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María F. Muñoz-Doyague
University of León
Mariano Nieto
University of León

Corresponding author:

María F. Muñoz Doyague
Universidad de León
Facultad de CC.EE. y Empresariales
Departamento de Dirección y Economía de la Empresa
Campus de Vegazana, s/n
24071- León (SPAIN)
Tel/Fax: +34 987291442
e-mail: s.munoz@unileon.es

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Abstract

Purpose – the purpose of the current work is to analyze how the exchanges that employees maintain with their immediate superior and with their work group influence the creativity that they manifest.

Design/methodology/approach – we carry out a study among employees of a firm from the automotive sector. On the basis of previous works, we first built reliable multi-item scales for each variable included in the model. Then, we conducted a multiple regression analysis to ascertain the causal effect of those exchanges upon creativity.

Findings – Our findings reveal that high-quality exchanges between the employee and their work group and, to a lesser extent, their immediate superior, have a significant positive influence on their creative behavior

Practical implications – All this underlines the importance of the composition of work groups for achieving the team environment necessary for creative production.

Originality/value – This paper provides new evidence about a still unexplored topic trying to bridge the existing gap in the literature about the influence of leadership and group behavior on creativity.

Keywords:

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1. Introduction

In recent decades, in which innovation has become an indispensable element for firms wishing to be competitive, it has undoubtedly become increasingly important for organizations to understand how to stimulate the creative potential of their workforce.

Indeed, there is consensus that creativity is a key aspect for guaranteeing success in the innovation process. Some researchers have even argued that it is creativity, rather than innovation, that is the true source of competitive advantage for organizations, as it is the basis of their innovative potential (Amabile, 1996; Woodman *et al*., 1993; Amabile *et al*., 1996; Ford, 1996; Cummings and Oldham, 1997). And, "*at the very heart of the successful innovation process were "key individuals" of high quality and ability; people with… a strong commitment to innovation"* (Rothwell, 1994:11). Consequently, employee creativity is a significant treasure trove of innovation, so firms are increasingly attempting to promote individual creativity (Hirst *et al.*, 2009) in order to be competitive.

But in spite of the evident importance of employees' creative contributions, research on the factors influencing creativity in labor environments is still at an early stage, although it is true that in recent years significant advances have been made on the question. Specifically, for any individual to be creative we must bear in mind, among others, aspects to do with their immediate environment, in other words, with their work group, a particularly important issue that has not been sufficiently examined in the literature. Thus, although the generation of creative ideas can at times be a solitary activity (Perry-Smith and Shalley, 2003), it is increasingly the case that employees work in teams, and individual creativity is often enacted within teams where individual creative contributions may be considered as a significant input to the team's creative outcome (Shalley *et al.*, 2004; Shin and Zhou, 2007; Hirst *et al,* 2009). This implies that the team context plays a critical role in stimulating team creativity (Shin and Zhou, 2007, Liao *et al.,* 2010). In that sense, a number of recent research have stressed that

social context shapes individual's actions (Yang *et al*., 2009), so that individuals' relationships with their team may influence the extent to which they are motivated to get involved in creative endeavours (Pirola-Merlo and Mann, 2004; Chen *et al.,* 2007; Shalley and Perry-Smith, 2008; Hirst *et al.,* 2009).

As a consequence, not only to identify creative employees is critical in order to enhance creativity in organizations, but foremost to understand the way in which the team context affects the creativity of diverse individuals (Hirst *et al.,* 2009), mainly with the analysis of the dynamic interactions amongst the teammates (Chen *et al.*, 2007). So, the members of the work group to which the individuals belong – both the supervisor and the other group members – will normally influence their creativity (Woodman *et al*., 1993; Scott and Bruce, 1994).

In this respect, the leaders have a whole series of mechanisms available to influence their subordinates' behavior, and hence their creativity (Yukl, 2008; Atwater and Carmeli, 2009), such as structuring the functions, defining the goals, allocating the rewards and distributing the resources. At the same time they express the organization's norms and values, structure the nature of the interactions of the work group, condition their subordinates' perceptions about their working environment and make decisions about how to carry out operational procedures (Carmeli and Schaubroeck, 2007; Yukl, 2008). On the other hand, just as the employee interacts with their supervisor, in their work group a series of interrelations clearly takes place deriving from the daily contact among its members and that also influence their behavior, potentially determining their creative performance as a consequence (Shalley and Perry-Smith, 2008, Hirst *et al.,* 2009). Thus, various authors have pointed out that some characteristics of the group, such as its size, degree of cohesion, interactions between its members or the communication processes taking place within it, influence its members' creative performance (Rogers, 1954; Woodman *et al*., 1993). However, prior research has not

studied in depth why and how in-group relationships matter to employee creativity (Liao *et al,* 2010)

Thus, in order to offer new empirical evidence on the question, the objective of this work is to determine the influence of the individual's relationship with, on the one hand, their immediate superior, and on the other, their work group, on the creativity that they manifest.

This paper has the following structure. Section two presents the background and the hypotheses of the study. Section three describes the method, data and variable measures. Section four presents the results of the empirical analysis and section five discusses the main findings.

2. Background and hypothesis.

Creativity defined

Creativity is a complex and diffuse construct that has been defined in various ways (Shalley, 1995). Thus, creativity can be identified with the specific characteristics of products (e.g. Shalley, 1991; Woodman *et al*., 1993; Oldham and Cummings, 1996), people (e.g. Guilford, 1950), thought processes (e.g. Weisberg, 1992) or of the situation in which it takes place (Csikszentmihalyi, 1990).

Nevertheless, although this has meant a lack of integration in the research into the question (Mumford and Gustafson, 1988), there is consensus in the literature that creativity refers to something that is both novel and in some sense valuable (Ford, 1995). Establishing a creative strategy or solution will vary according to the sector of activity or the particular task involved, but all creative behaviors involve, to a certain extent, the identification of original and better ways of achieving some purpose (Shalley, 1995).

On the other hand, most researchers studying creativity in organizations have adopted a definition focusing on the product or idea generated, since a person, process or situation are creative if they have generated a product that can be classed as such (McKinnon, 1978). In

this respect, the most accepted definition of creativity is that it involves the production or development of ideas, processes or procedures that are new and useful for an individual or group of individuals working together (Shalley, 1991; Woodman *et al*., 1993).

According to this, in this work we adopt Amabile's (1988) definition, according to which creativity is the generation of novel and useful ideas (p. 126). An idea or product is novel if it involves either a significant recombination of existing materials or the introduction of entirely new materials (Oldham and Cummings, 1996). These contributions should also offer something original and unique compared to what is already available in the firm's repertoire of products or procedures (Cummings and Oldham, 1997). An idea or product is useful if it serves to solve a problem, meet the demands of a particular situation or achieve some recognizable goal (McKinnon, 1978). This implies that it must be directly relevant to the organization's objectives and be something that the firm can expect to extract some value from, whether in the short or long term (Cummings and Oldham, 1997). Specifically, creativity "*can include ideas related to solving problems, new practices, or new procedures, as well as ideas about new products or services. As such, creativity involves imagination and insight that can ultimately lead to inventions and innovations"* (Shalley and Perry-Smith, 2008:24).

