The Effect of Proclivity to Open Innovation, Job Complexity and Technology Turbulence on Creativity: Evidence from Technologically Less Advanced Countries

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ABSTRACT

Despite the growing interest on open innovation, its effect on creativity has not yet been received a scholarly attention. Also, the effect of job design and turbulent environment on creativity in technologically less advanced countries is largely unexplored. Closing this gap, present study investigates the effect of proclivity to open innovation, job complexity, and technology turbulence on creativity. Building on the componential theory of creativity and job characteristics model of work motivation, this paper proposes positive causations from open innovation proclivity and job complexity to creativity. A positive effect from the technology turbulence to creativity is posited. Also, moderating roles of job complexity and technology turbulence on proclivity to OI are assessed. The findings from a cross-sectional survey of 363 managerial employees in Sri Lanka indicate that open innovation proclivity, technology turbulence and job complexity have positive effect on creativity. Also, both moderating variables have negative effect. Thus, managerial employees' baseline attitudes towards open innovation, complex job designs and turbulent environment enhance creativity. Also, highly complex job designs and turbulent environment undermine the effect of proclivity to open innovation on creativity. Consequently, while using open innovation to promote creativity, the firms should be cautious on the adverse effect of highly complex job designs and turbulent environment. Finally, this paper provides implications, limitations and opportunities for future research.

1. Introduction

A firm's capacity in creativity has become vital for the survival in present competitive and global business environment. A firm level creativity is determined by individual creativity via its effect on group creativity (Woodman, Sawyer, & Griffin, 1993). There is considerable evidence for the impact of individual creativity on firms' competitive advantages (Kanter, 1983; Devanna & Tichy, 1990; Shalley, 1995; Shalley, Zhou, & Oldham, 2004). Creative employees suggest novel, potentially useful ideas for the improvement and implementation of firm's products, practices, services or procedures (Amabile, 1988; Staw, 1990; Woodman et al., 1993; Shalley & Gilson, 2004). This novelty brought by individual employees enhances the firm's ability in responding to shifting markets and opportunities and thereby, to adapt, compete and grow (Kanter, 1988; Van de Ven & Angle, 1989; Nonaka, 1991; Oldham & Cummings, 1996; Oldham, 2002; Shalley et al., 2004).

The creativity can be investigated at different levels such as firm, group or individual levels. The level of creativity of a person is a function of various factors, and theories such as interactionist model of organizational creativity and componential theory of creativity propose various such person-related and contextual factors. As a person-related factor, attitudes of employees are recognized as an important determinant of individual creativity. Thus, the managers' attitude towards open innovation, which is assessed by proclivity to open innovation, may cause to the individual creativity. Also, contextual factors such as job complexity and the turbulence nature of the environment may be determinants of individual creativity. Yet, these effects on individual creativity have not been investigated particularly, in the context of technologically less advanced countries.

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There is a plethora of literature on employee creativity investigating personal and contextual factors which promotes, sustains and hinders creativity (Tierney & Farmer, 2002; Zhou, 2003; Rodan & Galunic, 2004; Oldham & Cummings, 1996; Coelho & Augusto, 2010). In order to extend the present literature on employee related characteristics in creativity, this study investigates the impact of baseline attitudes of employees on their creativity. In particular, this study investigates the effect of proclivity to open innovation (OI) on managerial employees' creativity in technologically less advanced countries. At the same time, the effect of job complexity and technology turbulence on creativity is investigated. The different aspects of OI have been discussed in large number of studies in the context of technologically advanced and developed countries (Karo & Kattel, 2010). Also, there are a few OI studies in the context of emerging economies (i.e. Li & Kozhikode, 2009; Lee, Park, Yoon, & Park, 2010; Kafouros & Forsana, 2012). However, knowledge on OI in technologically less advanced countries is scarce. There are few studies focused on proclivity to OI (except the noteworthy study by Hung & Chiang, 2010). Though there is a plethora of OI studies at the firm level, there are no studies at the individual level(except the recent study by Deegahawature, 2014). Yet, the effect of proclivity to OI on employee creativity has received no attention. Therefore, this study adds to our understanding of creativity and OI paradigm assessing the impact of proclivity to OI on creativity. Further, this study contributes to the existing knowledge of OI by studying it in the contexts that were less researched, and fills the scant of literature in job complexity and technology turbulence. Managers will find the outcome of this paper useful in adapting OI in technologically less advanced countries. The rest of the paper is structured as follows. The next section reviews the relevant literature on creativity and proclivity to OI, and develops hypothesis. The third section describes the research methodology adopted in this study. The forth section reports and discusses the results of the empirical analysis, whereas the final section outlines the discussion including some conclusions and directions for future studies.

