Leveraging Innovativeness of High-tech Enterprises through Hope & Optimism: Insights from Case Studies

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Abstract

India has shown noteworthy progress in its high-tech sector during the last decade. High-tech enterprises can be identified as their novel growth is driven through creative and innovative environments. Creative behavior is inclined by personality factors including cognitive and non-cognitive factors, and an association between individual and organizational factors of creativity and innovativeness. Hope and optimism can enhance newness and novelty through motivational empowerment. The present paper concentrates on identifying the role of hope and optimism which foster the motivational empowerment of an individual leveraging creativity and innovativeness. It provides discussions on various aspects of personality factors that bring strengths to enhance hope and optimism through motivational empowerment of leveraging the creative potential of the workforce. The exploratory research has been conducted through a case study in two high-tech industries. This research aims to integrate personality factors with hope and optimism through motivation-empowerment which leads to creativity and innovativeness of employees at individual and organizational levels.

Keywords

Hope & Optimism, Creativity, Innovation, Empowerment-motivation, and High-tech Enterprises.

1. Introduction

As the universe confronted the covid 19 pandemic and its negative impacts, including associated mental health issues, negative environment, and adverse surroundings, finding meaning in life, and building positive self-talk and capacities will help to strengthen positive orientation for the future (waters et al.,

2021). In literature hope and optimism can be considered as pillars for positive thought processes, and can act as potential mechanisms toward achieving positive mental health (Gallagher & Lopez, 2009, 2018). The concept of dispositional hope (Synder, 2003) and dispositional optimism (Scheier and Carver, 1985; Carver, 2014) share several elements: (a) personality factors, (b) cognitive components, (c) reference to prediction, (d) connection to meaningful personal target, (e) futuristic direction, and (f) behavioral factors (Kraft et al., 2021).

In the last decade, India has witnessed a revolution in its high-technology sector. The successful emergence of its knowledge-based industry in the prevailing competitive milieu of globalization has resulted in creating a common interest among planners, policy-makers, professionals, entrepreneurs, and researchers to understand the impact of various organizational and personality factors on the sustainable performance of such firms. High-technology enterprises are characterized by their knowledge-intensive environment and focus on newness and novelty in the development of products, processes and services (Nirjar & Tylecote, 2007). In general terms, the ability of people to combine ideas in a uniquely way is called 'creativity' (Amabile et al., 1996). Creativity has been described by Gurteen (1998) as the generation of new ideas whereas innovation implies putting these ideas into action by processes of shifting, redefining, and implementing (Job and Bhattacharya, 2007). Thus besides the technical competence of professionals, creativity, and innovation are the dominant factors which are essential for surviving and holding competitive advantage in highly dynamic technology-intensive sectors (Ojha and Krishna, 2004; Kapur et. Al. 2008).

The professionals working in high technology enterprises having technical competence are often known as knowledge workers. The definition of knowledge workers based on their individual characteristics identifies workers as people who are highly educated, creative, talented, smart and communicative. (Herwitz, Heng and Quazi, 2003, p31.)

Knowledge workers have a high level of skills/education in technological literacy, high cognitive power, and abstract reasoning. This includes the ability to observe, synthesise and interpret data and to communicate new perspectives and insights to lead to more effective decision-processes and solutions for their organization.

In addition collecting data through case studies and analyzing the responses of case studies show that hope and optimism have a significant relationship with creativity and innovativeness through motivational empowerment. In other words, hope, and optimism are effective through motivational empowerment to foster innovativeness.

Researchers have identified that the main objective of a creative thinking process is to think beyond existing boundaries, to enkindle curiosity, to break away from rational conventional ideas and formalized procedures to rely on the imagination, the divergent and random to consider multiple solutions and alternatives (Candy, 1997; Schlange and Juttner, 1997). The capability of an organization to be more creative starts at the level of the individual and the task of a high-tech enterprise is to identify the individual personality characteristics and create an organizational environment conducive to strengthening the individual potential for innovation ((Einsteine & Hwang 2007)).

