their professionalism (P), and the organisational context (O). In the paper we try to explore the first (M) and the latter (O) elements. Given the correlation between individual motivation (M) and the working/organisational context (O), we follow the Amabile's model that shows how the working environment influences employees motivation and individual creativity or innovative propensity (Amabile, 1988).

Organisations have high creative output characteristics and specific problems, which are not always categorized. Evidences show that for most organisations the source of innovation takes place within organisational boundaries (Prencipe, 2000), and most significant source of ideas come from employees (IBM, 2006). In particular, it seems that most new ideas for innovation are generated and diffused through a bottom-up approach, whereas managers help employees spend a part of their time sharing and discussing new ideas (Iyes and Davenport 2008). The parallel between individual creativity and organisational climate is necessary to deepen the concept of corporate creativity studied by Lubart (1995).

Very creative companies grant autonomy to internal resources giving them the possibility to develop new forms, new structures, new modes and new products. The concept of creativity is often associated to "self-organisation" (Rullani, 1993). Andriopoulos (2001) summed up in five basic elements the ability of the management to stimulate creativity or innovative propensity within an organisation: 1) culture, 2) climate 3) organisational structure and systems, 4) leadership style, and 5) knowledge / expertise. In this multi-faced scenario a complex system of equilibrium needs to be found since the internal organisational context needs to balance different contrasting pressures. The need for autonomy calls for forms of self-organisation whereas the maintenance of internal homogeneity of task accomplishment and compliance to organisational culture still calls for some general guidelines and hierarchical relations. To this extent the parallel with clinical innovation could be exemplary. In such a context, the innovative protocols are developed within some general guidelines and the individual autonomy find its boundaries in the mechanisms of self-responsibility, e.g. a clinician is free to experiment completely unknown paths but, at the same time, he/she is called to carry the burden of any action into place.

Techniques and processes that facilitate and stimulate innovation propensity have grown rapidly (VanGundy, 1992). Despite the availability of different models and solutions, these techniques and processes seem to consist of "instructions, and manipulations, capable of arousing the creative potential of individuals namely when working with others, either face-to-face or mediated by computers" (Pisarra and Jesuino 2005). Innovative propensity flourishes when the organisation encourages it, when employees are motivated to think and pursue new ideas, and when the organisation provides employees with the resources they need to play with these ideas in generative ways (Amabile 1998, Ford 1996, Mainemelis and Ronson 2006, Woodman et al. 1993). Mainemelis (2010) studied creative deviance in the evolution of new ideas, and observed that individual behaviours can be nurtured by personal conviction of the validity of the ideas which results to be stronger than the organisational structural rules. The non-predictable effect of the interaction between organisational encouragement and individual conviction requires the adoption of a systemic approach and the consideration of firms as a creativity and innovation creator.

All the previous remarks lead to the necessity to implement a radical change in the way organisations manage creativity and innovation in general. The above described perspective, in actual terms, implies a radical change in the way ideations is considered, since the focus moves from individuals (creators) to the collective ideation. Such a change is driven both by the search for the above mentioned complex equilibrium and by the need of a bottom up approach that requires an effort in terms of organisational change.

As we will show later in building our framework, some experiences reported in previous study refer to the general concept of new idea generation without paying the necessary attention to the internal dynamics occurring in firms contexts (see Amabile, 1993, 1997). Such a contextualization might

take place in two different, thought correlated, directions that we will emphasize in the paper.

The first one regards the **extrinsic vs intrinsic incentives**. Innovative reward systems based mostly on non-monetary incentives can be able to boost the individual innovative propensity; to some extent the social recognition of innovation might some time overtake some monetary rewards (Shalley, Zhou, Oldham, 2004). On the one hand, the process of ideation should be considered by organisation as part of their business and consequently should be paid by usual rewards; on the other hand, when ideas are directly rewarded, the ideation process could be perceived as an extra-work activity. A better understanding is needed and the topic is explored in the research questions.

The second aspect concerns **individual vs group incentives**. Internal group dynamics and collinearity between individual motivation and contribution to teamworking could lead to unexpected individual reactions to rewards; e.g. switching from the assessment of the input/outcome ratio at the individual level towards the collective one forces to consider additional sources of complexity, such as equity. Further the move of focus from individual to collective entities calls for a systemic approach regarding the management of innovation.

In order to stimulate an effective enactment, managers should set up specific solutions for collecting employees' ideas at any organisational level. In details, a specific managerial agenda should include the following elements: 1) individual contribution to innovation; 2) importance of reciprocal influence among individuals; 3) dynamics of social interaction within groups.

As for individual contribution, since some people are more creative than others (Amabile, 1983; Ford 1996; Guilford 1950; Woodman et al. 1993), each individual choose how to contribute to the idea generation. This phenomenon has been theorized by Ajzen and Fishbein (1975, 1980), studying the human behaviour within the framework of "reasoned action" and "planned behaviour" (Ajzen, 1991). This theory argues that the decision to behave in a certain manner is influenced by member's attitude toward a behaviour and by member's comprehension of norms and perception of the external environment. Individual characteristics, hence, play a large role in influencing whether someone choose to contribute to the development of a new idea (Garfield et al. 2001) or not.