However, no matter how creative a firm may be, if the ideas are generated but never evaluated or converted to new products or services, they are merely interesting artifacts or even an illusion. Value is generated by taking a creative new idea and moving it through a series of stages to produce a new product or service or business model and launch that new thing into the market (Rothwell, 1994).

So, creativity is an ingredient for innovation, with the difference that this latter comprises commercialization, and implies the successful implementation of creative ideas (Shilling, 2006). That is, creative ideas provide a basis for innovation emergence, but for

innovation being successfully implemented, it is necessary to have in place or to obtain a wide range of necessary resources, not only political or financial ones, but also emotional support, and commitment. Therefore, creativity is linked to innovation, and is a major forerunner of innovation, but they are different concepts (Shalley and Perry-Smith, 2008).

The leader-member exchange and creativity

The exchange between a superior and their subordinate (leader-member-exchange – LMX) is defined as the quality of the interpersonal relationships that exist between them both (Dienesch and Liden, 1986; Graen and Scandura, 1987).

On the basis of this idea, the leader-member exchange (LMX) model suggests that leaders develop different types of relationship with each of their followers within the same work unit (Graen and Scandura, 1987; Bauer and Green, 1996). The theoretical basis of the LMX relationship is that the dyadic relationships between superior and subordinate and the functions carried out in the unit take place or are negotiated over time through a series of exchanges between the leader and the member (Dienesch and Liden, 1986). The main assumption of the LMX theory is that leaders develop different relationships among the subordinates who report directly to them in their work groups (Liden *et al.,* 2006; Henderson *et al.,* in press). The process starts from an initial interaction, in which each party provides unique personal characteristics and behaviors to the encounter, which will determine the type of link that will be established between them (Liden and Graen, 1980; Bauer and Green, 1996). Moreover, a series of contextual factors exists, such as the organizational culture, the size of the work group, and the organization's policies, which can also affect the way the relationship develops (Liden *et al*., 1993; Henderson *et al.,* in press).

Consequently, these are dynamic relationships based on a trust-building process (Bauer and Green, 1996), which develop over time and which moreover form rapidly and tend to remain stable over time (Liden and Graen, 1980; Liden *et al*., 1993). Additionally,

these interpersonal relationships between superior and subordinate are informal in nature and evolve independently of, and even possibly against, the formal organization (Graen and Cashman, 1975).

In this respect, the model considers that the relationships (exchanges) between leader and subordinate can be situated on a continuum ranging from high to low quality, where the former implies greater exchange of effort, resources and support between both parties, and the latter is characterized by a minimum exchange between the two. Specifically, low-quality LMX relationships are defined as relationships that are limited to the exchanges specified in the employment contract (Liden and Graen, 1980). They are characterized by their lack of trust, poor level of support between the parties and a poor allocation of rewards from the supervisor (Dienesch and Liden, 1986).

At the other extreme, high-quality relationships involve the exchange of material and non-material goods that goes beyond what is specified in the formal job description (Liden and Graen, 1980). These relationships are characterized by high levels of mutual trust, interaction, linkage, respect and support, the granting of high formal and informal rewards and by cooperative behaviors (Dienesch and Liden, 1986; Liden and Maslyn, 1998). The subordinates invest more time and energy in their work, have a more positive attitude towards it, and there are fewer operational problems in the unit (Graen and Cashman, 1975). The superior has higher levels of orientation, while the subordinates have higher levels of satisfaction and performance and lower turnover levels (Scandura *et al*., 1986; Bauer and Green, 1996; Liden *et al*., 1997).

These exchanges between superior and subordinate determine a series of important organizational indicators (Graen and Uhl-Bien, 1995), including innovation and creativity. In this respect, Graen and Cashman (1975) and Graen and Scandura (1987) argue that the nature of the exchange between superior and subordinate is compatible with the latter's creative

action, since this is considered an integral part of the coupling process between both. In addition, LMX theory suggests that the quality of the relationship between superior and subordinate is related to innovation (Graen and Scandura, 1987).

In this way, the quality of the LMX relationship should establish the conditions for the employee's creative performance in various ways. For example, the superior grants greater autonomy and capacity of decision to those subordinates with whom they maintain a high-quality relationship. These are elements that have been shown to be determinants of innovative behavior (Cotgrove and Box, 1970).

Equally, employees who have a high-quality exchange with their supervisors take on more challenging and important tasks than those with low-quality relationships (Liden and Graen, 1980). And workers who perceive high LMX relationships tend to experience high levels of organizational commitment (Cogliser *et al.,* 2009) and job satisfaction (Cogliser *et al.,* 2009; Harris *et al.,* 2009). These factors have been linked to creative performance in the job (Amabile and Gryskiewicz, 1989). Recently, Liao *et al*. (2010) have demonstrated that LMX quality has a significant indirect effect on creativity through self-efficacy.

Likewise, employees are more likely to take on tasks that involve the adoption of risks (Graen and Cashman, 1975), and to receive more resources to undertake the task (Graen and Scandura, 1987), as well as greater recognition from their superiors (Graen and Cashman, 1975). The combination of all these factors suggests that the supervisor will display receptivity and support for creative work (Amabile, 1988; Ford, 1996; Amabile *et al*., 2004). In fact, previous research (Dunegan *et al*., 1992; Scott and Bruce, 1994) suggests that subordinates with a high LMX perceive that they work in a working environment that supports innovation and creativity.

Finally, these employees experience a strong feeling of defense and affection for their supervisors (Duchon *et al*., 1986), and vice versa, which leads to the level of comfort and

trust necessary for creativity (Mumford and Gustafson, 1988). Oldham and Cummings' (1996) work supports this idea, by showing that employees' perceptions about their leaders' interpersonal support are linked to their creative performance. In that sense, Amabile *et al.* (2004) show that leader support is a significant element of the work environment for creativity. Also, Carmeli and Schaubrock (2007) find that leader's expectations for creativity have a strong effect on individual´s involvement in creative work due to the Pygmalion Effect and because of the reciprocity feelings they establish with their supervisors to the extent that employees perceive leaders' support. In the same vein, Kuo *et al*. (2010) demonstrated that transformational leadership has positive effects on a number of attitudinal outcomes, which have been shown to be necessary for creativity, as organizational commitment.

In general, therefore, it seems that those elements that influence individual creativity coincide with the characteristic aspects of the existence of a high-quality superior-subordinate relationship. Moreover, the personality characteristics manifested by employees who have a high-quality relationship with their supervisors correspond to those that the literature points to as characteristic of creative employees.