In present scenario, Informational technology and biotechnology are the two sectors which are derived and sustained through creativity and innovation and are heavily dependent on professional knowledge for their successful business. While considerable research has been conducted on understanding the impact of various individual and organizational determinants on the creative potential of high-tech enterprises (D'Costa, 2002; D'Costa and Sridharan, 2003; Nirjar and Tylecote, 2007; Ojha and Krishna, 2004).

This paper aims to examine the role of hope and optimism in the innovativeness of knowledge - professionals. We also intend to bring out some components that enkindle hope and optimism to lead to the creative potential of individuals.

Our present study is focused on high-tech enterprises and a brief of India's knowledge enterprises is provided in the next section.

2. The Indian High-tech Sector

The high technology based industries and services commonly known as 'Knowledge Intensive Business Services (KIBS) are those enterprises which are heavily dependent on professional knowledge for their business operations and service. In present scenario of globalization, deregulation, and intense competition, India's entrepreneurial firms in software development, biotechnology and knowledge based service sectors have exhibited credible performance and resilient capability to withstand against the uncertainties of a vibrant global economy. The research literature provides quite a comprehensive evidence concerning impact of various individual organizational and environmental determinants on the innovation capability, performance and

sustainable growth of software development firms (Athreya, 2002; Budhwar, 2001; Buxton, 1991; D'Costa, 2002 2004; Humphrey, Snyder & Willis, 1991; Leintz & Swanson, 1980; Mahajan, 2000; Mowery & Graham, 2001; Nirjar &Tyelcote, 2007; Ojha & Krishnan, 2004; Shridharan, 2004). However, in case of the biotechnology industry which is another sun rise sector of India's emerging economy, the dynamics of development are different. Besides, another knowledge-based business sector which although is a comparatively new entrant to Indian business has indicated a promising potential for sustainable growth is the e-business sector. It may thus be emphasized that the consistent progress of Indian entrepreneurial enterprises in a high technology sector last decade is essentially a result of the innovation capabilities of its highly qualified, motivated, empowered manpower (Nirjar and Tylecote, 2007). Our next section illustrates issues concerning individual and organizational facets of creativity and innovation.

3. Creativity and Innovation

The high tech enterprises conducting business in a global environment and focusing significant competition requires an uninterrupted furnishing of creativity and innovation as a crucial ingredient of their survival and sustainability (Vande Ven et.al, 1999; Van Djik & Van den Ende, 2002) Woodman, et.al (1993 p294) suggested that individual creativity is:

"a function of antecedent conditions (e.g., past reinforcement history, biographical variables), cognitive style and ability (e.g., originality, divergent thinking, ideational fluency), personality factors (e.g., self-confidence, future mindedness perseverance risk orientation, self-esteem) motivation and social influences (e.g., social facilitation, social rewards) and contextual influences (e.g., the physical environment and time constraints)".

Individual creativity is a complex phenomenon, influenced by multiple individual, contextual and environmental variables (Politis, 2005) and is a crucial component of organizational creativity. Woodman, et al., (1993 p294) suggested that organizational creativity is the creation of a valuable, useful, new product, service, idea, procedure or process by individuals working together in a complex social system, and is a function of the creative outputs of its component groups and contextual influences such as organizational culture, reward system and resource constraints. Amabile (1997) portrayed the inter-relationship between individual creativity and organizational innovation. Researchers have suggested that organizational innovation which is defined as the adoption of a novel idea or behavior that is unique to the organization (Damanpour 1991, Zammato and

O'Conner, 1992) is created through learning. As learning leads to newness and finally to innovation, the essential task before a company for producing innovations (product or processes) is to acquire new knowledge. Nonanka and Takeuchi (1995), based on their extensive research on Japanese companies presented a theory of knowledge creation in organizations. The theory posits that knowledge creation is a process of continual socialization i.e. sharing of individual tacit knowledge, externalization which is associated with creating new concepts having the potential to contribute to organizational intent, and combination in which the prototypes of new concepts are developed and incorporated into the organization and internalization of this knowledge by doing and experimentation. The effect of organizational learning on innovation performance in high-tech firms was explored by Therin (2002) who suggested that the innovation capacity of a firm is an outcome of organizational learning. Chen (2006) reached the same conclusion in the context of biotech firms.