Even in knowledge-creation based team "the individual brings his repertoire skills...strategies, which affect and are affected by the situation" (Gore and Gore, 1998). Thus, individual actions are very important for continuous innovation and improvement. Innovative work behaviour (de Jong and den Hartog, 2010) aims to achieve the initiation and intentional introduction of new and useful ideas, processes, products and procedures (Farr and Ford, 1990). It differs from employees creativity, as stated by Amabile (1988), because it also includes implementation. Implementation requires an intensive effort and a result-oriented attitude for organisations. Innovative work behaviour can be engaged allowing employees to contact more diverse views and influences that may help creativity.

The switch of focus from individuals to collective entities (groups) requires further speculation on the subject. Perry-Smith and Shalley (2003) developed propositions on the association between social relationship and the related construct of creativity. Some studies by Pizarro and Jesuino underlie that interaction processes could negatively affect the efficacy of the face-to-face groups (2005). They analysed three relevant phenomena: previous fear, social loafing (free riding) and blocking, concluding that blocking is the main cause of the decrease in efficacy of the face-to-face brainstorming.

Several studies focused on the different innovation performance of groups with different configurations and explained how different combination of individuals could create internal organisational contexts in which the generation of new idea could blossom or perish according to the equilibrium towards which such contexts converge. Evidences show that ideas arising from large and heterogeneous groups are more valid than ideas resulting from smaller and therefore more manageable groups. Another study (Girotra, Terwiesch and Ulrich, 2010) showed that *hybrid groups* (in which individuals begin working independently without interaction of any kind and lately end up in working together) perform better than the others (groups interacting in time and space, sharing a common experience based on information) because each member can potentially access to different knowledge and can deal with problem solving in different ways and then share

his/her findings from the individual phase to perform additional exploration together. Kavadias and Sommer (2009) proved that *nominal groups* (the same number of individuals generating solutions in isolation) perform better than *brainstorming* (Osborn, 1953) in dealing with specialized problems, even when factors that affect the solution quality exhibit complex interactions (Kavadias and Sommer, 2009). Heterogeneous groups in terms of professionalism achieve better results than homogeneous or individuals who work alone (Bjork and Magnusson, 2010). Although a limited amount of diversity is normally preferred, different types of diversity might have opposite effects. Best results are achieved when potential members, even if coming from different experiences or background, join the team agreeing to team's goals and expectations (Foo, 2011). Ensley and Hmieleski (2005) described team effectiveness as the degree of collective efficacy in terms of group goals achievement.

It is undoubtful that the convergence to common goals achievement is also a function of human resource management practices, of group and individual incentives applied and it depends on the individual perception of equity and justice in the organisational context.

In the end the analysis of the impact of different reward systems is fundamental to shed light on the link between motivation, both at the individual and group level of analysis, and innovative propensity.

3. Research problem: the link between incentives and innovative propensity

The understanding of the link between incentives and innovative propensity needs to be explored through the analysis of how intrinsic and extrinsic incentives (e.g. Porter and Lawler, 1968) might affect new idea generation. While the role of intrinsic motivation (and incentives) appears to be predictable, the role of extrinsic motivation seems to be controversial on new idea generation process and innovative propensity over time.

Starting from the remark that motivation is the initial force resulting from the direct activation of a goal, two forms of related incentives need to be recalled in order to study innovative propensity and creativity (Amabile, 1983). In details:

- Intrinsic motivation, which is linked with basic and advanced needs (Maslow, 1958; Andreani Dentici, 2001), takes place when an individual feels the pleasure of doing some activities, without external rewards. It includes: a) the need for achievement, and b) the need for learning/knowing. In this sense, Herzberg (1964) underlines that each appreciation and each award of merit from top management is a very strong motivation for every individual. More recent studies confirm that the best gratification for employees is to see their own ideas implemented. Dworkin (1988) referred to *autonomus motivation*: autonomy involves acting with a sense of volition and having the experience of choice, it means endorsing one's actions at the highest level of reflection. Intrinsic motivation is an example of autonomous motivation (Gagnè e Deci, 2005).
- Extrinsic motivation, conversely, is linked to the organisational consequences rather than to the actions. "It requires an instrumentality between the activity and some separable consequences such as tangible or verbal rewards, thus satisfaction might not come from the activity itself but rather from the extrinsic consequences to which the activity leads" (Gagnè and Deci, 2005). The analysis of the impact that extrinsic incentives have on innovative propensity is quite controversial. Amabile (1988) stated that monetary incentives in exchange of new ideas induce individuals to be interested in money and not in innovative ideas, therefore they will be looking for safe and rapid solutions to gain money. The above mentioned elements lead to an apparent paradox, rooted in the idea that extrinsic incentives would constrain innovative propensity. For instance, Amabile and her team (1997) showed that students creativity in exchange for a premium (or bonus) was lower and less effective (innovative) than students creativity without any reward.

An opposite research stream maintains that extrinsic motivation could have a positive impact in terms of new ideas development. Rossman (1931) through an experiment based on 700 inventors on the biggest motivating elements to create and study new ideas, found “need to gain” and “need to get better” above “love to invention” and “desire for personal growth”.

Deci (1971, 1975) and Deci and Ryan (1980) tested the additivity hypothesis that tangible extrinsic rewards undermined intrinsic motivation whereas verbal rewards enhanced it, thus implying that intrinsic and extrinsic motivation can be both positively and negatively interactive rather than additive.

