

# Employee Perception on Factors of Innovation in Information Technology Sector: An Empirical Study

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**Abstract**— Technological advancement is opening the doors for innovation in all the sectors throughout the globe. Therefore, it is evident that technological innovations are key for the success in all the sectors. Though India is striving for “Make in India” programme, the success of Indian companies also lies with innovation, for which there is a need for technological advancement. Technological advancement requires some drivers. In this context the current article tries to highlight the perception employee on factors influencing innovations in information technology sector.

**Keywords**— Innovations, Technology Development, Global Competition, Organizational Climate, Personality, Motivation.

## INTRODUCTION

In view of today’s economic climate, increasing global competition and rapidly changing organisations, an organisation’s ability to innovate is regarded as a key factor for success (Shipton et al., 2006) and often for mere ongoing survival (Oldham and Cummings, 1996). Some scholars (Mumford et al., 2002; Drazin et. al., 1999) regarded innovation as key goal for many organisations because they believed that innovation has potentially powerful influence on organisational performance. Over the past several decades, innovation did play an important role in achieving organisational efficiencies, effectiveness and outcomes. Research into innovation has grown theoretically and methodologically sophisticated and has made important contributions to direct practises (Hennessey and Amabile, 2010). If strides are to be made in management, one must arrive at a far more detailed understanding of the creative process, its antecedents and its inhibitors. How does the innovation research it recently becomes? Are there specific factors or antecedents that promote or inhibit innovation? There are many problems about it unsettled. According to the logic of organisational behaviour, an individual’s ability to innovate at work is influenced by several factors, which can be classified into three levels of analysis: the individual, group and organisational level.

### **Factors Influencing Innovation**

From the literature review it is found that factors of innovation are spread along three levels which includes Personal, Group and organisational level factors. Information Technology innovations which can be drivers for innovations in all other sector has high influence of personal factors like Employee personality, Employee Motivation and Employee Cognition. In

Information technology sector most of the business is generated through projects which necessitates group performance. Therefore, innovation in information technology is highly influenced by group dynamics such as structure, climate and leadership etc. In any sector the key criteria for innovation is organisation itself. The organisational level factors like structure, culture, strategy and resources are considered in this study.

### **Individual level factors**

#### **Personality**

Certain factors pertaining to individual may be seen as antecedents to the creative process in organisations (Pirola-Merlo and Mann, 2004). In a multi-faceted meta-analysis of the personalities of artists and scientists, Feist and Gorman (1998) identified a common pattern for the creative personality, which was characterised by openness, flexibility, self-confidence, high self-efficacy and a high need for autonomy.

The need to manage innovation creates a paradox in which increased control constrains the autonomy of teams and employees, which encourages tested-and-true ways of solving problems and stifles the emergence of new ideas that may spawn new innovation projects. Individuals with a high need for autonomy value individual freedom to pursue their own goals and ideas. The concept of self-efficacy refers to an individual’s perception of his or her effectiveness in a specific domain. Moreover, George and Zhou (2001) were able to establish a relationship between two of the five-factor personality traits, i.e., openness to experience and conscientiousness and creative behaviour in the workplace. Research suggests that openness enhances an individual’s intrinsic motivation towards novelty and therefore works in a multiplicative way to

produce innovation (King et al., 1996); openness is perhaps the most important personality dimensions to predict the propensity for innovation (Batey and Furnham, 2006; King et al., 1996; Wolfradt and Pretz, 2001). A recent study reported that the negative association between conscientiousness and creativity is likely to be moderated by contextual factors, such as lack of autonomy and support (George and Zhou, 2001). Recent studies have also shown that the facets of conscientiousness that are most closely associated with lack of innovation are being methodical, ordered and dutiful (Robertson et al., 2000). Moreover, at the individual level (Seibert et al., 2001) found that a personality trait such as high proactivity, high achievement orientation (Barron and Harrington, 1981) and internal locus of control (Woodman et al., 1993) has been associated with creative behaviour. Individuals with an internal locus of control feel that they themselves are in charge of their future, as opposed to individuals with an external locus of control who believe that success or failure is due to factors beyond their control.

