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INFLUENCING FACTORS IN INNOVATION ON INDIVIDUAL AND GROUP LEVEL

BEERKENS, BAS, 941220044050
WAGENINGEN UNIVERSITY AND RESEARCH
Geoffrey Hagelaar, MST-81812

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Abstract

Innovation is essential for our world to make it a better place to live. But what is needed to make innovation flourish? The innovation process consists of two phases manifesting in a cyclical manner; the idea generation and the implementation of innovation. To let these phases function optimally, both individuals and groups should work in an environment in which innovation can occur in the best way possible on both levels. But are the factors that influence individual level innovation similar to those that influence group level innovation? Or is there contradiction in these factors? These questions are discussed with the ultimate goal to create an optimal business environment in which innovation can flourish optimally. It seems that there are multiple factors that positively influence both individual and group innovation (e.g. Confidence, Self-efficacy, Autonomy, Expectation of innovation by a leader, Perception of a safe environment, Clarity of objectives, Diversity and Support for innovation) as well as there are multiple factors that positively influence innovation on one level, but mitigate innovation on the other (Individualism, Openness to experience, Pressure from external demands, Time and Financial resources and Reflexivity).

1. Introduction

Porter (1990) argues that *innovation, continuous improvement and change* are the three cornerstones of global competitiveness. Baragheh et al (2009) states that organizations need to innovate in response to changing customer demands and lifestyles and in order to capitalise on opportunities offered by technology and changing marketplaces, structures and dynamics. Innovation plays a key role in sustaining competitive advantage (Bessant et al, 2005). Besides literature on the importance of innovation, data on the amount of patents in Europe gives an indication of a growing interest in innovation[1]. The EPO (European Patent Office) granted 96 000 patents in 2016 in Europe, which is 40% more than in 2015 and a new record high. Though the definition of innovation is debatable[2], a core element is found in practically every definition, namely: change. Whether the change is new to the world, significant, positive or effective of not, every innovation has a core of newness and change relative to the original situation. West & Farr (1990) also defined innovation, a definition including three different levels namely within 1) a job, 2) a work team and 3) the organisation. West & Anderson (1996) also follow this distinction, as they propose that individual creativity may be the most important at the initial stage (of innovation). At the second stage group processes may become important in either hindering or facilitating the expression and development of ideas. Similarly, Woodman et al (1993) argue a concept of 'organizational creativity', in which also the before mentioned levels are dissected. This distinction will be discusses extensively in this thesis.

Innovation is a social process that happens on the group level, whilst creativity is an individual cognitive process (West et al, 1996). On the one hand people are individually creative, but they also have to work together to turn their individual ideas into economically viable products, processes or services (Paulus & Nijstad, 2003). These two different processes should both be working properly and simultaneously inside an organisation to create successful innovation (Amabile, 1988; West, 2002). But can these different processes be positively influenced by the same factors? Are there certain factors that foster e.g. the individual process, but inhibit the group process, and vice versa? A summary of factors that positively influence the individual process, the group process, or both processes will help to understand the business environment in which innovation as a process could function optimally.

New products, services or processes begin with new ideas and ideas begin within individuals (Amabile, 1988). This process is often referred to as creativity, and is the basis for innovation (Cummings, 2010; Baron & Tang, 2011; Shane 2003). This individual level of innovation is about the idea-creation within an individual. Before an idea is shared with others, it has to be identified and partly structured within the mind of an individual. Hammond (2011) has presented a model, based on a meta-analysis of the predictors of individual innovation, in which four areas of importance are identified (Individual differences, Motivation, Job characteristics, and Contextual influences). This model will be used as a reference point for the individual level innovation. The next step is to share this idea with others inside a group.

With the growing necessity of specialization, the innovation process will increasingly require group interaction (Paulus & Nijstad, 2003). The group level process is needed to structure and shape an idea into a concrete, economically viable product, service, or process. In a group, the idea is exposed to new perspectives, appraisal and opinions, which can give important adjustments to the idea in order for it to serve as a lucrative innovation within a company. West (2002) argues that four groups of factors together principally determine the level of group innovation (Task characteristics, Group knowledge, diversity and

[1]However, not all innovations are patentable, so this increase is no exact represent of the actual increase in innovations in Europe.

[2] Nowadays the term innovation is used everywhere. Even the smallest organisations state 'innovation' as one of their main goals. But what is innovation? What does it mean? Johnson (2001) broadly states innovation as change in either product, service or market, where Scott Berkun (2013) states that innovation is significant positive change, focusing on the change being helpful and good. Kuczmarski (2003, p. 536) however focusses more on innovation as a paradigm, as he defines it as: "A mindset, a pervasive attitude, or a way of thinking focused beyond the present into the future vision." Even broader stated by Damanpour (1991, p. 556) is innovation defined as: "adoption of an internally generated or purchased device, system, policy, program, process, product or service that is new to the adopting organization", focussing on the newness of the innovation relative to the adopting organization.

skills, External demands and Integrating group processes). These four groups of factors will be the reference point for the group level innovation.

The individual and group processes of innovation do not work in a consecutive way, but rather in a cyclical and integrated manner (Amabile, 1988). Both these processes happen repeatedly and at the same time during an innovation processes, and perhaps even in multiple parts of an organisation. This continuous nature of both processes makes the need for a business environment in which the factors that positively influence both these processes exist simultaneously. However, how do these factors function simultaneously? Some positively influencing factors of individual innovation that e.g. support individuals to come up with creative ideas, could inhibit the group process of critical thinking that is needed to evaluate an idea. These factors will thus result in creative ideas, but they are unlikely to be converted into economically viable innovation. Will the factors that positively influence individual innovation, also foster or maybe hinder group innovation and vice versa? The four areas of importance identified by Hammond (2011) will be put in a group perspective, trying to identify the mechanisms these individual level factors have on a group level. Vice versa, the four groups of factors that, according to West (2002), determine group level innovation will be put in an individual perspective, similarly identifying the effect of these factors on individual level innovation. Based on this cross-section of the two presented models, conclusions can be drawn regarding the functioning of these factors simultaneously.