Therefore the impact of intrinsic and extrinsic incentives and of the consequent intrinsic and extrinsic motivation on innovative propensity is not clear enough, it is still ambiguous.

Further, other unexplored areas rely on the links between intrinsic and extrinsic incentives in teamworking. On this point Ancona and Caldwell (1992) noted that in organisational teams, subjective ratings sometimes determine promotions, future job assignments and performance evaluations. It could be debateable if the social “mutual” control taking place in creative context recalls somehow the idea of *clan* control introduced by Ouchi (1979). Further research in such vein could be useful to the task. Closely connected to the idea of incentives and teamworking is the necessary notion that the circular loop “innovative propensity innovation incentive innovative propensity” is not affected only by the “psychological contract” that ties a single individual (A) to the organisation, but that the subjectivity of the evaluations calls for the concept of perceived equity. That means an individual does not consider only what he/she receives from the enterprise (Outcomes A) as a result of his commitment (Input A) (but tries instead to observe this relationship comparing it with other workers he considers equal/similar to himself (Outcomes B/Input B) (Adams and Freedman, 1976). In case of a perceived iniquity (2), whichever is the perceived incentive, the behaviour of the individual (A) is not sure to reach to the expected performance (creativity).

(Equity) (1)

(Inequity) (2)

It is therefore interesting to shed lights on this topic trying to answer to the following research question.

R.Q.1: What is the impact of incentives on individual innovative propensity?

This question can be analysed at the individual and group level and thus it can be decomposed in the following two questions:

R.Q.1.1: What is the impact of individual incentives on individual innovative propensity?

R.Q.1.2: What is the impact of group incentives on individual innovative propensity?

We can presume that rewards/incentives affect motivation that affects innovative propensity. Of course it could be useful to identify the drivers or intermediate motivational factors through which such incentives affect innovative propensity.

In this vein, *Cognitive Evaluation Theory* suggested that incentives such as tangible rewards, deadlines (Amabile, DeJong, and Lepper, 1976), surveillance (Lepper and Greene, 1975), and evaluations (Smith, 1975) tend to diminish feelings of autonomy, and undermine intrinsic motivation. In contrast, some incentives such as providing choice about aspects of task engagement tend to enhance feelings of autonomy, and increase intrinsic motivation (Zuckerman et al., 1978). In fact, feeling of competences as well as feeling of autonomy are important to nurture intrinsic motivation. Therefore we can conclude that incentives activate intermediate motivational factors (e.g. feeling of competences, feeling of autonomy) that in turn affect motivation and consequently innovative propensity. The comprehension of these intermediate motivational factors is central for the achievement of high levels of innovative propensity, in that they explore "how" incentives affect motivation to creativity. Therefore we aim to answer the following research questions.

R.Q.1a: What are the main drivers (intermediate motivational factors) determining a positive/negative impact of incentives on individual innovative propensity?

This question can be analysed at the individual and group level and thus it can be decomposed in the

following two questions:

R.Q.1.1a: What are the main drivers (intermediate motivational factors) determining a positive/negative impact of individual incentives on individual innovative propensity?

R.Q.1.2a: What are the main drivers (intermediate motivational factors) determining a positive/negative impact of group incentives on individual innovative propensity?

The analysis of some recent contributions coming from the economic and psychological fields justifies the existence of a “crowding out” effect of extrinsic incentives on the intrinsic ones (Festré and Giustiniano, 2011). The Self-Determination Theory (SDT) made by Gagné and Deci (2005), started from the assumption that human behaviours are driven by three main innate psychological needs: competence, autonomy and relatedness. The novelty of such approach relies on the fact that psychological needs can be fostered or undermined by the external social context. To this extent, the process of internalization of extrinsic motivation leads the equivalence between extrinsically motivated behaviour and autonomy (Festré, 2010). According to SDT, there are three main ways of ‘regulation’, and different ‘degrees’ of internalization of extrinsic motivation (Gagné and Deci, 2005): a) *Introjection*: regulations are followed but not accepted by the agent (e.g. acting in order to feel valuable or to avoid penalties); b) *Identification*: individuals perceive greater freedom and volition owing to the overlapping between the expected behaviour and the individual cultural and motivational basis; c) *Integration*: when the identification involves other aspects of oneself (beliefs, interests, and values) the required activity itself become instrumental for the achievement of personal goals, while still being considered as extrinsic motivation. The usage of SDT for analyzing innovative behaviours has two main managerial implications: a) intrinsic and extrinsic incentives can be considered as a continuum of possible states within the underlying needs driving the human behaviour; b) extrinsically motivated behaviour can be efficient when an external regulation has been internalized; in such cases, extrinsically motivated behaviour will end up in a higher autonomy; c) As a consequence, control based on *regulation* rather than on the *external influence* exercised by a principal may be efficient because of the cognitive feedback gained by the agent. As for the managerial implications, we observe that in pure innovative contexts (e.g. creative activities) the internal locus of control and the self-determined behaviour are compatible with relevant regulatory processes based on interest, enjoyment and inner satisfaction. When innovation takes instead place within codes of conducts and general guidelines (e.g. clinical innovation), extrinsic motivation should be compatible with the self-involvement of agents.

Therefore an interesting research question is the following:

R.Q.1.b: How the degree of overlapping between "regulation" and "personal goals" determines a positive/negative impact of incentives on individual innovative propensity?