Nevertheless, empirical research into the relation between LMX and innovation is still at an early stage, although it has provided support for a possible relation between LMX and innovative behavior (Scott and Bruce, 1994; Basu and Green, 1997) or creativity (Tierney *et al*., 1999; Atwater and Carmeli, 2009).

Specifically, Scott and Bruce (1994) find evidence that a high-quality exchange between leader and subordinate positively influences subordinates' innovative behavior, although it does focus on a measure that the authors call innovative behavior, which includes general activities that can apply to various stages in the innovation process, or reflect other performance behaviors apart from creativity. For their part, Basu and Green (1997) conclude that the quality of the exchange between leader and subordinate is positively related to the

autonomy granted to the latter, to the support that the employee perceives they receive from their supervisor, and to the workers' commitment to the organization. These employees with a high-quality exchange with their superior clearly engage in superior innovative behavior than those maintaining low-quality LMX relationships.

In subsequent research Tierney *et al*. (1999) also find support for the existence of a significant positive relation between a high-quality superior-subordinate exchange and the latter's creativity.

Recently, Atwater and Carmeli (2009) have demonstrated that those individuals who perceive a high-quality relationship with their supervisors are imbued of feelings of energy, and consequently reveal a high involvement in creative work.

Thus, in order to add new evidence to the extant empirical literature and on the basis of the above arguments, we propose to test the following hypothesis:

H1: A high-quality LMX relationship positively influences individual creativity.

Employees' exchange with their work group and creativity

An individual's exchange with their work group (team-member exchange – TMX) is defined as the quality of the interpersonal relationships existing between that individual and their colleagues in the team, understood in a global sense (Seers, 1989).

This concept was proposed by Seers (1989) as a construct of function generation complementary to the quality of the superior-subordinate exchange. Specifically, it refers to "*the member's individual perception about their exchange with their peers in the work group as a whole"* (p. 119).

Thus, starting from LMX theory Seers (1989) suggests that individuals are involved in a process of establishment of functions with their work groups. Consequently, TMX Theory, like LMX theory, has its theoretical basis in role theory (Katz and Kahn, 1978) and in social exchange theory (Homans, 1961; Blau, 1964), which suggests that an individual's responses

when carrying out their functions can be understood as the product of the interaction between the individual and the set of function emitters with whom they generally interact. Usually the key members of the set of functions are the individual's supervisor and their work colleagues. However, Seers (1989) points out that previous research on this phenomenon has focused on the supervisor as the function emitter, ignoring the effects of the working relationships between the members of the work group, which are also particularly interesting.

For this reason Seers (1989) extends the scope of analysis of work relationships, analyzing those taking place between the member and their team, adapting the construct developed for LMX theory mentioned above. In this case, the exchange is defined in the context of a group in which the member interacts with the independent members of the set of functions (Katz and Kahn, 1978), so that the members' functions are defined in relation to the group and to the remaining members, by means of a consolidation of the reciprocal actions (Jacobs, 1970). Consequently, *"the model of reciprocity that evolves for the different members of a group will vary with the individual's skills and interests, as well as with the needs of the remaining members and the changing demands established by the group as a whole"* (Seers, 1989: 119).

On the basis of this idea, Seers (1989) proposes the TMX (team-member exchange quality) construct as a way of evaluating the reciprocity of the relationships between an individual and their work group. This construct captures the member's perception of their willingness to offer help to the other members, share ideas and feedback, and the extent to which they receive information, help and recognition from the other members in exchange.

As a result, these interactions can give rise, analogously to the LMX relationship, to a high-quality team-member exchange, characterized by trust and mutual respect, and by cooperation and collaboration between the individual and the group. Alternatively, this

process can lead to a low-quality TMX, in which the individual is not integrated in the work group, and in which collaboration and mutual respect are consequently scarce.

Few empirical works analyze the determinants and consequences of this relationship. Only Seers (1989) and Seers *et al*. (1995) demonstrate its influence on the satisfaction and work performance of the components of the work group, at the same time as they show that self-managed teams are characterized by the existence of high-quality TMX relationships between their members. Additionally, Liden and Wayne (2000) show that the TMX relationship influences member identification, commitment and turnover in work groups, so that members' identification and organizational commitment is greater and their turnover is significantly lower in groups with high-quality relationships than in groups whose individuals perceive they have low-quality relationships.

Similarly, research on the TMX relationship and creativity has received little attention in the literature. Recently, Liao *et al*. (2010) found that TMX has indirect effects on employee creativity via self-efficacy. Additionally, only one work analyzes the influence of this variable on individual innovative behavior (Scott and Bruce, 1994), and it fails to find support for this relation. However, as we have already mentioned, the dependent variable used by this authors includes general activities applicable to the various phases of the innovation process, and they may reflect other behaviors apart from just creativity.

In the same way, analysis of the influence of work groups on creativity has also been rare in work examining the determinant factors of this phenomenon. Despite this, both at the theoretical and empirical level work has examined how different aspects of group behavior influence creativity.

In this respect, Rogers (1954) suggested that the cohesion existing in the group determines the extent to which individuals feel that they can suggest new ideas without fear of "censure" from their colleagues. Equally, Amabile and Gryskiewicz (1989) and Sethia

(1991) argue that collaboration efforts between colleagues are fundamental for the generation of creative ideas.

In the same line, Hackman and Morris (1975) consider that the interactions that arise in the work group significantly affect the effort that members exert when carrying out their tasks, and serve as a mechanism for increasing the pool of knowledge and skills available in the group, thereby facilitating the generation of new knowledge and ideas from the members.

Zhou and George (2001) show that help, support and useful feedback from work-group colleagues significantly and positively influence the creativity of individuals who are dissatisfied in their jobs but who have opted to respond to this situation actively and constructively (voice option). In other words, the behavior of the work group to which the dissatisfied employee belongs is a particularly important condition for channeling that dissatisfaction into creative work, turning creativity into an expression of voice as a reaction to that job dissatisfaction.

However, we should mention the existence of empirical work demonstrating that the presence of colleagues inhibits creative work. The argument is that they will be distracting, preventing the individual from being receptive to the wide range of environmental stimuli that stimulate their creativity and, hence, from exploring the various possible solutions before selecting the solution regarded as most novel and useful (Shalley, 1995). But Amabile *et al.* (1990), in contrast, fail to find any relation between the presence of colleagues and creativity.