**- Motivation**

Although theories on innovation and creativity never fail to refer to intrinsic motivation as one of the most important antecedents of creativity and innovation, few studies have empirically studied the association between intrinsic motivation and innovation. In the 1980s, Amabile suggested a componential model of innovation that involves three components including intrinsic task motivation, domain-relevant skills (expertise) and innovation relevant process skills (cognitive skills and work styles conducive to novelty). The model includes a five-stage description of the innovation process; task presentation, preparation, idea generation, idea validation and outcome assessment, where the roles of the three components vary at each of the stages. Amabile's model suggests how and where individual skills and motivation affect the progress of the innovation process. Amabile (1983) and Mumford et al. (2002) found that the personality traits that favour creative outcomes are dependent on a key mediating factor individual intrinsic motivation, this concept has been defined as a motivational state generated by the individual in reaction to the inherent challenge of a task, rather than to extrinsic factors such as rewards (Amabile, 1983, 1998). The motivational state is arguably one of the most important individual factors related to creativity (Amabile, 1983; Woodman et al., 1993). Prabhu and his colleagues (2008) found that intrinsic motivation completely mediated the personality traits of openness to experience and individual sense of self-efficacy, in relation to creative performance.

Sauermann and Cohen (2008) recently analysed the impact of individual motivation on organisational innovation and performance. They found that intrinsic and extrinsic motivation affected both individual effort and the overall quality of the innovative endeavours.

**- Cognition**

Numerous researchers have explored the association between innovation and cognition, some scholars, Amabile et al. (1983) and Woodman et al. (1993) found that the creative and innovation performance influenced by cognitive ability and style factors, since they require knowledge and expertise, however, lead to creative excellence, expertise not itself does not necessarily. To produce creative and innovative outcomes (Woodman et al., 1993), divergent thinking, (the ability to combine knowledge elements from diverse sources), is best combined with convergent thinking (the ability to focus on and select the best solution to a specific problem).

**Group level factors**

**- Structure**

Over the last decades, work groups have examined by organisational innovation, particularly their composition. To generate innovation outcomes, heterogeneous in which members has diverse skill sets, knowledge and backgrounds, are arguably more likely, because of the stimulation of divergent thinking in the team (Paulus and Yang, 2000). However, the structure of groups influencing innovation from the angle of high group diversity comes with the risk of low cohesion, which may lower innovation capacity. Thus, innovation in groups has a relationship with cohesion.

**- Climate**

The recent shift of research interest towards group and organisational aspects of innovation has led to their cognition that transferable skills, such as communication skills, are pertinent to the process of innovation, especially for the implementation phase of innovation (Good et al., 2007). Hemlin and his colleagues (2008), described climate as various aspects of the psychological atmosphere in a team and in the surrounding organisational environment. Over the years, several factors have been linked to innovation and pertaining to group climate. The level of information exchange and internal communication were regarded as the central climate factors. Studies have demonstrated that innovation performance influenced by a highly open communication which making team members feel that they can contribute their views on particular ideas without fear of reprisal (Anderson and West, 1998; Bain et al., 2001). Van de Ven and Poole (1989) went on

to discuss enabling factors in the organisation, highlighting the importance of information flows in the organisation. Information flows are dependent, to a certain degree, on organisational climate and culture, expectations about the importance of communicating, the vehicles available for communicating and the cues within the environment regarding with whom to communicate can determine how communication will influence innovation.

In order to innovate, employees often need to relate and interact with other individuals – inside or outside the organisation. Hence, they need communication, articulation and social networking skills. Moreover, the degree of team and team member autonomy has been found to be the strongest predictors of innovation performance (Ekvall, 1996; Mann, 2005; West et al., 2003).

**- Leadership**

It has been widely accepted that leaders play a key role in determining innovation and creativity in organisations (Nam and Tatum, 1997). More specifically, leadership style is perceived to be an important individual attribute that influences innovation (Aragón-Correa et al., 2007). In a complex framework, leader impact has been viewed as only one of several influences on innovation outcomes (Kaiser et al., 2008). Some scholars (Kaiser et al., 2008; Mumford et al., 2002; Shalley and Gilson, 2004) believe that leaders are essential in facilitating innovation because they can create the conditions and circumstances needed for creativity and innovation to flourish.

Several studies suggested that leaders could be seen as whole to organisational innovation in two ways, which can be described as the managing innovation dual process. First, much of the literature points out the important role that leaders play in supporting innovation. Leaders of innovation are those who exert influence and motivate others to work together collaboratively to accomplish new and useful outcomes. Shalley and Gilson (2004) argued that leaders are central in creating the context and opportunities for teams and employees that favour creativity and ultimately innovation. Leaders can establish and maintain high quality work relationships with team members (Scott and Bruce, 1994) and increase individual intrinsic motivation (Avolio et al., 1999), by creating team heterogeneity (Keller, 2001) facilitating team reflection and problem-solving (Tierney et al., 1999; Somech, 2006; Puccio et al., 2007) and by creating and supporting a positive team climate (Anderson and West, 1998).