The hypothesis of maintaining a high level of motivation, and consequently of innovative propensity, over time only by leveraging intrinsic or extrinsic motivation seems quite unrealistic. Organisational mechanisms could work as “regulatory process” in order to complement the intrinsic motivation. Such mechanisms are meant to be used in order to amplify the positive/negative effect of the impact of incentives on innovative propensity. In short, innovative propensity itself does not contradict the evidence by which extrinsic incentives could boost performance; it is, on the contrary, the organisational context in which innovative propensity takes place that calls for proper mechanisms (incentive structure) (e.g. Alexy, Criscuolo and Salter, 2011). Such an approach relies on synergic usage of extrinsic incentives as described in the Amabile’s work *Creativity in context* (1996), and also tries to provide other implementation elements.

Since the processes of goal reaching (see Frey, Benz and Stutzer, 2004) generate a further procedural utility, it implies that the organisational context (locus of causality, regulatory process, relationship with colleagues, available technologies, relationship with superiors, human resources management) is a relevant part of the incentive. Particularly interesting is the fact that when the corporate context is considered positive by the workers, individual behaviours are not limited to the ones that Katz and Kahn (1978) have labelled as “productive” behaviours (result achievement) but on the contrary it is possible to start some “innovative” and “cooperative” behaviours that are summed to the previous ones. Such a consideration could solve the dilemma appearing between individual

creativity and organisational compliance (culture, structure, etc.). In this sense, the organisational context is potentially capable of generating internal relational economies based on shared procedures, knowledge, experiences and solutions; in order to generate a organisational context capable of stimulating these kinds of intrinsic incentives and spontaneous behaviours, a relational leadership that enhances such a cognitive capital becomes indispensable.

It would be useful to understand what are the other organisational factors that are able to moderate the main relation between incentives and innovative propensity. Therefore we formulate the following research question:

R.Q.2. What are the organisational factors that positively/negatively moderate the impact of incentives on innovative propensity?

To summarize, the theoretical model explored in the paper is the following:

Figure 1. *The model*

4. Empirical analysis

We gained access to data about incentives and innovation propensity in three organisations in Central Italy. The criteria for the selection of the organisations have been the following: the high degree of innovation performance of the firms, proved by the new products and discoveries they systematically introduce, the acknowledgment as innovation-oriented organisation, the belonging to industries that are high research intensive (biopharmaceutical and telepace), the presence of a proactive management, the presence of high skilled employees, usually researchers.

Therefore the model is built considering that innovation performance in all the cases is high and positive and, starting from this, we try to go back and understand what kind of incentives such innovative organisations have in place.

Data were collected through personal structured interviews with the managers of innovation and some questionnaires were filled in also by innovators (individuals involved in innovative activities without formal responsibility of coordination and/or project management).

The interviews and the questionnaires included questions and required evaluations and comments on the following elements that we can use as framework for the analysis:

- application and efficacy of different types of incentives for innovation at the individual and group level: fixed monetary incentive (e.g. permanent increase in salary), variable monetary incentive (e.g. monetary bonus related to the actual performance), other fringe benefits (e.g. healthcare insurance, free use of facilities etc.), formal or informal acknowledgement, career promotion, actual implementation of ideas proposed by the individual researcher. All the incentives are proposed both at the individual and at the group level;
- intermediate motivational factors that are activated by these incentives and that explain why the incentives have a certain impact on innovation propensity: increase in task motivation, knowledge sharing, creative competencies, job competencies, in the employee' sense of autonomy, in the effort for promotion, in the preference for short-term aims instead of long-term results, creation of unfair competition, and of equity problems;
- degree of overlapping of *regulation* and *personal goals* along this continuum: a. *introjection*: the rules are followed but not accepted by individuals; b. *identification*: the individual employee perceives greater autonomy and willingness thanks to the coherence between expected behavior and his/her cultural and motivational basis; c. *integration*: the identification includes other aspects such as creed, interests, values, therefore the required activity become instrumental for the achievement of personal aims;
- organisational internal environment characterized by other elements such as: task stability, job rotation, managerial support, heterogeneity/homogeneity of team members, width of the role, innovation appropriability.

The evidences from the single organisations and the results are reported in the following

paragraphs.

5. Analysis of the different organisations

5.1 Organisation A

The organisation is a diversified industrial group operating within the biotech and pharmaceutical sector, dedicated to innovative preclinical drug discovery and development in areas of high unmet medical need, including neurodegenerative and rare and neglected diseases (with a particular focus on fully integrated small molecule and peptide-based drug discovery, peptide-based vaccines, and biomarker development.). It has also developed a central repository of organic compounds and serves as a national and european high throughput screening center of excellence for the identification of novel lead molecules acting on biological targets of interest.

It was created in 2009 as a spin-off of a big pharma, it operates within a 70,000 m² research facility and it has the mission of accelerating innovation in the form of discovery and preclinical development of disease modifying small molecule and peptidic drug candidates. It operates a hybrid business model having proprietary drug discovery programmes and offering “one stop shop” preclinical small molecule and peptide drug discovery services.

The staff is a team of experienced scientists with a proven track record. The organisation currently employs 180 scientists with extensive drug discovery experience, more than half qualified to MSc/PhD. The team has an impressive productivity record having delivered 25 preclinical candidates over 9 years, including small molecule, peptides and synthetic vaccines currently in clinical development.