2. Literature Review and Hypotheses

A variety of definitions on creativity follows one of two approaches: as a characteristic of a person and as a process (Amabile, 1988). Most of definitions have adopted the later approach (Oldham & Cummings, 1996). Accordingly, creativity is "the development of ideas about products, practices, services or procedures that are (a) novel and (b) potentially useful to the organization" (Shalley et al., 2004, p. 934). Here, novelty refers to a product, idea or procedure that is either a significant recombination of existing materials or an introduction of completely new materials (Oldham & Cummings, 1996), whereas usefulness refers to their ability to extend direct and indirect value to a firm over time (Shalley et al., 2004).

Previous studies indicate on the value of examining the creativity at different levels such as individual, groups and firms within their social settings (Amabile, 1983; Amabile, Goldfarb, & Brackfield, 1990). The interactionist model of organizational creativity establishes the relationship among these different levels of creativity (Woodman et al., 1993). The creative behavior of individuals is an outcome of the complex interaction between person and situation which is influenced by certain antecedents and current conditions. According to the interactionist model, creative behavior of an individual is a function of seven salient aspects: antecedent conditions, cognitive style and ability, personality factors, relevant knowledge, intrinsic motivation, social influence and contextual influence (Woodman et al., 1993). Various literature on creativity focuses on contextual factors which refer to ''dimensions of the work environment that potentially influence an employee's creativity but that are not part of the individual'' (Shalley et al., 2004, p. 935). Contextual factors such as rewards (e.g., George & Zhou 2002), job complexity (e.g., West & Farr, 1989; Oldham & Cummings, 1996), evaluation (Zhou & Shalley, 2003), relationships with supervisor (e.g., Zhou, 2003), relationships with coworkers (e.g., Zhou & George 2001), and time deadlines and goals (Amabile, Hadley, & Kramer, 2002) have been investigated in previous studies.

Also, the componential theory of creativity suggests that the level of creativity of an employee is a product of the components of creativity operating within and around the person (Amabile, 1983, 2013). Within-the-person components of the componential theory include three components namely, domain-relevant skills, creativity-relevant processes, and task motivation. The component around-the-person is the surrounding social environment (Amabile, 2013). The domain-relevant skills refers to person's expertise in the particular domain or domains, whereas creativity-relevant processes refer to "cognitive and personality processes conducive to novel thinking" (Amabile, 2013). Task motivation refers to the intrinsic motivation that determines the way a person approaches a certain task, and differentiates between what a person 'can do' and 'will do'. A confluence of all components is a requirement for the creative behavior. Thus, a person's creativity should be highest when he possesses higher intrinsic motivation, higher expertise in the

particular domain and higher skills in creative thinking while experiencing a highly supportive environment for creativity (Amabile, 2013). Out of three within-person components, motivation is the most important component, and to some extent, intrinsic motivation compensates the deficiency in domain relevant skills or creativity relevant skills (Amabile, 1996). There are two elements of task motivation in the componential theory: the baseline attitudes towards the task and the perceptions on the reasons for undertaking the task in a given instance (Amabile, 1996).