In an organisational context, the leadership role may be seen as a bottom-up process in which the leader acts as a facilitator creating the conditions for team members to use their capacities in producing creative innovation outcomes. Second, leaders embody the organisation's desires to become innovative, constituting one of the primary channels by which these desires can be realised, by facilities money and knowledge, managing and allocating resources in the form of time, setting and managing individual and team goals (Shalley and Gilson, 2004) and expectations for innovation performance (Yuan and Woodman, 2010), managing rewards (Mumford and Gustafson, 1988) and granting autonomy to individuals and teams (Hemlin, 2006; Hülsheger et al., 2009). Accordingly, this could be viewed as a top-down process, in which the leader manages the strategic innovation goals of the organisation. The studies found that leaders possessing the above characteristics significantly influence innovation outcomes directly as well as indirectly through such variables as organisational learning and team (Aragón-Correa et al., 2007). In view of this, it is expected that leadership will influence organisational culture, group climate for innovation and the level of innovation performance.

**Organisational level factors**

**- Structure**

The structure of the group and structure of the organisation are totally different, there are three main aspects regarding the influence about group structure on innovation, which are heterogeneous composition, cohesion...etc. as mentioned before in the group structure. While the aspects of organisational structure on innovation include centralisation, formalisation and complexity of the organisation. Early research suggests that centralisation and strong hierarchy are detrimental for innovation. Two sets of structural factors have been identified by Damanpour (1991) which determine innovation capability in organisations. First is the high degrees of professionalism, specialisation and functional differentiation which seems to be conducive to innovation performance. Second is the lively internal and external communication which promotes animated, open and cross-functional communication to foster innovation. Last, early research suggests that centralisation and strong hierarchy are detrimental for innovation (Burns and Stalker, 1961). Centralisation is believed to hinder innovation as it restricts information flow and communication. Conversely, decentralisation gives rise to greater participation, allowing more viewpoints to be considered during idea generation. Damanpour (1991) found that structures that promote centralisation and formalisation are negatively

associated with innovation. Absolutely, Mumford and his colleagues (2002) found that creativity and innovation appear to occur more naturally in decentralised, organic and flexible, rather than mechanistic and organisational contexts.

- **Culture**

Culture is the environment that surrounds employees at work all of the time. Culture is a powerful element that shapes employees work enjoyment, work relationships and work processes. Innovation also depends on organisational culture, more specifically, on the degree of organisational support which can be divided into three forms:

1. Organisational encouragement of innovation which refers to the degree to which researchers feel and perceive including (idea support, trust, emotional safety and acceptance of risk-taking)
2. Granting access to requisite resources which include expertise, materials and information...etc.
3. Empowerment, which refers to employee autonomy or freedom (Mann, 2005).

Amabile and colleagues (2005) noted that organisational encouragement is a vital aspect of a work environment for innovation including; encouragement of risk taking and valuing of innovation from the highest level, fair and supportive evaluation of ideas, reward and recognition for innovation, collaborative idea flow across the organisation, participative management and decision-making.

West and Anderson (1998) found that organisational support for innovation was the strongest factor predicting overall innovation. Particularly, innovation performance has consistently been linked to the freedom granted to pursue unique ideas and insights (Ekvall, 1996; Hunter et al., 2007). Autonomy can empower the group, sending signals of organisational trust that invokes a sense of ownership and control (Amabile, 1998; Mann, 2005).

- **Strategy**

A strategy is an integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage. In this sense, strategies are purposeful and in advance the taking of actions (Slevin and Covin, 1997). This research suggests that there is a distinct relationship between innovation and strategy. Innovation and strategy are closely related to each other; however, it does not provide enough empirical support to uncover the nature of the relationship between them (Hitt et al., 2001). Damanpour (1991) suggests that

organisational characteristics, such as structure and strategy, are primary determinants of innovation in one stage of innovation whereas individual characteristics are the primary determinants in another. The above statement by Porter (Argyres and McGahan, 2002) clearly shows the link between innovation and strategy and emphasises the need for an organisation to adopt a strategy and to be committed to it.