The innovation achievements are documented in over 800 papers and 100 patents. For one molecule the organisation won the prix for “Best Pharmaceutical agent”.

Usually in contract research (integrated drug discovery and development services) the organisation build interdisciplinary project teams to progress a partner project from early stage to preclinical development operating on a FTE-based approach. Each team is assembled with a Senior Project Leader and an enthusiastic team of drug hunters with a proven track record at delivering solutions and progressing effectively to the milestone. Therefore the concept of group incentives for innovation applies easily to the organisation.

Interviews

We report the evidences from the perspective of the manager of innovation.

The research center has had an increase in number of employees from 22 in 2010 to 208 in 2015, the 90 per cent of wich are valued researchers, some of them with worldwide aknowledgments. The selection process is very rigorous.

The incentive policy and system have some specificities given by the nature of the employees. These are researchers therefore by definition they have a level of intrinsic motivation higher than the one of normal employees. The most important incentives are not the economic ones but the responsibility taking-on and the personal gratification, such as relevant publications.

Since this is an oligarchic organisation, high responsibility and autonomy is assigned to each head of Department in the evaluation of the Unit leaders, that in turn must reward their Unit employees.

The President of the organisation interacts just with the heads of Departments and very rarely with others. Consequently in the organisation employees have high level of responsibility and autonomy that then become acknowledgement and reward. The autonomy also regards the choice of the project to be carried out. The heads of Departments propose offers to the President and an economic value and a budget for them. There is also a very strong variable economic incentive: if the organisation gains, then employees will gain.

In sum the incentive system is twofold: based on variable economic incentive and intrinsic motivation.

The first one is estimated in the 5 per cent of the revenues assigned to the manager who produced this revenue. Considering that the total revenues moved from € 1.180.000 to € 3.000.000 without a

business development, but just with researchers' relations, the economic incentive is strong. There is a monetary variable individual incentive. The head of Department choose who are the employees who deserve a superbonus, a bonus or a penalization. The same kind of evaluation is made by the president regarding the heads of Departments.

The second one is represented by a very strong sense of belonging to the organisation, organisation identity, pride of membership. The organisation makes efforts in order to develop this sense of belonging and pride of working for the organisation, in order to create a positive organisational context. This sense of belonging is so high that a researcher choose to work for the organisation even if taking the 40 per cent less on his salary with respect of his previous job. The pride of belonging is worth more than money. The organisation has a level of fixed salary equal to the 15 per cent less than the average salary of a multinational company. But adding the variable prizes ad personam it can become higher. In fact the organisation is the only pole of research development in Italy, and reference point for multinational companies. In fact multinational companies in the industry do not carry out research in Italy. The organisation is paid by multinational companies for research services, profits are reinvested for organisation's own research development.

At the group level, there is a variable group incentive. For instance in a case of high group performance the group has been rewarded with a relevant economic prize and with a formal acknowledgement (introducing the researchers of the team to the final customer as the actual innovators). The group incentive is applied just in extraordinary cases, for special events.

Moreover the context and the organisation of the work is very positive. There is high automation: 24 hours of machine work. Researchers set up the work and then the machines go on. Also, the spaces and the offices are very comfortable with respect to other organisations.

To sum up the evidences from the interview to the *manager of innovation* using our framework we can state that:

- At the individual level, the incentives for innovation used in the organisation are: individual variable monetary incentive (e.g. monetary bonus related to the actual performance), informal acknowledgment, actual implementation of ideas proposed by the individual researcher. These incentives have a positive impact on innovative propensity because they generate an increase in intrinsic and extrinsic motivation, in creative competencies and autonomy (as intermediate motivational factors), while individual fixed monetary incentives would have a negative impact because they spur short-term results achievement and create equity problems. The most effective individual incentive is informal acknowledgment meaning here high level of responsibility and autonomy. It is a signal of trust about the competencies of the resources and it increases intrinsic motivation, that seems to be the most important factor to achieve better innovative performance.

At the group level there are just occasional incentives, that are given in extraordinary cases. When applied, they are group variable monetary incentive, formal and informal group acknowledgement. These incentives have a positive impact on innovative propensity because they increase intrinsic and extrinsic motivation, knowledge sharing, and creative competencies, while group fixed monetary incentives would have a negative impact because they spur short-term results achievement. The most effective group incentive is formal acknowledgment in the sense of highlighting of the merit of the single group component and it generates an increase in intrinsic motivation and knowledge sharing, because it removes potential free-riding concerns.

- There is a high degree of overlapping of regulation and personal goals, or *integration*: the identification includes other aspects such as creed, interests, values, therefore the required activity become instrumental for the achievement of personal aims.
- The elements of the organisational internal environment that strenghten the positive impact of incentives on innovative propensity are: task stability, absence of job rotation and managerial support. Instead, regarding the incentives having a negative impact on innovative propensity a moderating factor is the width of role.

In this organisation there was the possibility to collect also the opinion of the *innovaros*. To sum up the evidences from the interviews to the *innovators* using our framework we can state that:

- The most effective individual incentives having a positive impact on innovative propensity would be in their opinion individual variable monetary incentive and actual implementation of ideas proposed by the single innovator. These incentives are used in the organisation and their level of satisfaction about them is medium. The positive impact of these incentives on innovative propensity is given by the following drivers: they favour creative competencies and job competencies. The only negative aspect is that they can create equity problems.