2. Comparison of Theories

2.1. The individual level

The term 'creativity' is often related to and sometimes used interchangeable with the term innovation. Although these concepts are strongly related, these terms do not have the same definition. West et al (1996) state that innovation is a social process that happens on the group level, whilst creativity is an individual cognitive process. Though, Cummings (2010) stresses that the level of innovation in a company is dependent on the level of creativity in its human resources. Also Baron & Tang (2011) state that creativity is often a necessary condition for subsequent innovation. The role of creativity in innovation is also emphasized by Shane (2003) who notes that many teams engage in various forms of "brainstorming" in order to increase the number of new ideas available, and so enhance creativity, which then provides an important foundation for innovation (Baron & Tang, 2011). This is backed by West (2002): "Creativity can be seen as the first stage in the innovation process." This first stage will be referred to as 'individual (level) innovation'.

Individual innovation can only come from within one of the most complex parts of an organisation; people. In an organisation, people are used and treated as an asset and part of the production process. However, this 'human capital' is not just a straightforward economical asset of the company. People can think, feel and be motivated or not. All those factors are unique and should be taken into account when searching for an ideal business environment in which individual innovation can be triggered.

The model by Hammond (2011)

Hammond et al (2011) conducted a meta-analysis of the predictors of individual level innovation, in which four areas of importance are identified (individual differences, motivation, job characteristics, and contextual influences). This categorization will be used to create a clear overview of the predictors of individual level innovation.

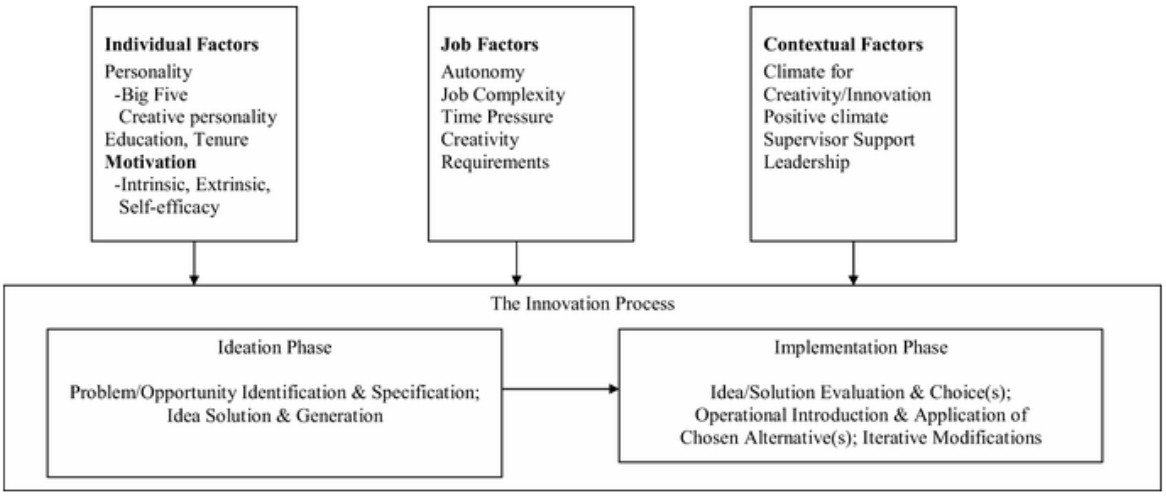

Figure 1 – The four areas of importance in individual level innovation (Hammond, 2011)

Individual Factors

No two brains in the world are the same, they are all wired differently because of different learning paths. This results in the fact that every individual is different, with different characteristics. This area consists of individual, intrinsic characteristics of people.

Personality

Based on the theory that creativity is primarily determined by stable traits, researchers developed and validated scales to assess creativity-relevant personality traits, often by designing lists of adjectives common to exceptionally creative individuals (Hammond et al, 2011). These creativity-relevant personality

traits (e.g. clever, confident, individualistic, insightful, inventive, original and unconventional) have shown to be positively correlated with innovation (Hammond et al, 2011). Also a more general personality trait that is positively linked to innovative behaviour, is 'openness to experience'. Individuals with high 'openness to experience' are more likely to have more imagination, high intellectual curiosity and independence and are less likely to shy away from change, thus supporting innovation (Yesil & Sozbilir, 2013).

Also mentioned in individual innovation literature is the importance of multidiciplinarity. The ability of an individual to integrate knowledge across multiple perspectives is an important factor in the transformation of individual creativity into innovation. Being able to sympathize and imagine a different perspective, e.g. from a different part of the organisation, can broaden the view of an individual which leads to a more holistic and multidisciplinary perspective on an idea, which increases its chance to be transformed into a successful innovation (Litchfield et al, 2015). Closely related to this is 'intuitive problem-solving style' a concept introduced by Scott & Bruce (1994) that is characterized by 'bisociative thinking'; combining overlapping domains and skills, thinking outside the existing boundaries and focus on imaginary and intuition, resulting in unique paradigm combinations to solve problems and thus innovative solutions.

Furthermore, creativity will be fostered by the need for cognition of an individual. An individual engaging in and enjoying thinking will be more likely to show individual innovative behaviour, for they are more likely to recognize problems and generate ideas, to develop a strong and positive attitude toward issues they work on, and to be more persuasive champions of their ideas (Wu et al, 2014).

Demographic variables

Differences in education and professional background may influence innovative performance due to the fact that knowledge and experience of an individual can broaden an individual's view and enable them to build a larger and more integrated repository of response possibilities from which to draw creative ideas to problems (Amabile, 1983; Hammond, 2011).

Motivation

An important and widely made distinction in the area of motivation is the division of intrinsic motivation, which comes from the individual's engagement in the task, and extrinsic motivation, which comes from external factors such as rewards. Both forms of motivation have shown to have positive relation with innovation (George & Zhou, 2002; Taggar, 2002), however, extrinsic motivation could have a negative effect on intrinsic motivation over time (Hammond et al, 2011). Also Hammond argues that intrinsic motivation will have a stronger and more consistent relationship with innovation.