In this respect, Perry-Smith and Shalley (2003) stress the importance of social relationships or "network ties" as an important element influencing individual creativity. They suggest that individuals who maintain strong ties or relationships with their colleagues, characterized by direct relationships that imply relatively frequent interactions, strong emotional proximity and reciprocity, will be less creative than those maintaining weak ties. They reason that strong ties develop between similar individuals, while weak ties are more

likely to connect people with differing perspectives and points of view, varying interests and different ways of tackling problems. In addition, weak connections provide access to a larger group of people and a greater quantity of valuable and non-redundant information. Both arguments facilitate the processes that favor creativity. Thus, exposure to various approaches and perspectives could stimulate creative abilities such as the capacity to generate alternatives and flexible thinking, while access to more information could increase the type of knowledge relevant for creativity.

This reasoning appears to contradict the idea that "*a successful social psychology of creativity demands that the creative individual be placed within a network of interpersonal relationships"* (Simonton, 1984: 1273). But it simply reinforces the importance of the composition of work groups for creativity, since the probability of creative performances will be greater when the groups are composed of individuals coming from diverse fields or functional antecedents (Woodman *et al*., 1993: 302), a view that is consistent with Perry-Smith and Shalley's (2003) argument. Equally, it corresponds to the fact that, as Cummings and Oldham (1997) point out, creative employees need to be surrounded by colleagues who stimulate them to become passionate about their work but do not at the same time distract them from it. In this respect, the interrelation with particular colleagues can provide them with "*additional motivation, stimulating wider interests in them, adding complexity or introducing some competitive pressure to foster novelty, utility and the number of contributions*" (Cummings and Oldham, 1997: 29). These authors stress the importance of group interactions, such that it is important to ensure that they do not inhibit individuals' ability to integrate divergent information and to pursue ideas that stray outside the habitual parameters. Accordingly, *"diverse knowledge of multiple domains and deep knowledge in a specific domain can both lead to innovations"* (Taylor and Greve, 2006), as it provides more flexibility and a number of point of views so that facilitate team members learning from each

other (Liang *et al*, 2007). And, Harrison and Klein (2007) states that diversity within teams implies greater creativity and innovation, because of the differences in knowledge, experience, or information among team members.

In this vein, Shalley and Perry-Smith (2008) reflect on the fact that diversity of knowledge and expertise in a group facilitates learning and search behaviors that lead to more creative outcomes, and they argue that diverse teams can join together diverse points of view and information, and challenge each other to think creatively. So, *"when teams are diverse in terms of demographic characteristics or area of specialization and they communicate and share their different knowledge, there may be improved performance"* (pp. 28). This assertion is consistent with Hirst *et al* (2009) findings which confirm that individual differences in the team context enhance individual creativity, as the group adopts a learning orientation that kindle creative behavior. Also, Hirst *et al* (2009) demonstrated that team identification, which contributes to cooperation, is positively related to individual creative effort, which in turn predicts creative performance, what highlights the fact that an adequate team management is critical for this purpose. In this vein, Somech *et al* (2009: 371) state that *"teams that rely on the cooperative style tend to … accomplish their tasks effectively"*. And even conflict in groups, if adequately managed, can be beneficial for creativity as it can help to generate innovative solutions to ill-structured problems (Troyer and Youngreen, 2009). These ideas are consistent with Yang and Rui (2009) findings about how both knowledge dissemination in organizations, and knowledge innovation contribute to the enhancement of creativity continuously.

As we can see, the group aspects considered in the literature correspond with those that characterize high-quality exchanges in the work group. On the other hand, it is conceivable that if the behaviors associated with a high-quality LMX relationship correspond

to a certain extent with those suggested for a high-quality TMX, then this latter variable will be positively related to creativity too.

Thus, in conditions of a high-quality TMX, individuals have additional resources available in the form of coparticipation in the ideas and feedback, aspects positively associated with creativity.

Thus, we propose the following hypothesis:

H2: A high-quality TMX relationship positively influences individual creativity.

Method

Sample

To test the proposed hypotheses we conducted a study of the employees of a firm from the automotive sector mainly dedicated to manufacturing two-wheeled vehicles. The firm applies a just-in-time production philosophy, in which the generation of creative ideas is fundamental for achieving continuous improvement, with the ultimate objective being total quality. Moreover, the automotive sector needs new ideas to exercise influence in the initial stage of the innovation process, when the cost for changing is still limited (Backman, *et al.*, 2007). This flow of new ideas can increase the frequency of problem-solving cycles while reducing the total amount of time and money spent on R&D, and can lead to better innovation output (Thomke, 1998).

The population object of analysis consists of 110 workers from the administration (18.18%), production (60%), and sales divisions (21.82%). The members at the strategic peak of the firm and the assembly-line workers are excluded. We sent a questionnaire to all these workers, including a series of questions aiming to measure the variables of the model to be tested. The questionnaires were sent twice: first with the pay slip of March 2003 and then with the following month's pay slip, in order to increase the number of responses.

We received a total of 53 valid responses, which represents a response rate of 48.1%. The Chi-squared test (χ^2=0.82; p=.960) corroborates the sample response rate representativeness regarding the analyzed divisions, so that all them are representative in relation to the whole population.

The sample is relatively young, since 50% of the individuals surveyed are 40 years or under, with the average age being 42.68. On the other hand, the average tenure of the sample employees is extremely long (17.93 years). Hence it is generally a mature workforce in terms of professional experience. Specifically, although a large proportion of the workforce has a short tenure – between one and five years – the majority of employees joined the firm more than 11 years ago. Thus, 17% have been at the company for between 21 and 25 years, another 17% for between 26 and 30 years, and 7.5% of the employees have worked for the firm for more than 30 years.

With regard to the educational level, 43% of the workforce has professional training qualifications or the equivalent, while 34% are university educated. Moreover, 13.2% declare that they have carried out complementary training courses after finishing their high-school diploma. The employees who have worked longest in the company have the lowest educational level, while the university-educated employees are mainly concentrated among the workers with less than 11 years' tenure.

Thus, the sample essentially consists of employees with an extremely long average tenure and an average educational level of high-school diploma or professional qualifications. This final point implies that the employees have substantial experience based on on-the-job learning during a long period of time.

Variable measurement

To measure *creativity* we built a multi-item scale based on the work of Ettlie and O'Keefe (1982), Cummings and Oldham (1997), Tierney *et al*. (1999) and Zhou and George (2001), which captures the two fundamental aspects of this concept – novelty and utility. Specifically, we used a 7-point Likert-type scale, in which the employees were requested to express their level of agreement with the statement (1 = totally disagree, 7 = totally agree). According to this, a score of 1 implies that the respondents do not consider themselves to be creative, while 7 implies that they regard themselves as very creative. In total, the measure consists of 11 items, of which the first six relate to novelty, and the remaining five regard the utility of the idea. To summarize the data we used the arithmetic mean of the items making up the measure, with the resulting index been labeled CREATIVITY ($\alpha = 0.96$).