The most effective group incentives having a positive impact on innovative propensity would be in their opinion: fixed monetary incentive for the whole group and formal acknowledgement at the group level. However these incentives are not used in the organisation. They would eventually increase the task motivation as main driver for the positive impact.

- There is an intermediate degree of overlapping of regulation and personal goals, or *identification*: the individual employee perceives greater autonomy and willingness thanks to the coherence between expected behavior and his/her cultural and motivational basis.
- The elements of the organisational internal environment that strenghten the positive impact of incentives on innovative propensity are: task stability and managerial support.

The opinions of the manager of innovation and the innovators about incenvces are quite similar, the main difference is about group incentives. While they are just occasionally applied in the organisation, they are considered as very effective by the innovators, even in the form of fixed monetary reward. Extrinsic monetary rewards at the group level are considered a good stimulus by the innovators.

5.2 Organisation B

The organisation seeks to deliver truly innovative and life-changing drugs for patients. The company vision is to build a major global biopharmaceutical corporation while focusing on the discovery, the development, and the commercialization of products for the treatment of cancer and other severe, immune, inflammatory conditions.

The high innovative performance is proven by the more than 300 clinical trials at major medical centers using compounds from the organisation. Investigational compounds are being studied for patients with incurable hematological and solid tumor cancers, including multiple myeloma, myelodysplastic syndromes, chronic lymphocytic leukemia (CLL), non-Hodgkin's lymphoma (NHL), triple-negative breast cancer and pancreatic cancer. The discovery and development platforms for drug and cell-based therapies allow the company to both create and retain significant value within therapeutic franchise areas of cancer and inflammatory diseases.

The employees of the organisation have some core qualities such as 1. *passion for the patient*: a willingness to make essential advancement of healthcare, in a way that sets apart from the past and the future; 2. *courage to face the challenges and the unknown*: a capacity to embrace the unkown, pioneering new science and new ways of doing business, a willingness to challenge the status quo and create new standards in medicine; 3. *trust in words and actions of each other*: dignity, respect, group work, integrity as the core values of the organisation; 4. *excellence in delivering exceptional results*: highest of standards - quality, scientific, and ethical - achieved through creativity and simplicity in problem-solving, transparency in communicating, and data-driven results.

The characteristics of the organisation are: unique products and innovative approach to treating disease, cutting-edge research addressing a broad range of conditions, growing reputation as an important contributor to medical progress, commitment to healthcare providers and compassion for patients.

However most fundamentally the organisation is its employees, they are a varied group of talented people, highly trained and qualified individuals, employees of the highest caliber

united in their commitment to discover, develop and market life-enhancing drugs that make a measurable difference in the lives of millions of people.

Interviews

To sum up the evidences from the interview to the *manager of innovation* using our framework we can state that:

- At the individual level, the incentives for innovation used in the organisation are: individual fixed monetary incentive (permanent salary increase), individual variable monetary incentive (bonus related to the actual performance). These incentives have a positive impact on innovative propensity. Other individual incentives that, according to the manager of innovation, would have, if applied, a positive impact are: Career promotion and Actual implementation of the ideas proposed by the innovator. These four incentives have a positive impact and are effective because they increase extrinsic and intrinsic motivation, job competencies and knowledge sharing. However they could create equity problems.
At the group level the incentives used are: Formal acknowledgement for the group and actual implementation of the ideas proposed by the group. These incentives have a positive impact on innovative propensity because they increase intrinsic motivation, creative and job competencies and favour knowledge sharing. However they can create equity problems.
- There is an intermediate degree of overlapping of regulation and personal goals, or *identification*: the individual employee perceives greater autonomy and willingness thanks to the coherence between expected behavior and his/her cultural and motivational basis.
- The elements of the organisational internal environment that strengthen the positive impact of incentives on innovative propensity are: job rotation, managerial support, heterogeneity of team members, width of role.

A comparison with Organisation A suggests that here extrinsic incentives and motivation are more emphasized, and this is also in line with the fact that this is a company and not just a research centre. A common element is the importance of the actual implementation of ideas proposed by employees.

5.3 Organisation C

The organisation is one of the world's leading players in satellite services. The company, employs approximately 2500 people, relying on an international network of space centres and teleports, and operating worldwide through many subsidiaries and joint ventures. Its activities range from the design and development of **space systems** to the management of **launch services** and **in-orbit satellite control**, from **Earth observation services**, **integrated communications**, **satellite navigation** and **localization**, to **scientific programmes**. It covers the whole space market value chain through its four business units: **Satellite Systems & Applications**, **Satellite Operations**, **Geoinformation**, and **Networks & Connectivity**.

The high innovation performance of the organisation is undoubtful: it **responds to new demands in the satellite services market** with innovative ideas, offering new solutions, implementing international projects and, today more than ever, the organisation **is a true innovator**, transforming what were once just possibilities into real services available to an increasingly wide audience. Telespazio relies on a wealth of experience of the highest level, stemming from technological expertise **acquired over 50 years of activity**. The company's experience is also drawn from the management of space infrastructure - including the **Fucino Space Centre**, the world's largest civilian teleport - as well as from its involvement in major space programmes, including **Galileo**, **EGNOS**, **Copernicus**, **COSMO-SkyMed**, **SICRAL** and **Göktürk**.