Several researchers have studied the characteristics of creative workers. According to these researches, a knowledge worker incorporates several personality and professional attributes such as self-confidence, future-mindedness, perseverance, originality, aesthetic sensibility, risk orientation, and can orient their personal and professional growth with corporate vision (Awad and Ghaziri, 2004; Kelloway and Barling, 2000 and Storey, 2005;) The creative behavior of an individual is impacted by both, the cognitive and non-cognitive factors of personality (Woodman et al., 1993). The individual creativity is the psychological engagement of an individual (Drazin et al.,1999) and his creative performance is determined by the interaction of his personal traits and working environment (Bruce & Scott, 1994; Ford & Gioia, 1995; Oldham & Cumming, 1996) This indicates a definite role for positive psychological capacities in enhancing the innovation potential of knowledge professionals. The next section deals with the concept of psychological empowerment and its relevance for leveraging the creative potential for innovation.

4. Psychological Empowerment and Innovation

Researchers have adopted diversified approaches to conceptualizing the nature of the empowerment construct. Conger & Kanungo (1988) defined empowerment as a process of augmenting feelings of self-efficacy among organizational members. Self-efficacy according to Bandura (1989, p 408) involves "beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands". Researchers (Spreitzer 1995, 1996; Thomas & Velhouse, 1990) have defined psychological empowerment

based on multi-dimensional motivational constructs consisting of four distinct cognitive dimensions namely meaning or purpose, competence, self-determination, and impact which taken together comprise the basic essence of psychological empowerment in a workplace. Thus empowerment may be regarded a cognitive state and approach that causes individuals to strive toward and feel capable of shaping work roles and work contexts (Spreitzer, 1995). The concept of motivational aspects of psychological empowerment is intimately associated with positive psychological capacities (hope & optimism) of knowledge workers. This indicates a definite role of hope and optimism in enhancing the innovative potential of knowledge professionals. The next section deals with the idea of hope and optimism and their relevance for leveraging the individual propensity to innovate.

5. Hope and Innovation

Hope is another integral constituent of psychological capital that validates, enriches and support the present in life and yet creates confidence that the future will be more meaningful than in the past (Mackinnon, 2003; Walker, 2004). Human thought is always directed towards some valued goals. These goals oriented cognitions consists of two components (a) cognitive will power to get involved in a task (called as agency component) and (b) the perceived ability to foster routes to reach the destination. Dufault & Martocchio (1985 p 378) defined Hope as:

"multidimensional dynamic life force characterized by a confident yet uncertain expectation of achieving a future good, to the hoping person, is realistically possible and personally significant".

Thus hope can be conceptualized as a cognitive process that inspirits an individual to work for something that he believes to be significant and meaningful to him (and not because it stands a chance to succeed), which is the case with all creative-ventures. Research has also revealed that high-hope individuals are more decisive in formulating plans and since they possess confidence in their chosen plans, they are more likely to succeed in their effects (Snyder, 2000). Hope along with providing, perseverance, tenacity, and a sense of possibility strengthens the individual and organizational sense of self-efficacy. It may also be emphasized that a knowledge worker would be required to pass through all these stages in a process of innovation. Thus it may be envisaged that hope as a psychological construct would positively contribute in accruing to the individual's potential for innovations, which is being examined in the present study.

6. Optimism and Innovation

Like hope, 'optimism' also has a distinctive meaning as a positive psychological construct which is open to development (Schneider, 2001; Seligman, 1998). As a facet of psychological capital that is related to a positive outlook and defined in an attributional explanatory style (Carver and Scheier, 2002; Peterson 2000; Seligman 1998, Seligman and Csikszentmihalyi, 2000). Optimists are defined as those who attribute their successes (task accomplishment) to internal, stable and global causes such as their own abilities and identify unfavorable outcomes to specific causes which are unstable and external (Seligman, 1998). Researchers (Snyder, 2002) have also suggested that optimism is also a goal-based cognitive process that operates whenever an outcome is perceived as having substantial value. An individual involved in an innovation process has to go through a number of uncertain circumstances and negative events and essentially requires an optimistic attitude and unflinching belief in his abilities to override numerous impediments to success.

