Employee Creativity and R&D: A Critical Review

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Employee creativity is one of the most important components to measure a company’s human capital, particularly in knowledge-intensive companies. However, the complexity of the conception of creativity means that the measurement of employee creativity has become difficult. Reflecting discussions and contributions on Creativity in R&D as presented at the 2006 R&D Management Conference held in Taiwan, this short thematic paper reviews four different and critical approaches to creativity, namely the evolutionary approach, the cross-disciplinary science approach, the social system approach and the social network approach. This paper concludes that the four approaches provide complementary contributions in understanding the measurement of creativity in an R&D context, but that the interaction of the socio-cultural context with employee creativity needs to be taken into account.

Introduction

The rise of a knowledge-based economy is attributed to the increasing importance of employee creativity, one of a company’s intangible and most important assets, for its sustainable competitive advantage (Petty & Guthrie, 2000). Employee creativity is also regarded as one of the most important elements of a company’s human capital in keeping the body of knowledge alive and vibrant, and to secure the company’s well-being and long-term viability (Wiig, 1997). Creative performance, representing the growth and decline of intellectual capital, can be measured both by what is in the heads of organizational members, and by what remains in the company when they leave. However, the complexity of the conception of employee creativity and the lack of a universal definition of creativity make the measurement of creativity more difficult. For instance, Csikszentmihályi (1990) claimed that creativity is essentially an interaction between a person’s thought and a socio-cultural context, and almost all creativity involves group processes. Gardner (1988) argued that it is futile to study creativity at a single level of explanation, isolating a single element in a mental process, a personality characteristic, or a cultural context. Similarly, Kasof (1995) pointed out that the limitation of creativity within the individual is consistent with a variety of cognitive or attributional biases that lead to a tendency towards isolation from the social or environmental context of creativity. Therefore, studying employee creativity in an R&D context should be regarded as a multifaceted social phenomenon (Isaksen, 1987), since it emphasizes employee interaction, encourages a climate of sharing ideas, skills and knowledge, and stimulates creative outputs (Rickards, 1991; Kratzer, Leenders & van Engelen, 2006; Chen, Chang & Hung, 2008).

This paper focuses on the issue of employee creativity in an R&D context, and will review several critical approaches to the issue. The paper reflects discussions and contributions on Creativity in R&D as presented at the 2006 R&D Management Conference held in Taiwan, and was written as a theoretical introduction to the paper by Steve Boehlke, also originating from the Taiwan conference, presenting a practitioner’s view of the politics in facilitating creativity in an R&D organization. This paper is in two parts. The first part focuses on the difficulties of measuring employee creativity, and the second part reviews several critical approaches to employee creativity in an R&D context.

The Difficulties of Measuring Employee Creativity

The term creativity is used in different ways and the definition is formulated in different
respects. Creativity has many synonyms, such as productive thinking, divergent thinking, originality, imagination, brainstorming, etc. Some definitions of creativity have served as a starting point for theoretical and empirical investigations, but often they are ambiguous or non-operational (Ackoff & Vergara, 1981). Isaksen (1987) argued that some definitions are in conflict with each other, promoting confusion rather than improving understanding (Isaksen, 1987). Rickards (1991) also claimed that there is a lack of rigorous thinking about the term creativity, and there is therefore a danger that the term may degenerate completely into a single, blurred, catch-all concept. This section will highlight the difficulties of measuring employee creativity.

In the consensual assessment technique, creativity is defined in conceptual and operational ways and the importance of specifying the relation between the operational and conceptual definitions of creativity is stressed (Amabile, 1983). The conceptual definition articulates the notion of creativity that underlies the theoretical framework which explains how the crucial characteristics of creative products evolve in the process of task engagement (Amabile, 1983). A satisfactory operational definition must return to the final criterion for creativity assessment, a reliability on a person’s subjective judgement. In operational terms, ‘creativity can be regarded as the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced’ (Amabile, 1983, p. 359). Moreover, Amabile (1994) argued that in the scientific research, all researchers are limited to some degree by their environmental context, and that empirical analysis of creativity studies still requires more rigorous work, primarily concerning the role of epistemology and philosophy (Amabile, 1994), since creativity is a dynamic concept, which changes through our experience, domain knowledge and context (Isaksen, Puccio & Treffinger, 1993).