Interviews

The perspective of the manager of innovation reported below.

The organisation strategic plan is focused on R&D, therefore it is important to structure an adequate R&D system and find the mechanisms that spur innovation through a process of new ideas

generation, gathering and expression. In organisations with many hierarchical levels innovation will be blocked, there is a limited potential in gathering innovation. To build a culture based on innovation, fundamental for the organisation, a specific process focused on individuals not on the organisation is needed, a bottom-up and people-centric approach. It is important to avoid that breakthrough ideas are rejected in the initial stage without a check about their potential.

For these reasons, the organisation has introduced new innovation management mechanisms centred on the so called innovation fast track process. Inside the firm a call is systematically opened for new innovative ideas and the proposals of innovation reach directly the management of the organisation. The management analyse the ideas with innovative potential and give the possibility to implement the idea assigning a budget (e.g. € 20.000-30.000) and some time (3-4 months) in order to develop it. A given total amount (about € 300.000) is devoted for the funding of new ideas. On about 25 ideas, the management choose the 5 ideas that must be implemented as a test. This mechanism gives the innovator also a reward in terms of actual implementation of the idea proposed and formal acknowledgement of the innovative merits of the individual innovator.

The process to stimulate innovation is made of the following stages: 1. idea generation (that can be peer to peer, academic networks, hackathons, brainstorming), 2. incubator, 3. fast track (understand if industrial exploitation is possible, if the idea has a level of maturity from which it can enter the process of product development).

Economic incentives are important but not so important: a part from the personal creative qualities, the incentive must be emotional, intrinsic. Intrinsic motivation is more important than extrinsic motivation. And the acknowledgement in terms of giving space to a new idea is very effective.

Another very effective instruments are group incentives. The organisation has established an innovation prize assigned to the team. In case of a success in terms of innovation the organisation gives an amount (eg. € 5000) to the group and the components will share the monetary amount.

An innovative organisation is one that does not reward too much individuality, because by rewarding individuality, there is the risk of starting dynamics in which the ego limits innovative capability. Moreover, in an innovative context individuals are more likely to develop the sense of belonging and the willingness to be in the community.

The economic component can be both at the individual and at the group level but it must be functional for the implementation of the idea.

Moreover is very important for the innovator to be in a stimulating context, and to activate lateral thinking: the ability to think creatively, or "outside the box", to use inspiration and imagination to solve problems by looking at them from unexpected perspectives from different fields.

In sum, the less useful incentives are the economic ones and the individual ones. The maximum form of reward for an innovator is the actual implementation of his/her own idea. The incentive must be emotional and it is important for the employee to be in a positive environment and in a context that favours innovation.

The obstacles to innovation are the following: 1. the canalization of the processes too often lead by the product and not by the creative idea; 2. the hierarchical levels: hierarchies stop the creative ideas from being acknowledged by the top management.

The solutions are: creating mechanisms that allow the expression of the innovators, adopting a people-centric approach, gathering new ideas through R&D processes.

To sum up the evidences from the interview to the *manager of innovation* using our framework we can state that:

- At the individual level, the incentives for innovation used in the organisation are: individual variable monetary incentive (e.g. monetary bonus related to the actual performance), formal and informal acknowledgment, actual implementation of ideas proposed by the individual researcher. These incentives have a positive impact on innovative propensity because they generate an increase in intrinsic motivation, in creative competencies and in knowledge sharing. The most effective individual incentive is the actual implementation of the ideas proposed by the single innovator, it increases intrinsic motivation and stimulate creative

competencies.

At the group level the incentives applied are: group variable monetary incentive, formal and informal group acknowledgement, actual implementation of the ideas proposed by the group. These incentives have a positive impact on innovative propensity because they determine an increase in creative competencies, intrinsic motivation and knowledge sharing. The most effective group incentive is the actual implementation of the ideas proposed by the group.

- There is an intermediate degree of overlapping of regulation and personal goals, or *identification*: the individual employee perceives greater autonomy and willingness thanks to the coherence between expected behavior and his/her cultural and motivational basis.
- The elements of the organisational internal environment that strengthen the positive impact of incentives on innovative propensity are: width of role, task stability and managerial support. Instead, regarding the incentives having a negative impact on innovative propensity moderating factors are job rotation and task instability.

5.4 Comparison of human resource management (HRM) choices

In the following table we provide a summary of the evidences from the interviews with a comparison among the three organisation. We highlight in bold the most important element, the factors that have been stressed more by the person interviewed during the interview, according to a subjective evaluation of the speaker.

Table 1. Comparison of HRM choices among the three organisations

HRM choice	Organisation A	Organisation B	Organisation C
Individual incentives having positive impact on innovative propensity	<ul style="list-style-type: none"> • individual variable monetary incentive • informal acknowledgment • actual implementation of ideas 	<ul style="list-style-type: none"> • individual fixed monetary incentive • individual variable monetary incentive • career promotion • actual implementation of ideas 	<ul style="list-style-type: none"> • individual variable monetary incentive • formal acknowledgment • informal acknowledgment • actual implementation of ideas
Drivers (Intermediate motivational factors) related to these individual incentives	increase in intrinsic motivation , extrinsic motivation, creative competencies and autonomy	increase in extrinsic and intrinsic motivation , job competencies and knowledge sharing	increase in intrinsic motivation , extrinsic motivation, creative competencies and knowledge sharing
Individual incentives having negative impact on innovative propensity	Individual fixed monetary incentives	-	-
Drivers (Intermediate motivational factors) related to these individual incentives	increase in short-term results achievement and equity problems (answer by manager of innovation)	-	-
Group incentives having positive impact on innovative propensity	JUST OCCASIONAL <ul style="list-style-type: none"> • variable monetary incentive • formal acknowledgment • informal acknowledgment (answer by innovators) • fixed monetary incentive 	<ul style="list-style-type: none"> • formal acknowledgment • actual implementation of ideas 	<ul style="list-style-type: none"> • variable monetary incentive • formal acknowledgment • informal acknowledgment • actual implementation of ideas