Research has revealed that hope and optimism are related to various attitudinal, behavioral, and performance outcomes and affect success in various life domains. (Avey, et al, 2010: Babalolo, 2009; Chiaroni, et al,2009; Choubisa, R, 2009; Giachetti 2009 Froman, 2009, Jensen, 2008; Luthans et al, 2007; Money et al, 2008; Schermerhorn Jr. & McCarthy, 2004 and Seligman et al, 2005). Researchers have also suggested that the cognitive factors reflected through ideational fluency and associative thinking and individual factors (i.e. non cognitive personality factors such as willingness to assume responsibility, future mindedness, individual experimentation, risk orientation, and perseverance have an effective impact on an individual creativity and innovation. This leads us to our research propositions.

Summary of Propositions for Research

- Hope and optimism has a positive impact on cognitive and non-cognitive personality factors of an individual reflected Psychological empowerment.
- The individual's capability for ideational fluency, associative thinking, individual experimentation, future mindedness, risk orientation and perseverance, is positively associated with his propensity for creativity and innovation.

7. The Case Studies

Case study is the distinctive qualitative research technique adopted by researchers for developing a holistic and 'in-depth' understanding of the meaningful characteristics of a contemporary phenomenon within its real life contexts but such understanding encompasses important contextual conditions (Yin, 2003, 2008). Our case-studies were mainly focused on conducting semi-structured interviews with top executives of High-tech firms situated in 'National Capital Region'. The questions developed for conducting case-studies are broadly concerned with the issues of our research.

7.1 Methodology Adopted

Two case studies were conducted using semi-structured interviews, Yin (1994,p 13) has argued that a case study 'benefits from the prior development of theoretical proposition to guide data collection and analysis'. This was ensured on the basis of the literature, the discussions held with certain senior scientists of national-level research institutes situated in the National Capital Region (NCR) who have been extending support and guidance to biotech entrepreneurs and their own experience of second author with the industry. The firms were chosen based on their performance, level of operations, areas of applications, and close relationship with national laboratories situated in the NCR. Their performance ranged from above average to very good and their operations spread over several countries. Initially, eight firms were selected from the list of biotech industries situated in NCR region: The CEO's of those firms, whose reference were provided by scientists and academicians (known to authors) of these industries were approached through e-mails and telephone calls.

It may be mentioned that the present research is a part of an ongoing research conducted by authors to investigate the influence of 'PsyCap' on creativity, innovation, and performance, and its objective concentrates on generating insights that would facilitate the further development of the theoretical propositions (rather than any sort of testing).

Company Details

Brief descriptions of these firms are provided which would be followed by findings of case studies:

Company A

Company A based in Gurgaon, (National Capital Region) was established in 1992. The company has a team of more than 130 well-qualified professionals. It provides solutions for genomics, proteomics, and cell culture and occupies a commanding position in the instrumentation business. The company is now focusing on Imaging and Analytic business with tie-ups with major brands in the segments. The company has a strong export orientation and has been rated as fastest-growing bio supplier company by Association of Biotech Led Enterprises (ABLE) India, and is ranked 8th among the top 20 companies of India.

Company B

Based in Manesar, Gurgaon near Delhi. Company B is an international biotechnology venture founded by a group of highly qualified scientific experts and experienced industry professionals. The company is involved in conducting high-value research services for drug discovery solutions for the life science research industry. The company's clients besides Indian Pharma companies include a few larger global companies located in USA and Europe. The company employs around 80 highly qualified professionals. The company's growth during the last ten years has been excellent and it is on the move into new areas of application. The company is recognized as an 'in house Research and Development unit' by Department of Scientific and Industrial Research (DSIR) of the Government of India.