The *quality of the exchange between superior and subordinate* was measured by taking the average of the employees' responses to 15 items on 7-point Likert-type scales based on the work of Dansereau *et al*. (1975), Liden and Graen (1980), Graen *et al*. (1982), Scandura and Graen (1984), Liden *et al*. (1993), Liden and Maslyn (1998) and Schriesheim *et al*. (1998). A high score means that the employee maintains a high-quality leader-member exchange with their supervisor, while a low score implies a low-quality exchange. The resulting variable was labeled LMX ($\alpha = 0.98$).

Finally, to measure *the quality of the relationship between the employee and their work group*, we used a multi-item 7-point scale adapted from the measure developed by Seers (1989). The employee was requested to express their degree of agreement about a series of statements concerning their relationship with their work group. Item 4 was re-coded as it was originally in the reverse direction to the rest of the items. A high score implies a high-quality TMX relationship, and vice versa. The construct was composed of 11 items in total, the average of which was taken to produce the index, labeled TMX ($\alpha = 0.96$).

Results

Table 1 display means, standard deviations, and correlations among the study variables. LMX and TMX are significantly correlated with creativity. To test the proposed hypotheses we conducted a multivariate linear regression analysis using the stepwise method. This technique is valuable for quantifying the impact of various simultaneous influences upon a single dependent variable, when investigating relationships between variables, and it's especially useful when the investigator seeks to ascertain the causal effect of one variable upon another. As we can see in Table 2, the model fits the data according to the results of the F test, so we can reject the null hypothesis that the slope of the regression plane equals zero, in other words, that the parameters are equal, at the 99% significance level.

Table 1: Means, standard deviations (S.D.), and correlation.

	Mean	S.D.	1	2	3
1. Creativity	4,74	1,14	1,000		
2. TMX	4,85	1,27	,631**	1,000	
3. LMX	4,53	1,42	,521**	,123	1,000

N=53
**p>.01

Equally, the R^2 indicates that the explanatory variables introduced into the model explain 42% of the behavior of the dependent variable, meaning that other factors that have not been taken into account seem to explain the rest.

Table 2: Summary of model[b]. F statistic and coefficients of determination.

Model	R^2	Adj. R^2	F	Sig.
1	0.420[a]	0.409	36.923	0.000

a Predictor variables: (Constant), TMX
b Dependent variable: CREATIVITY

Table 3 shows the regression coefficient β associated with the variable maintained in the model, as well as its corresponding level of significance. In addition, the variable that was eliminated from the model appears, with the parameter and level of significance obtained.

As we can see, the individual's exchange with their work group has a significant positive influence on their creativity, as we hypothesized, thereby confirming Hypothesis H2.

For its part, the variable LMX was excluded from the regression model, not being significant at the 95% level – the criterion for maintaining variables in the regression equation. But as we can see the relation is statistically significant at the 90% level. We can consequently partially confirm Hypothesis H1, since we can reject the null hypothesis at the 10% level in the Student's t test.

Table 3: Coefficients of regression analysis.

PREDICTOR VARIABLES					
	Non-standardized coefficients		**Standardized coefficients**	**t**	**Sig.**
	B	**Std. error**	**Beta**		
(Constant)	2.037	0.461		4.416	0.000
TMX	0.560	0.092	0.648	6.076	0.000
ELIMINATED VARIABLES					
			Beta in	**t**	**Sig.**
LMX			0.252	1.795	0.079
Dependent variable: CREATIVITY					

We then proceeded to test compliance with the conditions for ensuring the validity of the regression analysis carried out. Specifically, we checked that the assumptions of linearity, homoscedasticity, and normality were fulfilled, so that results were trustworthy.

Consequently, we can confirm the proposed hypotheses with regard to the factors analyzed and their influence on creativity. In other words, the fact that an employee perceives that they have a high-quality exchange with their work group, and to a lesser extent with their immediate superior, positively influences their creative performance.

Discussion

Summary

This study provides new evidence of the critical role that social relationships within teams play in enhancing individual creativity. Specifically, it focuses in the quality of the exchange relationships that the employees maintain with their supervisors and their teammates, arguing that high quality relationships have a beneficial effect on creativity. Our findings allow us to conclude that the employee's social relationships with their immediate environment relate in a positive way with the creativity that they manifest. Specifically, we can conclude that the employee's exchanges with their work group, and to a lesser extent with their supervisor, are significantly and positively related to their creative performance, which confirms the proposed hypotheses.

Contributions to Scholarship

The support for both hypotheses is extremely important, since the relations verified here have been the focuses of very little work in the literature. So, the study contributes to the literature in several ways.

First, with regard to the LMX relationship, as we mentioned before we only found four studies demonstrating its positive influence on innovative behavior (Scott and Bruce, 1994; Basu and Green, 1997) and creativity (Tierney *et al*., 1999; Atwater and Carmeli, 2009), respectively. Thus, the results obtained in this research provide new support for what theory, and to a lesser extent, practice, have been postulating until now. We should mention that in the case of Scott and Bruce (1994) and Basu and Green (1997) the dependent variable used is actually innovative behavior, which, as we mentioned, is a broader concept than creativity. Moreover, although Tierney *et al*. (1999) find support for a positive relation between LMX and creativity, it is with a very small explanation of the variance.

However, in the current work this relation was found to be significant only at the 90% level, and not at the 99% level as in the case of the TMX. The reason for this reduced significance may lie in the attributes that creative employees need according to the literature, specifically their innovative cognitive style[i] (Cummings and Oldham, 1997; Buttner *et al*., 1999; Tierney *et al*., 1999; Taggar, 2002). Individuals who possess an innovative cognitive style are described in the literature as people possessing the skills, confidence and orientation needed to be creative (Kirton, 1976), so they may perceive that they receive no extra benefit from interacting with their supervisor. This influence would then be considerably weaker than that found for the other group variable analyzed. In fact, Tierney *et al*. (1999) analyzed the interaction between cognitive style and the LMX relationship, and they concluded that the quality of that relationship does not appear to significantly influence employees who possess an innovative cognitive style and who have been evaluated as highly creative. However, it does appear to be critical for these relationships to be of high quality when the individual has an adaptive or moderately innovative style, since they represent a strong support and stimulus for this type of employee and hence for their creative performance.

Consequently, the results obtained in this research appear to support a relation that has been barely tested in the literature, and which needs to be investigated further. Special attention needs to be dedicated to the interaction between employees and supervisor if we are to understand employees' propensity to create. All this shows the importance of taking the analysis of the influence of this variable on creativity further, and to establish how it interacts with the individual attributes that determine creative performance. In this vein, Liao *et al*. (2010) have recently demonstrated how LMX has an indirect and positive relationship with creativity via self-efficacy, which reveal the meaningfulness of carrying this argument one step further.