In the past, the firms adopted a closed, linear model of innovation where the extent of formal, internal research and development activities of a firm determined the extent of innovation. The closed model of innovation employed an internally focused innovation process assuming that firms should have a control over successful innovation (Chesbrough, 2003, 2006a). It was believed that firms must generate, develop, build, market, distribute, service, finance and support only their own ideas (Chesbrough, 2003). However, later changes of the business environment such as increasing in number and mobility of the knowledge workers, flourishing of the Internet and venture capital market, and broadening scope of possible external suppliers etc. weaken the sustainability of closed innovation (Chesbrough, 2003; Viskari, Salmi, & Tokkeli, 2007; Lee et al., 2010), and increased the reliance on multiple channel in technology exploration and exploitation. It was the emergence of a new paradigm in management of innovation, Open Innovation, coined by Henry Chesbrough in 2003 (Lichtenthaler, 2008; Elmquist, Fredberg, & Ollila, 2009; Enkel, Bell, & Hogenkamp, 2011; Lichtenthaler, 2011; Bigliardi, Dormio, & Galati, 2012). Since then, OI has been a top issue in technology management and innovation literature (Christensen, Olesen, & Kjær, 2005; Gassmann, 2006; Bianchi, Cavaliere, Chiaroni, Frattini, & Chiesa, 2011).

The fundamental difference between OI and closed innovation is about the tendency in using external knowledge and external paths to market. OI is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology" (Chesbrough, 2006b, p. 1). Thus, OI requires firms to create and captures value using technologies developed by external firms, also enabling external firms to use its own technologies. Accordingly, OI uses valuable ideas generated from internally and externally. Also, it uses internal and external paths to market. This fundamental change in innovation management requires an attitudinal change within employees and firms. In other words, employees need to possess deep interest and involvement in the new OI paradigm and the personal sense of challenges created by it. Due to various reasons, managers may develop negative attitude towards OI (Herzog, 2011) such as not-invented-here syndrome and not-sold-here syndrome. Discussing attitudes towards external knowledge management, Lichtenthaler & Ernst (2006) present a comprehensive six-syndrome model encompassing both negative and positive attitudes. Thus, the attitudes of managers that favor OI over its old paradigm become a salient issue in adapting OI. This is assessed by proclivity to OI which measures the managers' inclination to integrate external ideas, and enable others to use internal knowhow. It outlines employees' deep willingness to apply the concepts of OI. Thus, proclivity to OI can be defined as the employees' predisposition to perform OI activities.

As mentioned earlier, according to the componential theory, motivation is the central among components of creativity, and one of two elements of motivation is employees' baseline attitudes towards the task which determine the employees' creativity. Proclivity to OI, which is the baseline attitude towards OI, determines the level of intrinsic motivation and thereby, affects employee creativity. The interactionist model also recognizes intrinsic motivation as a determinant of creative behavior. Thus, building on intrinsic motivation perspective, a causal relationship between OI proclivity and creativity can be postulated. Based on this argument, the following hypothesis is proposed.

Hypothesis$_1$: The proclivity to OI has a positive effect on managerial employees' creativity.

Jaworski & Kohil (1993) define technology turbulence as the speed of change and nature of unpredictability of technology in a given industry. The firms that adopt OI has an advantage over the firms that do not adopt OI (Lichtenthaler, 2009) since the possibility of capturing value in a turbulent environment is getting reduced (Levin, Klevorick, Nelson, & Winter, 1987). In a turbulent setting, the possibility of achieving higher return from technologies by exclusively applying them in internal path to markets is limited (Gambardella, Giuri, & Luzzi, 2007). Thus, seeking external opportunities for internal technologies become necessary. Also, due to the rapid changes in technology, firms are unable to develop each and every piece of required

technology internally, and thus it is required to seek technologies from external sources (Cesaroni, 2004). Rapid changes of technology create both opportunities (i.e. for new products) and challenges (i.e. abreast with state of the art technologies), demanding more creative work outcomes. Thus, the turbulent environment obligates employees to be more creative and exposed to OI concepts. As a result, employees may be more creative and develop higher proclivity to OI in a technologically turbulent environment than in a non-turbulent environment. Thus, the following hypotheses are proposed.

Hypothesis$_2$: The technological turbulence has a positive effect on managerial employees' creativity.

Hypothesis$_3$: The technological turbulence positively moderates the relationship between the proclivity to OI and the managerial employees' creativity.