7.2. Factors Affecting Individuals' Propensity to Innovate

7.2.1. Individual Creativity and Innovation

We have cited earlier Amabile's opinion that creativity is a precursor to innovation (Amabile, 2000), and that creativity considered as individual's ability to recognize unusual designs, associations, and generate new ideas and things. Recognizing the complexities of managing biotech companies' long development cycles and their managers' obvious thrust for innovation, we raised our first question to know their opinion about individual creativity and how a creative idea is transformed into an innovation. Our respondents stated:

There are certain individuals who have a natural inclination towards finding new, simpler but more effective solutions to problems which might have earlier been solved or who most often like to engage in solving the unsolvable problems. They keep creating new concepts

and then work on them to create a novelty. I would consider such person to be a creative-individual. (Director of Company A)

The CEO of Company B, is a highly qualified person, having strong research background in a reputed university in the U.K. and has varied reading interests, responded: A Creative individual could be any person having a curious intellect, having an attitude to strive for utilizes his potential in solving the riddles of what is yet not clear or even unknown. (Chief Executive Officer of Company B)

The CEO of company B was more emphatic on the integration of non-connected ideas being the precursor of innovation He stated: "If an individual through his intensive involvement or we must say that a person has having clarity to connect these unrelated ideas into an integrated idea, be sure with proper organizational support it would sooner or later be materialized into an innovation. In our company which is involved in developing vaccines for certain serious and incurable diseases, numerous techniques and vaccines were developed which have been the outcome of the intensive efforts of those individuals who were from varied educational background such as information technology physics etc. and did not have any formal degree in biosciences."

To our curiosity about whether a potential innovator possesses some generic traits, attitudes, or characteristics through which he could be identified, or regarding the popular conception that they are often nonconformist, unconventional, and even bohemian with more conspicuous behavior flexibility, our respondents emphasized.

"On the basis of my observations of creative individuals around me, I believe that they are normal human beings like all of us in every aspect of life. In our industry professionals who have discovered effective techniques are normal people like us. But it is their deep understanding of the problem, openness to new information, lively awareness, and commitment which made them successful in their endeavours. It may also be mentioned that all the two of us, who started this firm were earlier engaged in the maintenance of electronic equipments and later moved to biotech instrumentation. (CEO of Company B)

CEO of company A briefly narrated the process of development of company at its initial stages and the varied situations the company has passed through during last two decades and said: "On the basis

of the belief that every person possesses the innate capability for creativity. On the basis of numerous factors like family-background, social surrounding, education, varied experience and other challenges that life imposes upon him. The existential necessity to keep striving intellectually, physically and spiritually in a proper environment and intensive learning convert an individual's creative potential into a successful innovation."

The interactive sessions with top managers/entrepreneurs of these biotech enterprises revealed that innovative ideas rise in the process of finding a solution to an unsolved problem or during an individual's intensive involvement in uncovering the mystery of some complex phenomenon. When a creative individual is intellectually absorbed and is able to connect the unrelated ideas, often from different fields of knowledge, conceived by him into an integrated conception, he is able to discover a novelty to refinement an existing product or process or create something new. Koestler (1964) raised the term 'bisociation' for such thinking pattern that is another term for associative thinking and may be identified as an important factor for an individual's creativity and innovation capability.

Our next few questions were focused on understanding the viewpoints of biotech managers regarding the individual and organizational factors which influence an individual's creativity and innovation potential. According to the Director of Company A:

"Our experience suggests that there could be numerous individual factors which influence the innovation capacity of knowledge workers at various stages of the innovation process. However, I would restrict to a few, which in my opinion are more important in the context of the biotech industry. The first factor that comes to my mind is an individual's positive attitude towards assuming responsibility and involving into new experimentation. Although the outcome of innovative ventures may be uncertain, one should be prepared to take such risks. Moreover the sense of assuming responsibility itself moderates an individual's risk orientation and reinforces his futuristic attitude and perseverance. In our industry, all the innovations and new techniques were developed by such individuals."