- **Resources**

Availability of resources is positively related to innovation since resources are needed to develop new ideas. From an organisational perspective, innovation is often resource intensive. Several researchers (Damanpour, 1991; Mumford et al., 2002; Woodman et al., 1993) have proposed that allotting sufficient resources may be a determining factor for innovativeness.

**OBJECTIVES OF THE STUDY**

- To study the literature and perception of employees to find the factors influencing innovations in information technology sector.
- To examine the factors applicability in select information technology organisation in Mindspace IT park, Hyderabad.

**Sample and data collection**

A quantitative approach was followed in this exploratory study. The participants selected for this study consisted of select information technology organisation in Mindspace IT park, Hyderabad employees. 650 questionnaires were distributed among the select companies.

Convenience sampling technique was deployed in sample selection. The respondents were solicited to complete the innovation questionnaire. The resultant response rate of useable questionnaires was 98.5% (640).

**Data Analysis**

Values of different fit indices; GFI, IFI, CFI, NFI greater than 0.9 considered as good fit and RMSEA values 0.05 or less indicates close to fit, between 0.05 to 0.08 indicates reasonable fit and values between 0.08 to 0.10 show marginal fit (Kline, 2001).

Structural Equation Modelling (SEM) is conducted with all ten variables and data shows that in select IT companies  $df= 4.822$ ,  $GFI= .903$ ,  $NFI= .918$ ,  $IFI= .915$ ,  $TLI= .907$ ,  $CFI= .914$ ,  $RMSEA= .075$  the model is improvised after allowing modification indices.

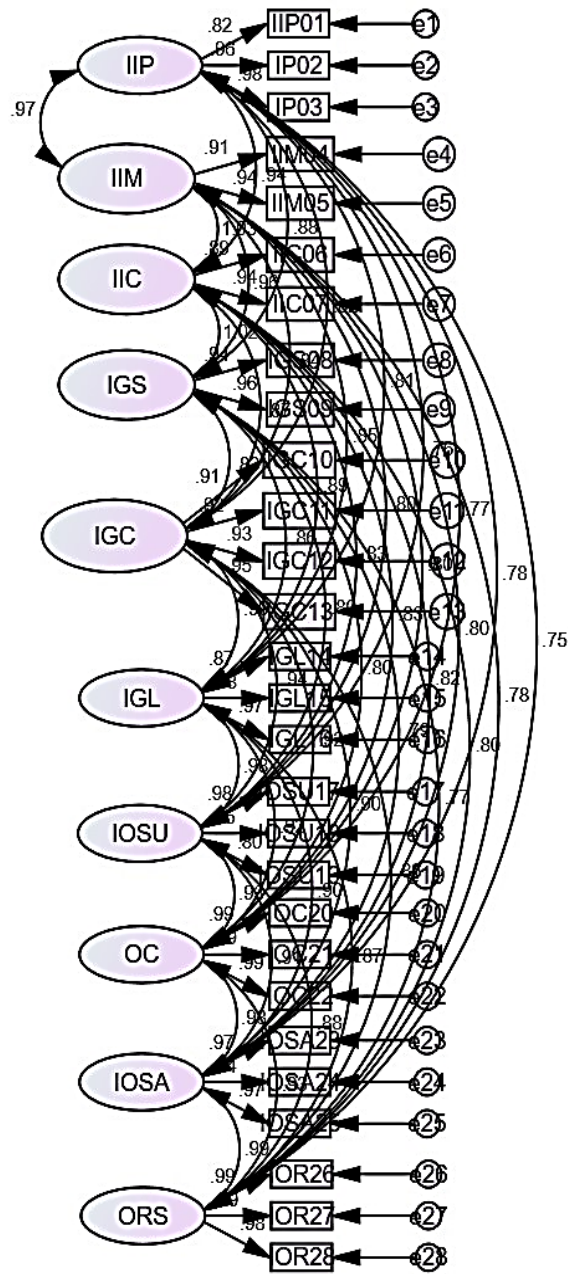


Figure 1: Innovation Model

**Divergent Validity & Convergent Validity**

Table 1: Divergent Validity & Convergent Validity of Innovation Model in Select IT Companies