The topic of creativity in the R&D literature has evolved along a path similar to that of the organizational psychology field. From an organizational psychology perspective, theories of creativity have progressed from static, content-oriented theories to dynamic, process-oriented theories (Campbell et al., 1970). Content theories search for the specific things within individuals that initiate, direct, sustain and terminate behaviour, but process theories explain how behaviour is initiated, directed, sustained and terminated. There are diverse views on the concept of creativity and its sub-concept cannot be understood from one single perspective. It is not the purpose of this paper to provide a historical review of all of the conceptions of creativity, but rather examines a number of critical approaches to creativity research, namely the evolutionary approach, the cross-disciplinary science approach, the systematic approach and the social network approach.

### The Critical Approaches to Measuring Employee Creativity in an R&D Context

The critical approaches to studying employee’s creativity in an R&D context are identified, namely:

1. the evolutionary approach, as suggested by Campbell (1960), Kaufman (1975), Quadagno (1979), McKelvey (1982), Amabile (1983) and Staw (1990);
2. the cross-disciplinary approach, as suggested by Gardner (1988) and Magyari-Beck (1990);
3. the social system approach, as suggested by Tardif and Sternberg (1988), Csikszentmihalyi (1990) and Woodman, Sawyer and Griffin (1993);

#### Evolutionary Approach to Creativity in an R&D Context

Campbell (1960) argued some theories of evolution focused on describing the course of socio-cultural evolution, without reference to evaluation and moralisms. He further depicted the evolutionary model as ‘blind variation and selective retention’ to rectify the gap and to explain natural selection in the socio-cultural evolution. Kaufman (1975) observed that the biological evolutionary metaphor fits remarkably well and explains why human institutions ostensibly created and controlled by people seem to be governed by a momentum of their own. Quadagno (1979) argued that evolution embodies many principles of change, order, direction, progress and perfectibility, with each principle being present in some but not all theories of evolution. McKelvey (1982) argues that the important concept of population is
ignored in Campbell’s model. Although there are arguments in Campbell’s evolutionary theory, his natural selection theory has been elevated to a more central position and attracted the attention of influential scholars.

Taking an evolutionary approach, creativity can be defined as a product of blind variation and selective retention process, which implies that employee creativity is the creative solution only by using a diverse set of alternatives and trial and error (Staw, 1990). However, individuals can use a variety of mechanisms to input to the problem process, such as task motivation, persistence, non-conformity, field independence, cognitive complexity, breadth of experience and knowledge. In the retention process, individuals can use strategic choice in their adaptation, such as general intelligence, self-criticism skills and high standards. Amabile’s (1983) componential model of creative problem solving at the individual level makes implicit use of the evolutionary approach in the content variables of measuring creativity (Staw, 1990).

Moreover, Amabile’s (1983) empirical work on intrinsic motivation emphasizes how work environment, external pressure, incentive structures and organizational structure can stimulate and inhibit creative responses or outputs. In her componential framework, Amabile (1983) reviewed many of the personality and environmental variables of individual creativity and placed them into a sequence of problem-solving steps. Three sets of determinants of individual creative performance are intrinsic motivation, domain-relevant skills and creative skills. Staw (1990) restated Amabile’s problem-solving sequence to be presenting variation and retention processes on the evolutionary framework. Specifically, the task motivation variables, including quantity- and quality-oriented ones, can broaden employees’ presentation or discovery of problems, and generation of alternative solutions. Domain-relevant skills are regarded as affecting the generation of alternatives and the selection of preferred solutions. Creativity-relevant skills affect the generation of alternatives, their selection and one’s responses to failure. However, creative problem solving can be seen as a social act that is subject to both environmental and personal influence, rather than characterizing creativity strictly as the personality characteristics and cognitive process applying to all situations (Staw, 1990). Therefore, from an evolutionary approach, employee’s creativity in an R&D context can be defined as a social process of variation and selective retention, which is subject to employees’ preferences, socialization and environmental determinants.