Drivers (Intermediate motivational factors) related to these group incentives	Increase in intrinsic motivation , extrinsic motivation, knowledge sharing , and creative competencies	Increase in intrinsic motivation , creative and job competencies and knowledge sharing	increase in intrinsic motivation, extrinsic motivation, creative competencies and knowledge sharing
Group incentives having negative impact on innovative propensity	Group fixed monetary incentives (answer by manager of innovation)	-	-
Drivers (Intermediate motivational factors) related to these individual incentives	increase in short-term results achievement	-	-
Degree of overlapping of regulation and personal goals	Integration (answer by manager of innovation) Identification (answer by innovators)	Identification (answer by manager of innovation)	Identification (answer by manager of innovation)
Other elements of organisational internal environment (Moderation)	Strengthen the positive impact: task stability, absence of job rotation and managerial support	Strengthen the positive impact: job rotation, managerial support, heterogeneity of team members , width of role	task stability, managerial support , width of role

As shown in the table in **Organisation A** the main driver for innovative propensity is intrinsic motivation (considered as better than extrinsic motivation): the organisation makes effort to increase the sense of belonging to it, the proud of working there and to give informal and formal rewards to researchers through acknowledgment of their merits, responsibility assignment, autonomy grant. These elements are more important than the monetary component, that is used but just on a variable basis. Also the group incentives are not systematic but used in occasional and special cases (formal acknowledgement and actual implementation of ideas).

In **Organisation B** both extrinsic and intrinsic motivation have an important role: monetary incentives (also fixed incentives) and actual implementation of ideas proposed. The element of belonging is less emphasized and balanced by extrinsic components. The organisation have stable group incentives, differently from Organisation A, and they are the same as Organisation A: formal acknowledgement and actual implementation of ideas.

Organisation C has the same individual incentives of Organisation A plus formal acknowledgement. Moreover the individual incentives are the same of group incentives. Among these the most important and effective incentive is the actual implementation of the ideas proposed by the innovators or by the group, that is also systematized and granted through a specific internal innovation process. This spurs creative competencies.

As for the organisational factors, managerial support seems to be important in all the cases to positively moderate the main relation between incentives and innovative propensity, in two cases (organisation A and C) also task stability and absence of job rotation have a relevant role.

6. Conclusions

In the paper we have built a theoretical model that links incentives with innovative propensity, and we have tried to highlight the reasons determining the main relation (intermediate motivational factors) and the organisational elements that work as moderating factors.

In particular we have tried to shed light on the role of extrinsic and intrinsic motivation and incentives and on group and individual incentives.

The three cases show different incentive systems however several similarities and some conclusions can be found. The overall results are the following and we try to show them as answers to the original research questions.

- *R.Q.1: What is the impact of incentives on individual innovative propensity?*

The extrinsic incentives and in particular the economic reward are not so important for

innovation. Anyway variable monetary incentive has to be preferred to fixed monetary incentive. The most important element for innovation is intrinsic motivation. The sense of belonging to the organisation, the pride of working in the organisation, responsibility, autonomy, formal and informal acknowledgment, and, first of all, the actual implementation of the idea proposed by the innovator, are considered the most incisive stimulus to individual motivation to be creative, the main factors that positively affect innovative propensity. The actual implementation of ideas is common to all the three organisation and in one case it has also been integrated in a systematic mechanism of call for innovative ideas. These intrinsic incentives are valuable both at the individual and group level.

An innovative organisation is one that does not reward too much individuality, because by rewarding individuality, there is the risk of activating dynamics in which the ego limits innovative capability. It is important to establish a context that rewards the group as a whole.

- *R.Q.1a: What are the main drivers (intermediate motivational factors) determining a positive/negative impact of incentives on individual innovative propensity?*

The reasons that drive the positive effect of innovative propensity are: increase in intrinsic motivation, in knowledge sharing, in competencies, in autonomy. The only concerns are related to equity issues.

- *R.Q.1.b: How the degree of overlapping between "regulation" and "personal goals" determines a positive/negative impact of incentives on individual innovative propensity?*

In all the three organisations the role of the overlapping of regulation and personal goals is important because they show high level of overlapping - identification or integration - confirming that the overlapping positively affects innovative propensity.

- *R.Q.2. What are the organisational factors that moderate the impact of incentives on innovative propensity?*

The main organisational characteristics that positively moderate the positive relation between incentives and innovative propensity are managerial support, task stability (in 2 of the 3 cases), width of role, heterogeneity of group members (in 1 of the 3 cases).

In the end, even though the incentive system is a complex picture, the theoretical framework tried to systematize the main causality relationships and their drivers, while the cases showed some significant regularities.

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