	CR	AVE	IIP	IIM	IIC	IGS	IGC	IGL	IOSU	OC	IOSA	ORS
IIP	0.939 87	0.839 89	0.916 46									
IIM	0.921 18	0.853 9	0.913	0.924 07								
IIC	0.916 07	0.845 24	0.911	0.918	0.9193 7							
IGS	0.948 3	0.901 71	0.873	0.911	0.904	0.9495 8						
IGC	0.962 9	0.866 47	0.82	0.842	0.874	0.831	0.9308 5					
IGL	0.932 84	0.822 72	0.808	0.85	0.885	0.862	0.903	0.9070 4				

IOS U	0.936 72	0.832 53	0.755	0.804	0.829	0.803	0.901	0.892	0.9124 3			
OC	0.993 28	0.980 1	0.765	0.804	0.828	0.795	0.92	0.898	0.907	0.99		
IOS A	0.973 71	0.925 08	0.774	0.798	0.823	0.795	0.9	0.902	0.915	0.95 1	0.9618 1	
ORS	0.991 01	0.973 51	0.751	0.784	0.803	0.774	0.86	0.87	0.881	0.93 2	0.955	0.9866 7

(Source: Primary Data)

Convergent validity was assessed through CR and AVE. The required levels of CR and AVE should be equal or more than 0.6 and 0.5 respectively (Hair et al., 2010). CR and AVE were also used to establish the reliability of the measurement model. CR is an alternative measure to Cronbach’s Alpha, it is recommended by Chin (1998) as an ideal measure to overcome some deficiencies in Cronbach’s alpha. The CR should be 0.60 or higher, while the minimum threshold for an AVE should be 0.5 or higher to indicate adequate reliability (Awang, 2015). The composite reliability (CR) and average variance explained (AVE) values for the final measurement model of Innovation are presented in above table. From the above table it is observed that all CR values are more than 0.7 and AVE values are more than 0.5, hence supporting their convergent validity (Hair et al., 2010).

The recommended approach for establishing divergent Validity is to compare the squared correlation between two constructs with either of their individual AVE estimates (Hair et al., 1998). The AVE estimates should be greater than the squared correlation estimate. In addition to distinctiveness of constructs, divergent Validity also means that individual measured items should represent only one latent construct. Form the above table it is observed that the AVE estimates are greater than the squared correlation estimates, hence supporting divergent validity (Hair et al., 1998).

**Employee Perception on Talent Development Impact on Innovation**

*Table 2: Descriptive Statistics of Employee Perceptions on Individual Personality*

Descriptive Statistics			
	N	Mean	Std. Deviation
Autonomy	640	3.29	1.407
Self-efficacy	640	3.03	1.435
Need for achievement	640	3.06	1.408
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Individual Personality “Autonomy” registered highest mean value

(3.29) and lowest standard deviation (1.407). “Self-efficacy” registered lowest mean value (3.03).

*Table 3: Descriptive Statistics of Employee Perceptions on Individual Motivation*

Descriptive Statistics			
	N	Mean	Std. Deviation
Intrinsic motivation	640	3.09	1.413
Extrinsic motivation	640	3.05	1.422
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Individual Motivation “Intrinsic motivation” registered highest mean value (3.09) and lowest standard deviation (1.413). “Extrinsic motivation” registered lowest mean value (3.05).

*Table 4: Descriptive Statistics of Employee Perceptions on Individual Cognition*

Descriptive Statistics			
	N	Mean	Std. Deviation
Knowledge	640	3.03	1.430
Divergent& Convergent Thinking	640	3.10	1.386
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Individual Cognition “Divergent& Convergent Thinking” registered highest mean value (3.10) and lowest standard deviation (1.386). “Knowledge” registered lowest mean value (3.03).

*Table 5: Descriptive Statistics of Employee Perceptions on Group Structure*

Descriptive Statistics			
	N	Mean	Std. Deviation

Heterogeneous Composition	640	3.05	1.440
Cohesion	640	3.10	1.404
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Group Structure “Cohesion” registered highest mean value (3.10) and lowest standard deviation (1.404). “Heterogeneous Composition” registered lowest mean value (3.05).

**Table 6: Descriptive Statistics of Employee Perceptions on Group Climate**

Descriptive Statistics			
	N	Mean	Std. Deviation
Internal Communication	640	3.34	1.399
Emotional Safety	640	3.18	1.447
Conflict management	640	3.20	1.464
Risk Taking	640	3.20	1.403
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Group Climate “Internal Communication” registered highest mean value (3.34) and lowest standard deviation (1.399). “Emotional Safety” registered lowest mean value (3.18).