Also self-efficacy is a variable that is related to and influences individual motivation. Hammond stresses that one should distinguish between 'job self-efficacy' and 'creative self-efficacy', the first being defined as the beliefs about one's competence in the job and the latter as the beliefs of one's competence with regard to creative performance. Creative self-efficacy is proven to predict creative performance and thus innovation most, however job self-efficacy has also shown signs of positive correlation with creativity and innovation (Axtell et al, 2000; Carmeli & Schaubroeck, 2007).

Job Characteristics

Alongside individual factors such as personality, demographic differences and motivation, the characteristics of the job also plays a role in the prediction of innovation. These characteristics include job complexity, autonomy, time pressure and role requirements. Complex jobs provide less routine and thus may promote idea generation (Amabile, 1988). Hammond mentions the use of Dictionary of Occupational Title ratings in order to measure job complexity. Regarding autonomy, jobs with relatively a lot of freedom in how, when or where work is accomplished may promote innovative behaviour. Individuals who stand out in their ability to perform creative acts often value independence and autonomy (McLean, 2005). A leader who is expecting a subordinate to show innovative behaviour will likely shape the behaviour of that subordinate by altering their self-expectancies and subsequent motivations (Eden, 1984). A leader that expects a subordinate to be innovative, will be perceived as encouraging and facilitating of innovation (Scott & Bruce, 1994). Hammond also mentions that supervisors who provide more creative-relevant

support by expecting their employees to be creative, enhances their employees' creative self-efficacy and thus as mentioned under 'Motivation' above, resulting in creativity and innovation.

Context

Lastly, the external environment outside the individual and the job plays a role in the innovation process. The factors that play a role are support for creativity or innovation, organizational climate, availability of resources, supervisory support, and transformational leadership. As for support of innovation, there is a lot of evidence showing the correlation between group level innovation and support for innovation, however there seems to be a lack of research finding correlation between individual level innovation and support for innovation. Hunter et al (2007) found a positive relationship between support for innovation and individual innovation through the fact that an environment in which risk taking is perceived safe, will increase the innovative behaviour of individuals working in this environment. This support for innovation is part of a 'positive climate' that is a positive, open and supportive work environment, which is positively correlated with individual creative and innovative performance (Hammond et al, 2011). Organizational resources such as information, technical support and financial resources may provide an employee with needed assistance and resources and thus facilitate individual innovation. The support of one's leader or supervisor could, through the increasing of an employee's interest at work and intrinsic behaviour, lead to creativity and innovative behaviour (Hammond et al, 2011).

Also leadership style will influence individual innovative behaviour. The use of transformational leadership, in which a leader shares commitment and responsibility with its subordinates, has shown to correlate positively with innovation due to the enhancement of motivation and self-efficacy, thus leading to increased innovative behaviour (Tierney & Farmer, 2002; Ekvall, 1996).

2.2. The Group Level

Ideas are not the result of single moments of great inspiration by an individual; an idea evolves and needs competition and collaboration that supports it (Johnson, 2010). An individual, working alone in a lab coming up with a brilliant new idea is an exception, Johnson (2010) states. A supportive environment in which the idea can be shared with others will help it to develop and improve, possibly resulting in innovation. The key of this part of the innovation process is the collaboration of people; a group. A group is defined as two or more individuals with some degree of interdependence and share a common goal or task.

The model by West (2002)

Creativity is thinking about new things, while innovation implementation is actually doing new things. Combining these stages results in the definition of innovation as presented by West (2002). West stressed the non-linearity and two-component nature of innovation; both creativity and innovation implementation happen simultaneously in a cyclical manner, where creativity dominates the beginning of the cycle, proceeded by innovation implementation. West argues that four groups of factors together principally determine the level of group innovation: Task characteristics, Group knowledge, diversity and skills, External demands and Integrating group processes.

Group Task Characteristics

The requirements of the work group are fundamentally influenced by the task the group needs to perform. The structure, the composition, the roles of the group members and the way of working are all a result of the characteristics of the task. Certain conditions (e.g. the group being responsible for whole tasks and relatively independent, the existence of a certain commitment to a certain product or service because of responsibility of group members for a complete task) will produce 'task orientation' (Emery, 1959), a state of interest and engagement produced by task characteristics, which is similar to intrinsic motivation that Amabile (1983) argues is so fundamental to creativity and innovation. The specific task characteristics that evoke 'task orientation' are completeness, varied demands, opportunities for social interaction, autonomy (Paulus, 2000; Mc Lean, 2005), opportunities for learning and development possibilities for the task. These characteristics thus will predict group creativity and innovation (West, 2002), however the underlying processes that evoke the group innovation are not mentioned.

Group Knowledge Diversity and Skills

The presence of professional diversity within groups (existence of group members with differing professions, knowledge, skills and abilities) is positively related to group innovation by Paulus (2000). The broad knowledge base as a result from difference in group members leads to more divergent views and perspectives that creates potential for more comprehensive or creative decision making (West, 2002; Martins & Terblanche, 2003). Also a positive relation exists between group diversity in gender and education, and the likelihood of introducing an innovation. However, age and ethnic diversity in groups does not have the same positive relationship with the likelihood to innovate (Østergaard et al, 2011). However, excusive amounts of diversity in groups can lead to reduction in clarity about and commitment to group objectives, resulting in reduction of innovation. A balance in diversity is desirable such that it leads to sufficient divergence, but enough overlap to share commitment.

External Demands

West defines external demands as the external context of the group consisting organisational climate, support systems, market environment and environmental uncertainty. A common response to external demands (in particular external threat) is to innovate, however, such threats will inhibit creativity, due to the absence of safety and the presence of pressure (West, 2002). In contrast, high work demands have found to be predictors of change in strategy and relationships (West, 1987). If the environment is uncertain, organisations and groups will likely be innovating in order to reduce this uncertainty (West, 2002). Important to note is that pressuring external demands will inhibit freedom and therefore individual creativity, but these demands will complement the later stages of innovation by creating pressure to innovate (although not linear, exorbitant levels of pressure and demands will result in paralysis and inability to perform).