The opinions of other owners/managers were similar, although there may have been varied emphasis on various factors. The Chief Executive Officer of Company B emphasized:- "For converting a creative idea into an innovation, the person concerned should have a futuristic bent of mind. This future mindedness motivates him to assume responsibility and conduct experiments to create something new. But it may sometimes not be such a smooth drive. He may have to pass through roller coaster passages, blind turnings, and roadblocks. So, what does he need in such situations? It is essentially the perseverance, which helps in maintaining equanimity and the sense of responsibility through which one's conscience enforces him to keep working until the goal is achieved. Our HR manager while recruiting professionals gives due weightage to the candidate's attitude towards setbacks in life. It is through the achievements of such individuals that we are growing at a good rate even in present times of global recession. (Chief Executive Officer of Company B)

The CEO of Company A, elaborated on his experience:- An individual may have an excellent creative idea, but to convert it into a useful innovative product, extensive experimentation is needed. No experimentation would be possible without a trustworthy support of technology and other resources. Further, he should also be assured that his job will remain safe, even if he is not successful in his initial attempts. For a good number of years at internal stages our HR section has adopted a result-oriented policy for awarding increments and promotions. In other words, if a scientist could make a breakthrough he was amply rewarded, but if he failed to achieve success he was not considered for promotion. Such employees would leave the company. We were often forced either to abandon the task itself or to start again from scratch. However, after the new 'Director' took over the policy was changed. The company now supports and recognizes an individual's effort at every stage, irrespective of his success or failure in his endeavour. Now our retention rate of employees is very good. We have developed numerous new techniques and products and have moved into new areas of operation and occupy a respectable place among good-performing biotech firms in India.

We may thus conclude that while the owners/managers of biotech entreprises consider ideational fluency, integrative (associative) thinking, assuming responsibility for individual experimentation, future mindedness, risk orientation, and perseverance are important individual factors which derive an individual's potential for creativity and innovation. The mediating role of organization support specifically in the form of providing autonomy to conduct new experiments and maintaining the self-esteem, particularly in times of disappointments inspires a knowledge worker to continue performing at the workplace.

7.2.2. Hope & Optimism for Enhancing Individual Innovativeness

The next phase of interviews was devoted to understanding the views of biotech entrepreneurs/managing professionals regarding the significance of 'Hope & Optimism' and its constructs for fostering the creative potential of individuals for innovation. The researchers were interested in knowing their views regarding the role they envisage for an individual's hope and optimism in strengthening his potential to innovate.

7.2.3. Observation

Hope and optimism are necessarily the decisive factors emerging in a research worker's confidence to find meaning in his efforts and strengthen his belief in the positive outcomes of his efforts. As earlier it was emphasized that life is not a smooth ride and one has to pass through many disappointments and failures, more so, in R&D derived sectors such as the biotech industry. But failures are the test of one's intellectual, physical and spiritual strength. It is essentially an individual's resilience along with his optimism and hope of a better future combined together which sustains his sense of responsibility and future-mindedness, his involvement in new experimentation, risk orientation and perseverance. Resilience provides necessary motivation and psychological strength to bounce back. In my opinion in all situations, the combined effect of psychological constructs will be much more pronounced on an individual's capability to innovate and achieve success. (CEO of Company A)

Company B in recent years has diverted its effort towards producing high value products in new areas of application and thus the value ladder. The CEO of company B elaborated his views:- Hope and Optimism may be separate constructs for psychologists and philosophers, but to an entrepreneur or practical professional they are the same, which provides confidence to an individual that he will definitely achieve his goal. I also believe that hope and optimism are the building blocks of the ultimate positive capability of an individual's resilience, which becomes an existential necessity for a diligent individual. Let me narrate an incident: Researchers were working on a specific vaccine and even though they had spent a significant amount of time, effort, and money we were not able to see a breakthrough which could give us confidence of the success of our efforts. At that time, I was somehow losing hope as I had the responsibility of maintaining the job of an odd number of people who were on this project and I feared that with the breakthrough not coming through what would happen? I had to leave for the US for meetings with some clients there and thought that on turn I will take a call on this matter. To my utter surprise, as it happens often in research my chief operating called me at midnight and cheerful noise made by teammates could assure me the they had achieved the breakthrough. This is possible only because of the fact that they had self-belief, they were optimistic and hopeful about the technical dimensions they were handling and the sustained efforts they were putting in. I would say that this could happen due to the combined effect of the confidence, hope, optimism, and resilience of team members.