With regard to the TMX relationship, we conclude in this work that a high-quality relationship between the individual and their work group is indeed significantly and positively related to their creativity. This result is a novel contribution to the literature, since to date scarce empirical studies exist that analyze the positive influence of this variable on creativity, in spite of the considerable amount of theoretical work that has postulated that a high-quality TMX relationship will be beneficial for creativity. In fact the only work that we have found that analyzes the influence of this variable, but on innovative behavior (Scott and Bruce, 1994), does not find empirical support for the hypothesis posed in the same direction as that proposed in this current work. These authors justify their rather surprising finding by pointing out that the interdependence of intragroup tasks may mediate the relation between the employee's exchange with their work group and the affective and behavioral responses that the former manifests. In this way, if the interdependence of tasks, and consequently the member-group interaction, is low, cooperation and collaboration in the work group will logically be weaker than when interdependence and interaction are high. This idea means that it may be useful to include some measure of the task interdependence and to analyze its influence on the quality of the exchange. However, as we have mentioned, the dependent variable in Scott and Bruce's (1994) study is individual innovative behavior not creativity, so their results may not be entirely comparable with the ones obtained here. In this respect, the employee's innovative behavior includes general activities that can apply to a number of the stages of the innovative process, or reflect other employee performance behaviors apart from creativity. It is possible then that in function of the stage of the innovation process concerned, the importance of the exchange existing within the work group may vary. In connection with this aspect, Tohidinia snd Mosakhani (2010) concluded that employees with higher levels of perceived self-efficacy were more disposed to share their knowledge, and that anticipated reciprocal relationships are specially important to create a favourable attitude toward

knowledge sharing, which is consistent with Liao *et al*. (2010) findings about the positive relationship between TMX and creativity via self-efficacy.

Managerial Implications

Bearing in mind the challenges that organizations are facing today, to foster creativity is one the strategic requirements for success in the long term. So, the confirmation of these relations stresses the importance of an adequate composition of work groups if firms are to obtain superior creativity from their employees, thanks to a good relationship of collaboration and mutual support between the members. Consequently, managers should be fully aware of the fact that the quality of their exchanges may bring about many positive but also negative effects in individuals that will influence all their activities especially their performances. Therefore, leaders have to play an active role in encouraging and supporting the adequate interactions amongst their subordinates in the drive to nurture creative efforts.

In this vein, practitioners should focus their efforts in increasing reciprocity of quality exchanges between team members and between team members and supervisors in order to encourage creativity behaviors. Also, they should take into account that that supportive leadership is likely to increase the quality of leader-member exchange. Specifically, leaders should focus on understanding the needs of their subordinates for quality relationships, being more supportive with less creative people in order to encourage them to engage in creative efforts, and as Ho (2010) point out, they also should boost all team members to learn and share what they have learned with other team mates. It would facilitate that the climate, the work structure, and HR practices were such that creative outcomes could occur (Mumford et al., 2002; Shalley et al., 2004; Yang and Rui, 2009), and would create the breeding ground to cultivate the appropriate intellectual capital which "*helps lead to better innovations in new products, services and processes*" (Phusavat *et al.,* 2011: 812)

Specifically, the importance of these relationships between the employee and their superior and work colleagues, demonstrated in this work, means that both questions should be taken into account when building these teams and selecting the person to lead them. Additionally, when forming them managers should consider the factors influencing employees' perception that both relationships are optimal, such as the characteristics of the creative employee or the supervisor's motivations. This opens up an interesting field of analysis for future research.

Limitations and Future Research Directions

Several limitations in this study must be taken into account when interpreting the results, with a view to determining exactly the scope of the conclusions reached. First, the data collection was cross-sectional in nature. However, the analyzed variables have time-related aspects, as the development of LMX and TMX are processes that change over time. So a longitudinal design might provide a more accurate assessment of the effects of both constructs on individual creativity. A longitudinal approach would also permit testing of the causal linkages between the variables. Second, we used a self-report measure of creativity which undoubtedly involves a high degree of bias and a benevolence effect. However, we think that the items used to measure creativity provide a good measure of creative behaviour, as previous research has argued in favour of creative self-efficacy (Tierney and Farmer, 2002; Carmeli and Schaubroeck, 2007; Atwater and Carmeli, 2009) for creativity to emerge. Finally, we only studied one organization in the automobile sector and the resultant sample size was small and, it suffered from lack of information about team size, cohesion, etc, that could improve the obtained results. Replication in other industries is needed prior to generalization.

References

Amabile, T.M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, 10, 123-167.

Amabile, T.M. (1996). *Creativity in context >Oxford, USA: Westview Press.*

Amabile, T.M., and Gryskiewicz, N. (1989). The creative environment scales: The work environment inventory. *Creative Research Journal*, 2, 231-254.

Amabile, T.M., Conti, R., Coon, H., Lazenby, J., and Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal*, 39(5), 1154-1184.

Amabile, T.M., Goldfarb, P., and Brackfield, S.C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. *Creativity Research Journal*, 3, 6-21.

Amabile, T.M., Schatzel, E.A., Moneta, G.B., and Kramer, S.J. (2004). Leader behaviours and the work environment for creativity: Perceived leader support. *The Leadership Quarterly,* 15, 5-32.

Atwater, L., and Carmeli, A. (2009). Leader-member exchange, feelings of energy, and involvement in creative work. *The Leadership Quarterly,* 20, 264-275.

Backman, M., Börjesson, S. & Setterberg, S. (2007). Working with concepts in the fuzzy front end: exploring the context for innovation for different types of concepts at Volvo Cars. *R&D Management,* 37, 17-28.

Bauer, T.N., and Green, S.G. (1996). Development of leader-member exchange: A longitudinal test. *Academy of Management Journal*, 39(6), 1538-1567.

Blau, P. (1964). *Exchange and power in social life >NY: Wiley.*

Carmeli, A., and Schaubroeck, J. (2007). The influence of leaders' and other referents' normative expectations in creative work. *The Leadership Quarterly,* 18, 35-48.

Chen, G, Kirkman, K.L., Kanfer, R., Allen, D., and Rosen, B. (2007). A multilevel study of leadership, empowerment, and performance in teams. *Journal of Applied Psychology,* 92, 331-346.

Cogliser, C.C., Schiresheim, C.A., Scandura, T.A., and Gardner, W.L. (2009). Balance in leader and follower perceptions of leader-member exchange: Relationships with performance and work attitudes. *The Leadership Quarterly*, 20, 452.465.

Cotgrove, S., and Box, S. (1970). *Science, industry, and society. Studies in the sociology of science >London. George Allen, and Unwin.*

Csikszentmihalyi, M. (1990). The domain of creativity. In M. A. Runco, and R. S. Albert (Eds.), *Theories of creativity* (pp.190-212.). Newbury Park: CA. Sage.

Cummings, A., and Oldham, G.R. (1997). Enhancing creativity: Managing work contexts for the high potential employee. *California Management Review*, 40 (1), 23-38.