Also the factor of organizational resources like time and money is discussed. West & Anderson (1996) clearly state that available resources do not predict overall group innovation. When it comes to time, not giving enough can lead to distrust and burnout (Amabile, 1998). An organisation should give employees time to think creatively and experiment in order to support innovation (Shattow, 1996). However, giving too much time can take away from the sense of challenge and decrease creative performance (McLean, 2005). As for money, enough must be provided such that employees do not have to put their creative focus on finding more resources; however, providing resources "over and above the 'threshold of sufficiency' does not boost creativity" (Amabile, 1998).

Integrating Group Processes

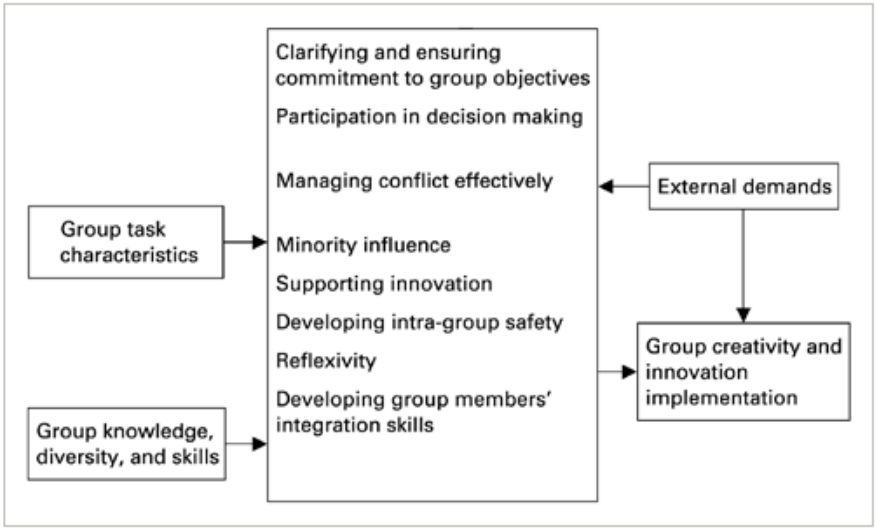

Figure 2 – Integrating group processes in a model of group innovation, West (2002).

Figure 2 shows the relationship of Group task characteristics, Group knowledge, diversity and skills and External demands to group processes. Group task characteristics and Group knowledge, diversity and skills both directly influence these group processes, while external demands influences these group processes, while also directly influencing group innovation. The mentioned group processes will be elaborated on.

Clarifying and Ensuring Commitment to Group Objectives

Clarity of shared group objectives facilitates group innovation since it enables focused development of new ideas, which can be filtered with greater precision than if group objectives are unclear. Furthermore, shared group commitment is needed for clarity of group objectives to facilitate group innovation. This is because group member persistence for innovation implementation is needed to reduce the forces of disintegration created by disagreements, diversity and the emotional demands of the innovation process, which are likely to inhibit innovation (West, 2002).

Participation in Decision Making

Participation in decision making means less resistance to change, which leads to higher chance of innovation being implemented. Investment in the outcomes of decision making is increased when the decision makers are highly participated and involved in the change process and sharing of information. This leads to increased commitment to the innovation and thus, like mentioned earlier, increased chance of innovation implementation.

Managing Conflict Effectively

In this group process West mentions the influence of minorities in decision making. Minority influence theory suggests that exposed to consistent minority influence, the majority attitude can change. The presence of conflict within a group is likely to lead to opposing views and thus, when shared, minority influence. However, the resulting attitude change is not said to be positively related to innovation and defining innovation as solely 'change' is short-sighted. Minority influence thus might be a factor in the fostering of innovation, however no clear link is found.

However, the benefits of disagreement about ideas within a group in relation to creativity and innovation is strongly supported. Task-related (not emotional or interpersonal) conflict may lead to group members challenging and re-evaluating the status quo and searching for a better fit of their tasks in relation to their environment. This could lead to innovative behaviour by increased consideration of alternative interpretations of information available.

Supporting Innovation

Support for innovation is defined by West as "the expectation, approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment" (West, 2002, p. 373). The presence or absence of this support will influence innovation attempts by group members. The absence of support may lead to routinely rejection or ignorance of innovative attempts. Support for innovation thus positively correlates to group innovation. Eisenberger et al (1990) found that an innovation supporting organization increases the constructiveness of anonymous, voluntary suggestions for improving the organization. It is also found that organizational structures and a culture that supports, or perhaps more appropriately does not punish, this type of communication will be more likely to have more effective creativity and innovation (McLean, 2005). Martins & Terblanche (2003) focus more on the granting of intrinsic rewards (such as autonomy or improved opportunities for growth) and its positive impact on the innovation process. Thus, innovation should begin with the support of management. The top echelons should promote an organizational climate in which workers in their posts are recognized for their efforts towards innovation, which, though contrary to the short-term achieving of objectives, should be encouraged and valued for the long-term results of their efforts in terms of innovation (Lloréns Montes et al, 2004).

Developing Intragroup Safety

Intragroup safety is defined as "the sense of psychological or psychosocial safety group members feel in the presence of their fellow group members and especially during whole group interactions." (West, 2002, p.374). Edmondson (1999, 2000) argues that learning and innovation can only take place in a group when members feel safe and trust each other. Her proposes that this safety will lead members to engage in learning and risk-taking behaviour, and thus to innovation. West concludes with the statement that intragroup safety facilitates the expression of creative ideas *and* the implementation of innovation.

Reflexivity

Reflexivity refers to the "extent to which team members collectively reflect upon the team's objectives, strategies and processes as well as their wider organizations and environments, and adapt them accordingly" (West, 1996, p. 559). West argues that the three central elements of reflexivity (reflection, planning and action or adaption) increase detail in planning, resulting in more likelihood of implementing innovation. Conceptual readiness for relevant opportunities for action and means to implement the innovation are a result of a more detailed planning of innovation implementation intentions. This argument is backed by Gollwitzer (1996).