**Table 7: Descriptive Statistics of Employee Perceptions on Group Leadership**

Descriptive Statistics			
	N	Mean	Std. Deviation
Participative Leadership	640	3.08	1.417
Problem solving skills of leader	640	3.15	1.441
Goal setting skills of leader	640	3.30	1.414
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Group Leadership “Goal setting skills of leader” registered highest mean value (3.30) and lowest standard deviation (1.414). “Participative Leadership” registered lowest mean value (3.08).

**Table 8: Descriptive Statistics of Employee Perceptions on Organisational Structure**

Descriptive Statistics			
	N	Mean	Std. Deviation
Centralisation	640	3.29	1.401
Functional Differentiation	640	3.28	1.405
External Communication	640	3.09	1.479
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Organisational Structure “Centralisation” registered highest mean value (3.29) and lowest standard deviation (1.401). “External Communication” registered lowest mean value (3.09).

**Table 9: Descriptive Statistics of Employee Perceptions on Organisational Culture**

Descriptive Statistics			
	N	Mean	Std. Deviation
Espouse for new ideas	640	3.31	1.335
Trust	640	3.31	1.343
Experimentation	640	3.38	1.325
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Organisational Culture “Experimentation” registered highest mean value (3.38) and lowest standard deviation (1.325). “Trust” registered lowest mean value (3.31).

**Table 10: Descriptive Statistics of Employee Perceptions on Organisational Strategy**

Descriptive Statistics			
	N	Mean	Std. Deviation
Vision	640	3.39	1.338
Reward	640	3.29	1.367
Flexible Policies	640	3.33	1.343
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Organisational Strategy “Vision” registered highest mean value (3.39) and lowest standard deviation (1.338). “Reward” registered lowest mean value (3.29).

**Table 11: Descriptive Statistics of Employee Perceptions on Organisational Resources**

Descriptive Statistics			
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	N	Mean	Std. Deviation
Information	640	3.36	1.343
Money	640	3.36	1.382
Expertise	640	3.34	1.357
Valid N (listwise)	640		

(Source: Primary Data)

From the above table it is understood that in Organisational Resources “Information” registered highest mean value (3.36) and lowest standard deviation (1.343). “Expertise” registered lowest mean value (3.34).

### Findings

1. Factors of Innovations are classified as individual, group and organisational factors.
2. Model fit is found to be significant for this model.
3. Autonomy of the employee is found to be highly significant factor.
4. Intrinsic motivation is found significant for innovative motivation.
5. Divergent& Convergent thinking also found to be important for individual cognition.
6. Risk taking nature of the group is also found to be essential for innovation.
7. Goal setting skills of the leader also place an important role in group innovations.
8. Organisation’s experimentation culture is significant for organisations innovation.
9. Flexible policies are key for the organisations innovations.

### Suggestions

- Autonomy is the prime requisite for innovation because unless there is no autonomy, the employee will not think beyond the instructions. But innovation require different outlook towards problems to overcome them.
- Though intrinsic and extrinsic motivation both is equally important, but innovation is inherent component therefore, organisations looking for innovation ensure intrinsic motivation among employees.
- Divergent& convergent thinking is also very crucial because always thinking beyond boundaries will creates number of new options for decision making. Therefore, organisation should conduct programs like brainstorming to increase divergent thinking of employees.
- Business always involves risk, unless management ready to take the risk employees will not come up with new ideas. Therefore, management should clarify that the organisation is ready to take risk

involved solutions also for the problems but risk should be according to organisational policies.

- The leaders’ goal setting skills also plays an important role, because too high or too fewer goals are not good for organisation as well as for employees. Therefore, leaders should be trained in such a way to ensure leaders setting optimum goals to the employees.
- Culture is significant in innovation. Innovative culture in the organisation motivates new employees also strive for new ideas and organisation should also able to modify policies according to the changes in business environment.

### CONCLUSION

The research is conducted to identify factors influencing innovation in information technology sector. For the study IT companies in Mindsapace IT Park is considered. From the literature it is found that innovation factors are broadly classified into three levels; those includes Individual, Group and Organisational level. From the analysis it is found that for individual personality; Autonomy, Individual motivation; intrinsic motivation, individual cognition; divergent& convergent thinking, group structure; cohesion, group climate; internal communication, group leadership; goal setting skills, organisational culture; experimentation, organisational strategy; flexible policies and for organisational resources; information found to be significant.

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