We also wanted to know, about if there is any opinion, beyond these psychological constructs and individual factors which may yet be unexplored, but is likely to affect the individual's propensity for innovation. The response of an entrepreneur was: Yes, apart from these constructs and factors, and it is 'mindfulness' which is the awareness that comes out of an individual's paying attention on the purpose from moment to moment. To be mindful a person is required to remain alive to present, this would have a positive effect on individual's mind and thinking pattern and prepare the necessary ground for germinating the seeds of hope, optimism, per se in his

personality and will enhance his creative potential also. (CEO of Company A)

Our interactions thus reveal that Hope and Optimism have a positive impact on cognitive and non-cognitive personality factors which determine the individual potential for creativity & innovation. Organizational creativity is an outcome of the collective efforts of creative individuals. This may also be mentioned that an organization environment conducive to creativity further moderates the individual factors and creativity.

8. Implications & Conclusions

The responses revealed by entrepreneurs/management professionals dispel the myth that creativity is an inherent trait and creative individuals have some recognizable distinct characteristics, styles, and attitudes towards life. Individual creativity is the potential of an individual to solve the riddles of unusual and unsolved problems and to produce novelty in ideas things and processes. Such novelty is achieved by the creative individual through his persistent involvement in his purposeful pursuit at psychological intellectual and physical levels (Tang, 1998).

8.1 Implications

The significance of findings of the present study is quite equable in societal context showing that creative potential of an individual is not tied down to any class, creed or country of origin. Since the innovativeness of an individual is an open to-develop attribute, there is a role for entrepreneurs and managers to enhance the creative potential of their workforce and to improve the innovation productivity of their firms. Researches have suggested that creative thinking and problem solving skills can be improved through appropriate training, though there may not be a single training technique which may be applied in all situations. (Brown, 1991; Clapham and Schuster, 1992).

8.2 Conclusions

The purpose of the case studies was focused on analyzing the views of managers/professionals of biotech companies in the context of the creative potential of their scientific workforce. Our questions were confined to what could be the pertinent factors (cognitive and non-cognitive) which in their views would be most effective in determining an individual's propensity to

innovate and what role they envisage for positive psychological capital, and its constructs in strengthening these factors thereby accruing the individual potential for creativity and innovation. The conclusions drawn from our interactions are:

- An individual's creative potential is an attribute which is open to development. It may be strengthened through appropriate psychological and intellectual nurturing and the consistent organizational support through technology and resources. The organization should ensure that an innovator is provided with necessary autonomy to conduct his experimentation and his efforts are well appreciated.
- When a creative individual is able to connect the unrelated ideas conceived by him through logical deductions or insight into an integrated conception, it is the initiation of innovation. There are numerous cognitive and non-cognitive individual factors such as ideational fluency, associative thinking, assuming responsibility, individual experimentation, future-mindedness, risk orientation, and perseverance which determine and derives an individual's propensity for creativity and innovation.
- Although hope, and optimism are affect the individual's personality factors in differing ways at various stages of innovation process but they should essentially be considered as an integrated construct of personality 'SHOR' (or PsyCap). All the four constructs of 'SHOR' are interconnected and interdependent and one construct nourishes the other.

The authors are not aware of any formal study being conducted on understanding the role of 'PsyCap' in the context of individual and organizational creativity and innovation and are conscious of the limitations of the present study. There is an immense scope for further research on various aspects of psychological capital in the context of creativity and innovation such as exploring the leadership role in enhancing innovation through 'PsyCap' and the influence of 'PsyCap' on organizational commitment, performances, and sustainability. Research may also be conducted for creating an effective framework, procedure and programme for providing 'PsyCap' training to knowledge workers. As pointed out by one learned respondent, the constructive role of mindfulness in enhancing the individual creative potential and organizational creativity and innovativeness, through 'PsyCap' could be another area for further, exploration.

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