Integration Skills

Integration skills are referred to as the relevant knowledge, skills and abilities of group members to work effectively in groups. These skills are not task-specific, but solely focus on the ability to work in groups, regardless of the task the group needs to complete. A few examples of these skills are conflict resolution skills, collaborative problem solving skills and teamwork skills such as goalsetting and performance management skills. These integration skills are needed for group members to respond to the requirements of the task and innovate by utilising with maximum effort their diverse knowledge and skills. West concludes with the argument that "the greater the diversity of the team, the higher the levels of external demands, and the more demanding the task, the more will team members be required to develop integrating group processes for successful innovation. Group processes, if sufficiently integrating, will facilitate group creativity and innovation implementation." (p. 377).

Concluding the model by West, External demands must be high, with strong group integration processes and high level of intragroup safety present. Group members must have the integration skills to work effectively in this environment and should develop a climate in which the above mentioned group processes are present. These conditions, divided into four main groups of factors interacting with each other as shown in figure 2, are then likely to produce high levels of group innovation (West, 2002).

3. Analysis

Hammond (2011) identified four areas of importance that play a role in the prediction of individual level innovation. Within these four areas, different concrete factors are found, which have proven to play an important role in the prediction of individual level innovation. However, because of the cyclical manner of the innovation process in which both individual and group innovation happen simultaneously, it is interesting to see how these concrete factors mentioned by Hammond prosper within a group setting; in what way will these individual factors influence group level innovation? Similarly, West (2002) identified four groups of factors determining group level innovation. Likewise, it is interesting to see how these group factors may influence individual level innovation.

3.1. Individual level factors on the Group level

Individual factors

Groups consist of individuals, working together. As mentioned earlier, individual creativity is primarily determined by stable personality traits. These same personality traits do not only influence individual creativity, but also influence the dynamics of a group and have an impact on the way individuals work together with each other. Hammond presents a list of examples of traits that positively correlate with individual creativity (clever, confident, individualistic, insightful, inventive, original and unconventional). Overall, confidence in groups leads to better decision-making (Sniezek, 1992), however, like with individuals, overconfidence could be a threat. Sniezek also found that groups are more confident than individuals, as individuals become more confident as a result of group discussion. This phenomenon may partly be explained by the shared group goal of achieving consensus in the group, for consensus is a strong cue to accuracy in judgement (Sniezek, 1992). Also, the objective quality of group judgements and choices is higher than that for individuals, Sniezek proposes. However this is not directly related to innovation, it might partly predict the group's increase in confidence as opposed to an individual. Important to note is that individuals keep the increased confidence after the group tasks are completed. Working in a group thus increases individual confidence, and thus individual level innovation.

The Oxford Dictionary defines individualism as: "A social theory favouring freedom of action for individuals over collective or state control." If group interest conflicts with personal desires, an individualist tend to ignore the group interest, which can lead to friction in goals (Wagner, 1995). Individualists who feel independent and self-reliant are less apt to engage in cooperative behaviour (Wagner, 1995). This, in combination with the friction in goals mentioned above, can mitigate group effectiveness and thus likely also effectiveness in group innovation.

Furthermore, an original, inventive and unconventional individual might be perceived as an outsider due to the deviating way of thinking. This could lead to misunderstanding within groups. However, no empirical or literary support exists of this possible outcome. On the other hand, high divergence in groups means high group diversity, which positively correlates with group innovation (Paulus, 2000; West, 2002; Martins & Terblanche, 2003).

Next to the personality traits defined by Hammond, a more general personality trait possibly linked to individual innovation is 'openness to experience'. Individuals with high 'openness to experience' are likely to be more independent (Yesil & Sozbilir, 2013). High rates of independence in individuals relates to individualism, which, as mentioned earlier in section 3.1., could lead to mitigation of group effectiveness.

Broad education and professional background of an individual may influence individual innovation through the larger and more integrated repository of response possibilities from which to draw creative ideas (Amabile, 1983; Hammond, 2011). A group consisting of several individuals with broad education and professional background will even further broaden and increase the size of this integrated repository of response possibilities. This will likely result in even more creative ideas and thus group innovation. However, important to note is that the quantity of creative ideas is part of the first phase of the innovation process, in which individual innovation and creativity play a major roll. The increase in quantity of creative ideas may not be necessary in the group phase, in which implementation of innovation plays a major role.

Although, the cyclical nature of the innovation process makes this increase in quantity of creative ideas helpful nonetheless.

Motivation

Within the boundaries of motivation in groups, the concept of 'social loafing' is an important factor. Social loafing emerges when an individual reduces its efforts when working collectively and it is found to exist in almost every working group, with varying degrees. The decrease in work as a result of this concept could also mean a decrease in group innovation, for there is less work that is done by the group. However, social loafing is not inevitable as there are several factors found that mitigate the effect of social loafing (Karau & Williams, 2001). Individuals are willing to put effort in a collective task, as long as they expect their effort to be instrumental in obtaining outcomes that they value personally (Karau & Williams, 2001). Thus, as long as an individual is motivated intrinsically by their personal values, social loafing can be mitigated.

A second concept related to motivation and discussed by Hammond is self-efficacy. This strongly relates to the concept of confidence, discussed under 'Individual factors' in section 3.1. Self-efficacy (which conveniently could be defined as *confidence* in one's competence to perform) is believed to be positively correlated with innovation, where confidence in groups is also positively correlated with innovation, as discussed above.

Job characteristics

Langfred (2000) found that both individual and group autonomy positively influence group effectiveness. For an individual as well as for a group, freedom in how, where and when to work may increase innovation. However, more complex tasks that involve many different kinds of perspectives, knowledge and skills, consist of different kinds of subtasks to perform. It is not far-fetched to say that the nature of these subtasks influences the level of autonomy needed to perform (e.g. a simple book-keeping of the projects budget might be hindered by too much autonomy, because of potential inconsistency with other projects in the company). Which tasks thrive under autonomy and which require a stricter and more controlled management is still theoretically inconclusive?