Cross-Disciplinary Science Approach to Creativity in an R&D Context

Creativity is a phenomenon much like prodigiousness and requires to be dealt with by drawing on a combination of different disciplines and perspectives (Gardner, 1988). Some researchers, like Gardner (1988) and Magyari-Beck (1990), articulate creativity as an elusive and complex phenomenon, and a multi-discipline scientific approach to illuminate creativity has provided a more holistic scope than does a single discipline and perspective. Gardner (1988) applied a ‘synthetic’ science approach which encompasses interdisciplinary efforts to seek to illuminate a complex phenomenon as creativity, rather than using a single scientific view, such as cognitive science, psychological approaches, historical-cultural and biological views.

Cognitive science has been used to tackle major cognitive issues ranging from the nature of perception to assessment of human rationality, but makes little contribution to present studies. Drawing on the cases of the creative person studied by Freud, it is argued that a psychological perspective to such a creative individual might begin with an examination of the cognitive strengths of the subject, and end up with the intelligence and the person (Gardner, 1988). However, the multiplicity of factors that interact and contribute to the achievement of human creativity needs to be carried out using various cognitive, personality and social factors, not simply taking a single psychological view.

Magyari-Beck (1994) used ‘creatology’, a term coined for a new cross-disciplinary science of creativity, to emphasize that creative product is the application of certain basic cultural paradigms of that culture for which the creative product in question was created. The results of creativity studies need to take the basic cultural paradigms into account, although such paradigms can severely limit creative thinking, and cannot be reduced to psychological phenomena.

Creativity was classified into four taxonomies, attributed to Rhodes (1961), whose four Ps was a remarkable step forward in the process of helping understand the creative process and products. Rhodes (1961) set out to analyse creativity by collecting 40 definitions of creativity and 16 of imagination. He clustered these into four groups: person-centred, process-centred, press-centred and product-centred (which became the renowned 4Ps of creativity). Rhodes (1987) has suggested that much conceptual confusion about his 4P model was due to a failure by researchers to recognize in their definitions that ‘each strand
has unique identity academically, but only in unity do the four strands operate functionally (1987, p. 218). Furthermore, Magyari-Beck (1990, 1994) argued that the four Ps approach cannot be studied by psychological phenomenon alone, where people are only a part of the whole context. Other entities need to be considered, such as culture, organization and group.

From a cross-disciplinary science approach, it can be concluded that a background in different cultural paradigms becomes a kind of logical universe to scientific problems and solutions. A synthetic science encompasses a multiplicity of science to illuminate the complex phenomenon of creativity. The science of creativity extends beyond cognitive-psychological boundaries and cannot be limited to study in a single discipline, but requires consideration from other disciplines, such as sociology, theories of organizations, economics, history, metrology and cultural paradigm. Therefore, from a cross-disciplinary approach, studying employee creativity in an R&D context, it is necessary to consider the employees’ different backgrounds, experiences, skills, knowledge and cultures.

Social System Approach to Creativity in an R&D Context

Tardif and Sternberg (1988) defined creativity in a social context as existing in the larger system of social networks, problem domains and fields of enterprise. It does not preclude the individual view, but provides additional insights regarding creative persons and products and their function in society as a whole (Tardif & Sternberg, 1988, p. 429). It is believed that using a systematic investigation of creative behaviour in complex social systems provides key understanding to organizational sciences. Woodman, Sawyer and Griffin (1993), therefore, view organizational creativity in a systematic approach that organizational creativity is defined as a subset of the broad domain of innovation, and innovation is then characterized as a subset of an even broader construct of organizational change. In their interactionist model, Woodman, Sawyer and Griffin (1993) integrate five constructs as a subset of a social context, such as (a) the creative process, (b) the creative product, (c) the creative person, (d) the creative situation, and (e) the way in which each of these components interacts with the others.