Dansereau, F., Graen, G., and Haga, W. (1975). A vertical dyad linkage approach to leadership within formal organizations: A longitudinal investigation of the role-making process. *Organizational Behavior and Human Performance*, 13, 46-78.

Dienesch, R.M., and Liden, R.C. (1986). Leader-member exchange model of leadership: A critique and further development. *Academy of Management Review*, 11(3), 618-634.

Duchon, D., Green, S.G., and Taber, T.D. (1986). Vertical dyad linkage: A longitudinal assessment of antecedents, measures, and consequences. *Journal of Applied Psychology*, 71, 56-60.

Dunegan, K,J., Tierney, P. , and Duchon, D. (1992). Toward an understanding of innovative climate: Examining the role of divisional affiliation, work group interaction and leader-subordinate exchange. *IEEE Transactions on Engineering Management*, 39, 227-236.

Ford, C.M. (1995) Creativity is a mystery: Clues from the investigators' notebooks. In C.M. Ford, and D.A. Gioia (Eds.), *Creative action in organizations: Ivory tower visions and real world voices* (pp. 12-49). Newbury Park CA: Sage Publications.

Ford, C.M. (1996). A theory of individual creative action in multiple social domains. *Academy of Management Review*, 21(49), 1112-1142.

Graen, G.B., and Cashman, J. (1975). A role-making model of leadership in formal organizations: A developmental approach, en J. Hunt, and L. Larson (Eds.), *Leadership frontiers* (pp. 309-357). Kent, OH: Kent State University Press.

Graen, G.B., and Scandura, T. (1987). Toward a psychology of dyadic organizing. *Research in Organizational Behavior*, 9, 175-208.

Graen, G.B., and Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of Leader-Member Exchange (LMX) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *Leadership Quarterly*, 6(2), 219-247.

Guilford, J.P. (1950). Creativity. *American Psychologist,* 5, 444-454.

Hackman, J.R., and Morris, C.G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. In L. Berkovitz (Ed.), *Advances in experimental social psychology* (pp. 47-99). New York: Academic Press.

Harris, K.J., Wheeler, A.R., and Kacmar, K.M. (2009). Leader-member exchange and empowerment: Direct and interactive effects on job satisfaction, turnover intentions, and performance. *The Leadership Quarterly*, 20, 371-382.

Harrison, D.A., and Klein, K.J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review,* 32, 1199-1228.

Henderson, D.J., Liden, R.C., Glibkowski, B.C., and Chaudhry, A. (in press). LMX differentiation: A multilevel review of its antecedents and outcomes. *The Leadership Quarterly*, doi. 101016/j.leaqua.2009.04.003.

Hirst, G., Van Dick, R., and Van Knippenberg, D. (2009). A social identity perspective on leadership and employee creativity. *Journal of Organizational Behavior,* 30(7), 963-982.

Hirst, G., Van Knippenberg, D., and Zhow, J. (2009). A cross-level perspective on employee creativity, goal orientation, team learning behavior, and individual creativity. *Academy of Management Journal*, 52(2), 280-293.

Ho, L. (2010). Meditation, learning, organizational innovation and performance. *Industrial Management & Data System*, 111, 113-131.

Homans, G.C. (1961). *Social behavior. Its elementary form >NY: Harcourt Brace. Contemporary Business*, 3, 81-97.

Jacobs, T. (1970). *Leadership and exchange in formal organizations*, Alexandria, VA: Human Resources Organization.

Katz, D., and Kahn, R. L. (1978). *The social psychology of organizations, (2nd ed.),* NY: Wiley.

Kirton, M. J. (1976). Adaptators and innovators: a description and measure. *Journal of Applied Psychology,* 61 (5): 622-629.

Kuo, T.H., Ho, L.A., Wu, Y.J., & Lin, C.T. (2010). The factors influencing employees' attitudes in high-tech environments. *Industrial Management & Data Systems,* 110, 1054-1072.

Liang, T.P., Liu, C.C., Lin, T.M., & Lin, B. (2007). Effect of team diversity on software project performance. *Industrial Management & Data Systems*, 107, 636-653.

Liao, H; Liu, D. & Loi, R. (2010). Looking at both sides of the social exchange coin: A social cognitive perspective on the joint effects of relationship quality and differentiation on creativity. *Academy of Management Journal,* 53 (5), 1090-1109. N

Liden, R.C., Erdogan, B., Wayne, S.J., and Sparrowe, R.T. (2006). Leader-member exchange, differentiation, and task interdependence: Implications for individual and group performance. *Journal of Organizational Behavior*, 27, 1-24.

Liden, R.C., and Graen, G.B. (1980). Generalizability of the vertical dyad linkage model of leadership. *Academy of Management Journal*, 23, 451-465.

Liden, R.C., and Maslyn, J.M. (1998). Multidimensionality of Leader-Member Exchange: An Empirical Assessment through Scale Development. *Journal of Management*, 24, 43-72.

Liden, R.C., and Wayne, S.J. (2000). An examination of the mediating role of psychological empowerment on the relations between the job, interpersonal relationships and work outcomes. *Journal of Applied Psychology*, 85(3), 407-416.

Liden, R.C., Sparrowe, R.T., and Wayne, S. J. (1997). Leader-member exchange theory: The past and potential for the future. *Research in Personnel and Human Resources Management*, 15, 47-119.

Liden, R. C, Wayne, S., and Stilwell, D. (1993). A longitudinal study on the early development of leader-member exchanges. *Journal of Applied Psychology*, 78, 662-674.

McKinnon, D.W. (1978). *In search of human effectiveness: Identifying and developing creativity > Búfalo, NY: Creative Education Foundation.*

Mumford, M.D., and Gustafson, S.B. (1988). Creativity syndrome: Integration, application and innovation. *Psychological Bulletin*, 103, 27-43.

Mumford, M.D., Scott, G. M., Gaddis, B., and Strange, J. M. (2002). Leading creative people: Orchestrating expertise and relationships. *Leadership Quarterly*, 13, 705-750.

Oldham, A., and Cummings, G.R. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Review*, 39, 607-634.

Perry-Smith, J.E., and Shalley, C.E. (2003). The social side of creativity: A static and dynamic social network perspective. *Academy of Management Review*, 28, 89-106.

Pirola-Merlo, A., and Mann, L. (2004). The relationship between individual creativity and team creativity: Aggregating across people and time. *Journal of Organizational Behavior*, 25, 235-257.

Phusavat, K., Comepa, N., Sitko-Lutek, A., and Ooo, K. (2011). Interrelationships between intellectual capital and performance. *Industrial Management & Data Systems*, 111, 810-829.

Rogers, C. (1954). Toward a theory of creativity. *Review of General Semantics*, 11, 249-260.

Rothwell, R. (1994). Towards the Fifth-generation Innovation Process. *International Marketing Review*, 11 (1), 7-31.