Furthermore, leadership and its influence on the individual is discussed. It is stated that the expectation of a leader may function as sort of a 'self-fulfilling prophecy', in which expectation of creative behaviour will likely lead in an increase in that very behaviour (Eden, 1984; Scott & Bruce, 1994). It can be assumed that a leader of a group that expects this group to be innovative, will similarly influence the members in this group, thus leading to increased group innovation. However, the actual empirical evidence for this effect is lacking.

Context

Hammond mentioned that there is a positive correlation between a 'positive climate' and individual innovation. An environment in which risk-taking is perceived safe, individuals tend to show more innovative behaviour (Hammond, 2011). If individuals work together in groups in this same environment, it might have the same effect on the risk-taking of a group and thus promoting innovative attempts, however, the translation of individual risk-taking to group risk-taking is a much debated topic without clear consensus (Cartwright, 1971; Cartwright, 1973).

Furthermore, the use of transformational leadership is positively correlated with individual innovation through the enhancement of motivation and self-efficacy (Tierney & Farmer, 2002; Ekvall, 1996). Transformational leadership is not bound to a specific level (individual or group), thus it is likely that the use of this specific type of leadership also enhances motivation and self-efficacy of group members, resulting in increased group innovation. Specific empirical evidence however is lacking.

3.2. Group level factors on the Individual level

Group Task Characteristics

Emery (1959) mentioned the concept of 'task orientation', a state of interest and engagement produced by task characteristics. Task orientation can be evoked by certain specific task characteristics such as 'completeness of the task, varied demands, opportunities for social interaction, autonomy, opportunities

for learning and development possibilities for the task. West (2002) argued that these characteristics will thus positively influence group innovation. To understand if these characteristics also will positively influence individual level innovation, the processes behind the influence of these characteristics on innovation needs to be dissected, which is an explanation that is lacking in the model by West.

Group Knowledge Diversity and Skills

The diversity of professional background, knowledge, skills and abilities is positively related to group innovation by Paulus (2000). This diversity leads to more divergent views and perspectives in problem-solving that creates potential for more comprehensive or creative decision making (West, 2002; Martins & Terblanche, 2003). It might be safe to assume that an individual with a broad knowledge base, skillset and divergent abilities would have the same effect on innovation by providing this potential for more comprehensive or creative decision making. However, an individual might not be able to shift in paradigms or perspectives in its own head, making it hard for an individual to approach a problem from different perspectives. The contradicting ideas, remarks or feedback of group members may play a major role in the reason why this potential for more comprehensive decision making is created. Further research on the ability of an individual to shift perspectives, thus leading to more divergent views that can increase creative decision making, is necessary to conclude this argument.

External Demands

West argues that uncertainty in the external environment can lead to innovative attempts in order to reduce this uncertainty. On the other hand, such threats could inhibit creativity due to the absence of safety and presence of pressure. An important argument West makes is that pressuring external demands will inhibit freedom and therefore individual creativity, but that these demands will complement the later stages of innovation by creating pressure to innovate. Due to its cyclical nature, the innovation process thus can both suffer and flourish under pressure created by external demands. In the initial stage, in which individual innovation and creativity is needed, pressure can limit innovation, where in the later stage, in which group level innovation is needed to implement innovation, this pressure can create need for innovative attempts.

As for resources needed, both time and financial resources need to be sufficiently present. Not having enough time can lead to distrust and burnout (Amabile, 1998), however, giving too much time can take away from the sense of challenge and decrease creative performance (McLean, 2005). This goes for both the individual and the group level, because this affects people, whether they work in a group or work individually. Also financial resources should be sufficiently present as employees should not waste time searching for needed resources (Amabile, 1998).

Integrating Group Processes

Figure 2 shows the relationship of the mentioned 'Group task characteristics' in the first paragraph of section 3.2., Group knowledge, diversity and skills and External demands with certain specific group processes. Because some of these processes are group specific, they cannot be extrapolated to the individual level. When possible, some remarks reaching for this extrapolation are made.

First, the clarity of group objectives is discussed. A clear objective enables focused development of new ideas. Shared group commitment is needed for this clarity of objectives, for group member persistence for innovation implementation is needed to reduce forces of disintegration created by disagreements, diversity and the emotional demands of the innovation process (West, 2002). It is likely that both clarity of objectives and commitment also play a role on the individual level. A clear objective also focusses development of new ideas on the individual level, while personal commitment may reduce impact of emotional demands of the innovation process, thus facilitating individual innovation.

Participation in decision making as mentioned by West does not play a role on the individual level, as an individual makes decisions without others. However, an individual working as a subordinate, could benefit of the participation in decision making with its superior, while this could lead to increased commitment to the innovation and thus increase individual innovation.

An important factor West mentioned that has a great impact on group innovation, is support for innovation. As seen in section 3.1. under 'Context', this same support has great impact on the individual level innovation. Both parts of the innovation process thus flourish under support for innovation.

Also the concept op Reflexivity is related to group innovation. The three central elements of reflexivity (reflection, planning and action/adaption) increase detail in planning, resulting in more likelihood of implementing innovation. Because the individual level innovation is more about creativity and having new ideas instead of the implementation of innovation, this increased detail in planning may harm creativity, for it could restrain autonomy and freedom of an individual.

4. Discussion

There is much debate about the definition of innovation. Although most definitions involve some sort of change, it seems a matter of preference whether a definition should state this change to be positive or significant. When talking about innovation in daily life, practically everyone understands the concept without having to clarify, however, when having to measure it, innovation should be quantified in order to make generalization possible. This quantification should be based on one, universal and clear definition, which is momentarily not existent. This makes the identification of factors that positively influence innovation (on both the individual and the group level) particularly hard. Many studies have tried to identify these factors by measuring results in many different organizations (Amabile, 1998; West, 2002; Paulus, 2000; Hammond, 2011), however using slightly different definitions of innovation. Comparing the results of these studies without a common definition of innovation might damage the validity of conclusions.

Also, in order to extrapolate factors that are specific to one level (individual or group) to the other level, the underlying mechanisms of its impact on innovation should be clear. Both the model by West and the model by Hammond lack this explanations in some areas, making it hard to show concrete relations on the other level. This results in insurmountable assumptions, leading to unstable arguments for potential relationships between these factors and innovation on a different level. All those relationships could be researched in the future to empirically underpin the influence of these factors on the innovation process.