Similarly, Csikszentmihályi (1990) contended that it is impossible to define creativity independently of a judgement based on criteria that change from domain to domain and across time, insisting that creativity ‘is not an attribute of individuals but of social systems making judgments about individuals’ (p. 199). In other words, creativity does not happen inside people’s heads, but in the interaction between a person’s thoughts and a sociocultural context. Creativity can be viewed as a systemic rather than an individual phenomenon. He used a systemic view to conceptualize a dynamic model, with creativity as the result of the interaction between three subsystems: a domain, a field and a person. The domain consists of a set of symbolic rules and procedures; the field includes all the individuals who act as gatekeepers to the domain; and the individual person. Therefore, from a systematic approach, studying creativity in an R&D context needs to concern the individual level, team level and organizational level which all interact with each other within a wider social system.

Social Network Approach to Creativity in an R&D Context

Simonton (1984) asserted that ‘a successful social psychology of creativity demands that the creative individual be placed within a network of interpersonal relationships’ (p. 1273). Relationships are generally created through exchanges between team members. The pattern of linkages and the relationships built through exchanges are the foundation for social capital (Nahapiet & Ghoshal, 1998; Gabbay & Leenders, 1999). Within an organization, the current increased emphasis on teamwork and various forms of job sharing ensures that knowledge workers must interact with others to get their jobs done. The innovation-related research at the firm and group levels provides some suggestion that social relationships are important for creativity (Tushman, 1977; Monge, Cozzens & Contractor, 1992). Mumford (2002) used the term social innovation to explain how people organize social interactions to meet common goals as a critical issue to the generation and implementation of new ideas. He also explained that social innovation might involve the creation of new processes and procedures for structuring collaborative work, the introduction of new social practices in a group, or the development of new business practices. Similarly, Leenders, van Engelen and Kratzer (2003) take a social network perspective to examine the relationship between a team’s communication and team creativity. They found that team creativity requires a moderate frequency of communication and a low level of communication centralization. One recent study by Chen, Chang and Hung (2008) found that social
interaction and network ties had significant and positive impacts on creativity of R&D project teams.

The importance of weak ties on creativity has been reported in the literature. For instance, Perry-Smith and Shalley (2003) found that weaker relationships, those involving comparatively low levels of closeness and interaction, may be particularly beneficial for creativity despite the intuitive ‘strength’ of strong ties. Weaker connections may be associated with non-redundant information, and this access to more non-redundant information should enhance domain-relevant knowledge. Moreover, the access to heterogeneous social circles that weak ties provide should facilitate a variety of processes helpful for creativity (Perry-Smith & Shalley, 2003). From a social network approach, employee creativity in an R&D context concerns employees’ interaction within a network of interpersonal relationships.

Conclusions

Most creativity studies focus on an individual cognitive process which has made a significant contribution to understanding individual cognitive processes and individual–environment interactions by taking psychometric and cognitive approaches. However, the limitation of creativity at the individual level leads to a tendency towards isolation from social and environmental contexts. The conceptions of creativity are dynamic and complex, and change through our experiences, domain knowledge and socio-cultural contexts. Therefore, it is not appropriate to study employee creativity through a single lens and a multidisciplinary approach is recommended. The evolutionary approach suggests that employee creativity can be measured as a social process of variation and selective retention, which is subject to employee preferences, socialization and environmental determinants. The cross-disciplinary approach argues that the study of employee creativity cannot be limited to study in psychological phenomena but different cultural paradigms and other discipline sciences need to be considered. The social system approach argues employee creativity is defined in a social context, but does not preclude the individual view, as creativity exists in the larger system of social networks, problem domains, fields of enterprise, and treats creative persons and products and their function in society as a whole. The social network approach suggests that a successful social psychology of creativity demands that the creative individual be placed within a network of interpersonal relationships.

We have learned that there is lack of a universally acceptable definition of the concept of creativity; however, the four critical and different approaches to creativity provide complementary contributions to understanding the measurement of creativity in an R&D context.

References


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