Scandura, T.A., Graen, G.B., and Novak, M.A. (1986). When managers decide not to decide autocratically: An investigation of leader-member exchange and decision influence. *Journal of Applied Psychology*, 71, 579-584.

Scott, S.G., and Bruce, R.A. (1994). Determinants of innovative behaviour: A path model of individual innovation in the work place. *Academy of Management Journal*, 37, 580-607.

Seers, A. (1989). Team-member exchange: A new construct for role-making research. *Organizational Behavior and Human Decision Processes*, 43, 118-135.

Seers, A., Petty, M.M., and Cashman, J. (1995). Team-member exchange under team and traditional management. *Group and Organization Management*, 20, 18-38.

Sethia, N. (1991). The evocation of creativity through collaboration. *Paper presented at the annual meeting of the Academy of Management*, Miami.

Settoon, R.P., Bennett, N., and Liden, R.C. (1996). Social exchange in organizations: The differential effects of perceived organizational support and leader-member exchange. *Journal of Applied Psychology*, 81, 219-227.

Shalley, C.E. (1995). Effects of coaction, expected evaluation, and goal setting on creativity and productivity. *Academy of Management Journal*, 38, 483-503.

Shalley, C.E., and Perry-Smith, J.E. (2008). The emergence of team creative cognition: The role of diverse outside ties, sociocognitive network centrality, and team evolution. *Strategic Entrepreneurship Journal*, 2, 23-41.

Shalley, C.E., Zhou, J., and Oldham, G.R. (2004). The effects of personal and contextual characteristics on creativity: Where should we go from here? *Journal of Management,* 30, 933-958.

Shilling, M.A. (2006). *Strategic Management of Technological Innovation, 2nd edition*. NY. McGraw-Hill/Irwin,

Shin, S., and Zhou, J. (2007). When is educational specialization heterogeneity related to creativity in research and development teams? Transformational leadership as a moderator. *Journal of Applied Psychology*, 92, 1709-1721

Somech, A., Desivilya, H.S., and Lidogoster, H. (2009). Team conflict management and team effectiveness: The effects of task interdependence and team identification. *Journal of Organizational Behavior,* 30, 359-378.

Taylor, A., and Greve, H.R. (2006). Superman or the fantastic four? Knowledge combination and experience in innovative teams. *Academy of Management Journal,* 49, 723-740.

Tierney, P., and Farmer, S. M. (2002): Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal,* 45, 1137-1148.

Tierney, P., Farmer, S.M., and Graen, G.B. (1999). An examination of leadership and employee creativity: The relevance of traits and relationships. *Personnel Psychology*, 52, 591-620.

Thomke, S. H. (1998). Simulation, learning and R&D performance: Evidence from automotive development. *Research Policy,* 27, 55-74.

Tohidinia, Z., and Mosakhani, M. (2010). Knowledge sharing behaviour and its predictors. *Industrial Management & Data Systems,* 110, 611-631.

Troyer, L., and Youngreen, R. (2009): Conflict and creativity in groups. *Journal of Social Issues*, 65(2), 409-427.

Wayne, S. J., Shore, L.M., and Liden, R. C. (1997). Perceived organizational support and leader-member exchange: A social exchange perspective. *Academy of Management Journal*, 40, 82-111.

Weisberg, R.W. (1992). Metacognition and insight during problem-solving. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, 18, 426-431.

Woodman, R.W., Sawyer, J.E., and Griffin, R.W. (1993). Toward a theory of organizational creativity. *Academy of Management Review*, 18, 293-321.

Yang, H., Moon, Y. and Rowley, C (2009). Social influence on knowledge worker's adoption of innovative information technology, *Journal of Computer Information Systems,* 50, 25-36.

Yang, J., and Rui, M. (2009). Turning knowledge into new product creativity: an empirical study, *Industrial Management & Data Systems*, 109, 1197-1210.

Yukl, G.A. (2008). How leaders influence organizational effectiveness. *The Leadership Quarterly,* 19, 708-722.

Zhou, J., and George, J.M. (2001). When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Academy of Management Journal*, 44, 682-697.

APPENDIX: Variable measures.

Creativity Measure (Self-Report)

1. Among my colleagues and co-workers, I will be the first or nearly the first to try out a new idea or method.
2. I solve problems which has caused others great difficulty.
3. I investigate and secure funds needed to implement new ideas.
4. I usually find new uses for existing methods or existing equipment.
5. I develop adequate plans and schedules for the implementation of new ideas.
6. I suggest new and better ways to achieve goal or objectives.
7. I usually search out new technologies, processes, techniques and/or product ideas.
8. I use existing information or materials to develop ideas, methods, or products that are useful to the organization.
9. I develop ideas, methods, processes, or products that are both original and especially useful to the organization.
10. Quite frequently, the ideas I develop are implemented by the organization.
11. On the whole, the ideas I generate are relevant for organizational success.

LMX measure

1. My supervisor will be always there for me, when I need help.
2. My supervisor encourages me to contribute ideas and suggestions with a view to improving my work.
3. I have my supervisor behind me when I really need him.
4. My supervisor gives me information and precise feedback about how I'm performing.
5. I'm sure that my supervisor has faith confidence in me.
6. My supervisor always keeps his/her promises.
7. My supervisor pays attention to my feelings and needs.
8. My supervisor is aware of my potential.
9. My supervisor let me know clearly what s/he expects from me at work.
10. My supervisor gives me autonomy for develop my tasks, and even to introduce changes I think that are appropriate.
11. I believe my supervisor is technically competent.
12. I believe I have a good relationship with my supervisor; we work well together.
13. My supervisor runs ideas past me when s/he has to make choices that affect my work.
14. My supervisor shows interest by my work details.
15. My supervisor bears in mind, and even sometimes implements the changes I suggest.

TMX measure

1. Within my work group, there is an open and free dialogue

2. In the group I belong to, there is a strong feeling of unity between us.
3. In general, the group members trust each other.
4. There is scarcely cooperation among my group members.
5. We make others to know if they are to our detriment.
6. The other group members are aware of my potential.
7. My group members sensitize and put themselves on my place when I face a problem.
8. When it's necessary, we are willing to exchange work amongst us. That is we are flexible.
9. In my work group, people are always willing to help others.
10. My teammates are committed and they identify with the work we make.
11. My teammates make me to know what they expect from me in the work.

[i] Kirton (1976) defines cognitive style as a natural orientation or preferred means of problem-solving that can range from the ability to "do things better" to the ability to "do things differently", two extremes on a continuum that this author labels adaptive and innovative, respectively. Thus, an adaptor (someone with an adaptive cognitive style) will tend to use data within a consolidated domain, accept problems as they have been defined and generate ideas that are consistent with the accepted norm. In contrast, an innovator (someone with an innovative cognitive style) will seek and integrate diverse information, redefine the problems that have been posed and generate ideas that may deviate from the norm.