Important to note is that this literature research assumed no interrelationship between factors. It is mentioned that the innovation process is cyclical with every stage possibly happening simultaneously in different parts of an organisation. This cyclical nature makes it inevitable for factors to be quarantined of each other, resulting in possible interrelationships between these factors. These potential effects do likely influence each other and the innovation process itself too.

Furthermore, different stages of the lifetime of an organisation request different rates and forms of innovation. Lewis & Churchill (1983) identified five different stages of business growth and state that all stages need a different strategy of management. Probably the business environment fostering innovation is subject to change over time too. The influence of time on an innovation-fostering strategy could be an important area of future research.

5. Conclusions

To conclude the analysis, first the factors that foster both individual and group level innovation are discussed. Second, factors that show contradiction in the fostering and/or mitigation of innovation are discussed. Lastly, some remarks about potential interrelations between factors are made.

5.1. Overlapping factors

When putting factors that have proven to positively influence individual level innovation in a group level and vice versa, a lot of assumptions could be made. Following the line of reasoning of different authors writing on similar topics, the following factors could positively influence innovation on both the individual and the group level: Confidence, Self-efficacy, Autonomy, Expectation of innovation by a leader, Perception of a safe environment, and Clarity of objectives.

Confidence in groups tends to lead to better decision making, because the potential benefits of an accurate judgment may be lost if its accuracy is in doubt. Groups that need to complete a difficult task in which there is no right or wrong answer, the group itself is its best judge of effectiveness. Therefore, when the group finds their answer unacceptable to their superior, the group will not be seen as effective. A lack in confidence will likely lead to the judgement of the completed task as unacceptable, resulting in the mitigation of the effectiveness of the group. Also, group confidence could lead to more endorsement, backing, approval or overall support for action in the environment (Sniezek, 1992), resulting in a greater chance of innovation to be implemented.

Creative self-efficacy appears to provide momentum in that strong efficacy beliefs enhance the persistence level and the coping efforts individuals will demonstrate when encountering challenging situations (Bandura, 1977). It is this persistence that is needed to overcome obstacles paired with the innovation process. When discussing the effect of group self-efficacy on innovation, this persistence should be mentioned. An individual could be easily thrown of an idea when there is nobody confirming the effectiveness of that idea in case of resistance. Self-efficacy will then be the reason an individual is persistent, due to confidence in its capabilities and judgements. In a group however, there are more different perspectives and views on the idea, resulting in a more elaborate discussion about the effectiveness of an idea in case of resistance. The accuracy of the judgement therefore is enhanced, with a better sense of potential success as a result. Self-efficacy of the group may not be needed as often to create the needed persistence to overcome obstacles in the innovation process. However, if group judgements tend to be more accurate, a groups judgment about their self-efficacy would be more accurate as well. This would mean that when group self-efficacy is high, the probabilities of that self-efficacy being justified are high. High group self-efficacy therefore could legitimize the persistence of a group in case of resistance, leading to increased innovative performance.

Langfred (2000) found that autonomy positively influences group effectiveness on both individual and group level, both directly and via group cohesiveness. The decision of a superior to grant autonomy may cause the receiver to believe its value and importance for the superior or organisation, for it is likely that more autonomy is granted to successful groups or individuals. This may increase self-efficacy, with the above mentioned effect on innovation.

A leader expecting certain behaviour of a subordinate could result in the expected behaviour of that subordinate via consequences of the 'Pygmalion effect', which refers to the modification of a focal individual's behaviour based on the expectations for that behaviour received from another (Eden, 1984). The behaviour of the subordinate is shaped by altering their self-expectancies and subsequent motivation. This altering in self-expectancies could link to self-efficacy, expecting to be able to achieve something is closely related with one's belief of being able to achieve something. Furthermore, a leader showing expectations of a subordinate could lead to the belief of that subordinate in its own abilities. Expectation of innovation could therefore lead to increased self-efficacy and thus innovative attempts. It appears that employees believe they have creative capability when they work with supervisors who build their confidence through verbal persuasion and serve as models for activities core to creativity (Tierney &

Farmer, 2002), which links the expectation of a leader to self-efficacy. Also, West (2002) has shown positive relations between support for innovation and innovative behaviour. Notable is that he defines support for innovation as "the expectation, approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment" (West, 2002, p. 373). Notice the word 'expectation' in this definition. This means that the expectation of innovative behaviour is not only an isolated factor influencing innovation, but also plays a role within a broader 'support for innovation', proving the robustness of this factor in the innovation process.

An environment in which risk-taking is encouraged, there is room for new ideas and there is an overall susceptibility for change and innovation. In such an environment, risk-taking will not be punished, which leads to more suggestions of ideas and attempts to do things differently. This stretches across both the individual and the group level, for such an environment is present in the entire organisation. This environment thus facilitates innovation, resulting in a higher quantity of innovative attempts. However it does not predict the successfulness of any innovative attempts.

Clarity of objectives results in focused development of ideas, resulting in increased facilitation of innovation. Mostly in the first phase of the innovation process, the quantity of ideas is important. However, focused development of ideas does not guarantee quality of those ideas. On the other hand, clear objectives can help to shape an idea to fit the situation better, creating a higher quality of the idea.

These factors have proven to be positively correlated with either individual innovation or group innovation, and were extrapolated to the other level. However, strong empirical evidence proving this extrapolation is justified is lacking. Two factors however are found to have empirical evidence for their relationship with innovation on both levels; Diversity and Support for innovation.

On the group level, diversity (in group members that is) broadens the knowledge base that funds more divergent views and perspectives that creates potential for more comprehensive or creative decision making. On the individual level, diversity in education, professional background and perspectives leads to a more holistic and multidisciplinary perspective on an idea, which increases its change to be transformed into a successful innovation. On both levels, diversity creates a larger pool of knowledge, experiences and skills that can be used in the innovation process. Notable however is the extent to which diversity positively influences innovation. Firstly, the amount of diversity is important. There could be a limit to the amount of divergent views and perspectives due to practical implications. A group of e.g. eight or more different minds could lead to never-ending discussions without consent. Although group dissent is found to improve group decisions (Schulz-Hardt, 2006), this is to a certain limit. Second, the direction of the diversity could be important too. It is safe to assume that knowledge and experience in e.g. the field of theoretical chemistry will do little good to the implementation of an innovation in management sciences. Diversity should be line with the task.

Support for innovation is defined by West as "the expectation, approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment" (West, 2002, p. 373). However expectation is already discussed, a more abstract and general expectation is not discussed yet. Not only a leader or a management team, but also the business culture itself could express expectations. If the business has the expectation of innovative behaviour institutionalized, there is less need for a manager to articulate this expectation. Although this expectation-rich environment and its impact on behaviour is not yet investigated, assumptions could be made with conclusions in line with the effect of leader expectations on behaviour. Furthermore, approval is line with an environment that is perceived as safe for risk-taking. If attempts to introduce new and improved ways of doing things is approved of, the threshold of attempting these things is lowered.

5.2. Contradicting factors

Furthermore, factors that have proven to positively influence innovation on either individual level or group level, but are likely to inhibit innovation on the other level, are found. Individualism, and Openness to experience are positively related to individual innovation, but are likely to decrease group innovation.

Individualists favour personal freedom of action over the collective interest. This could give them the freedom and space to exploit their deviating and original way of thinking into idea generation. However, a group will have collective interests, which should be taken into account when working in a group. An individualist could neglect these interests in favour of their own personal interests, creating friction within the group. However this friction can only be present when a choice has to be made. If both the personal and the collective goals could be met, there is no need for choosing and thus no friction.

Individuals with high 'openness to experience' are more likely to have more imagination, high intellectual curiosity and independence and are less likely to shy away from change, thus supporting innovation. However, it is this independence that could have similar effects as individualism, resulting in less collective activities, which could harm the innovation process on the group level.

Pressure from external demands, Time and Financial resources and Reflexivity could all positively influence group innovation, but might mitigate individual innovation. Due to the cyclical nature of the innovation process, these factors could do more harm to the innovation process than that they can enhance it. This however is extremely situation-dependent.

A pressuring external environment seems to inhibit creativity in the initial stages of the innovation process due to limiting freedom. Individuals thrive under the ability to work in freedom, without having too much boundaries in which they have to work. Pressure from external demands could create these boundaries by imposing constraints on factors such as time, money, influence and availability of information. However, pressure creates uncertainty, which can lead to innovative attempts to mitigate this uncertainty. Innovation is needed when the current situation is not desirable, which is the case in highly uncertain environments because uncertainty creates a risky environment for decisions, which could lead to wrong judgements. Pressure form external demands should thus be present when innovation needs to be sparked, which is mostly done on the individual level. However, this same pressure could inhibit individual innovation, which leads to a contradiction. The pressure should be present to ignite the innovation process, but should be mitigated when in the individual phase of the innovation process. The regulation of optimal exposure of an individual to this pressure may need delicate management.

Both time and financial resources should be sufficiently present for optimal functioning of an individual and group. A delicate balance should be created in order to keep a sense of challenge by giving time- and budget constraints, while at the same time keeping individuals and groups from spending too much energy and time gathering the needed resources for their innovative attempts. To manage properly, an estimate must be made for how much time and money is needed to complete the task, which can be difficult, especially when dealing with innovation, because innovation is likely to be something in which no experience or knowledge exists yet. In this case, most experience and thus knowledge about needed budget and time, is present within the individual or group completing the task. Letting them make an estimate about the needed resources could also give them a sense of autonomy, which may lead to an increase in self-efficacy due to the believe of the receiver of autonomy in its value and importance to the organisation, as discussed in section 5.1.

The three central elements of reflexivity (reflection, planning and action or adaption) increase detail in planning, resulting in more likelihood of implementing innovation. Keeping a tight planning could increase the clarity of objectives and thus more focused development of ideas. In groups, detailed planning could also help to adjust group members' schedules to each other, creating a more integrated and efficient way of working together. This same detail in planning could also restrain individuals in freedom of when and where to work, which inhibits individual innovation. In modern organisations it is safe to assume an individual has both individual tasks and group tasks intertwined within its daily job. When trying to stimulate innovative behaviour with such individual, it could be a challenge regarding the intensity of detail of planning for that individual, as its group tasks apparently need detailed planning, but its individual tasks function optimally under a certain degree of freedom in planning. It is this apparent contradiction that imposes difficulty in management.

5.3. Interrelations between factors

The conclusions mentioned in section 5.1 and 5.2 follow directly from the proven relationship between the mentioned factors and innovation. However, these factors have been treated as if they exist isolated from each other, while this is not the case. In actual business environments multiple factors play a role and not only have an effect on innovation on both the individual and group level, but also affect each other simultaneously. For example, the creation of a safe environment seems to predict innovation directly. However, an environment that is perceived safe will likely also facilitate a certain positivity towards employees; a friendly environment to operate in. This absence of hostility within a working environment could boost confidence and/or self-efficacy, which in turn also results in an increase in innovative behaviour. These factors are thus likely to create a certain synergy in which they strengthen each other's effects on innovation.

Furthermore, it is argued that a very precise and delicate management is needed to manage time and financial resources properly. A tight management is likely to create certain restrictions in autonomy, which is argued to mitigate individual innovation. Considering the cyclical nature of the innovation process, in which both individual and group level innovation are important and should manifest simultaneously, these effects should exist in an optimal balance, one which may be difficult to find in practice. A further examination of the interrelations of the above mentioned effects is needed to fully grasp the holistic effect of them on the innovation process.

When translating these conclusions into practical implications, the most important thing to notice is the situational nature of these conclusions in relation to the business stage (e.g. Lewis & Churchill, 1983), phase or environment a business is in. Every situation demands a different approach and particularly the factors that could enhance as well as inhibit innovation should be carefully evaluated.

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