Previous research has recognized job complexity as a determinant of intrinsic motivation (Oldham & Cummings, 1996). This is related to management practices such as job design that is considered as an important determinant of employees' intrinsic motivation and creative performance (Amabile, 1988; Kanter, 1988; West & Farr, 1989; Coelho & Augusto, 2010). The motivating potential score (MPS) has frequently been used to determine the overall degree to which a job is objectively designed in a way that maximizes the possibility for internal motivation (Hackman & Oldham, 1976), and simply to assess the job complexity. Complex and challenging jobs are expected to have positive effect on intrinsic motivation. Also the job characteristics model (JCM) of Hackman & Oldham (1975) suggests that core job characteristics (skill variety, task identity, task significance, autonomy, and feedback) are prompting three psychological states (experienced meaningfulness, experienced responsibility for the outcome, and knowledge of the results of work activity) (Elanain, 2009) which in turn, lead to number of positive personal and work outcomes including higher intrinsic motivation. An employee experiencing higher job complexity therefore, possesses higher intrinsic motivation. Finally, it leads to a higher level of creativity (Amabile, 1996). Thus, a positive causation from job complexity to employee creativity is proposed. On the other hand, a person's baseline attitudes may vary due to the effect of extrinsic constraints such as complex job designs imposed on him. Employees' baseline attitude towards OI is the proclivity to OI. Thus, linking JCM with the componential theory, it is postulated that job complexity positively influences the relationship between proclivity to OI and creativity. Therefore, the following hypotheses are proposed.

Hypothesis$_4$: The job complexity has a positive effect on managerial employees' creativity.

Hypothesis$_5$: The Job complexity positively moderates the relationship between proclivity to OI and the managerial employees' creativity.

3. Methodology

3.1 Sample Characteristics and Data Collection

This study investigates the impact of proclivity to OI, job complexity and technology turbulence on managers' creativity. The empirical study for testing the hypotheses adopted a cross-sectional questionnaire based survey conducted in a technologically less advanced country[2] by using an email database of a university. In consistent with previous studies (Oldham & Cummings, 1996; Farmer, Tierney, & Kung-McIntyre, 2003; Shalley et al., 2004; Coelho & Augusto, 2010), managers in different hierarchical levels were considered as the unit of analysis. A self-administrated questionnaire was distributed to 1,100 managers, and 378 responses were received (response rate: 34.4 per cent). Due to incompletion, 15 responses were eliminated and 363 were used for the analysis (net response rate: 33 per cent). The questionnaire was developed in English and tested with 12 respondents out of which 6 were from manufacturing sector, 7 were males from private sector. Also, 4 respondents possessed below graduate level education and 5 and 4 respondents represented lower and middle level in management hierarchy, respectively. Based on the responses, some of the questionnaire items were revised slightly for the clarity.

3.2 Variables and Measures

The scale for measuring the dependent variable, creativity, was adapted from Ganesan & Weitz (1996) who adapted it from Scott & Bruce (1994). The five items used tap the extent to which the managerial employees

[2]Technologically less advanced countries are the Scientifically Lagging Nations as of "RAND's Science and Technology Capacity Index". This study selected Sri Lanka as a technologically less advanced county.

are creative. The scale for measuring the independent variable, the proclivity to OI, was adapted from Hung & Chiang (2010). The constructs were devised based on six OI principles of Chesbrough (2006a, p. xxvi) and assessed the managers' inclination to utilize external ideas to complement their firms' technology and to sell their firms' intellectual property to outsiders to profit from them. The MPS index of Hackman & Oldham (1976) was used to measure moderating variable, job complexity. The MPS index is computed as follows: MPS = [(Task Variety + Task Identity + Task Significance)/3] x Autonomy x Feedback. To measure individual job characteristics, scales were adapted from Coelho & Augusto (2010) who adapted the scales from the job diagnostic survey of Hackman & Oldham (1975, 1980). The four-item scale concerning technology turbulence wasadapted from Jaworski &Kohli (1993), and they measure the rate at which the technology in an industry is getting changed. All items were measured by five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5).

Construct Validity: The measures were refined and assessed for construct validity as per the two-step approach recommended by Anderson &Gerbing (1988). Firstly, the exploratory factor analysis was run for multi-item scales (creativity, OI proclivity, technology turbulence and each job characteristics). Theoretically expected factor loadings for all items were achieved (over 0.7 except two item bearing 0.688 and 0.649. One item was dropped due to the lower factor loading). Secondly, an 8-factor confirmatory measurement model was estimated for all focal latent variables. Each questionnaire item was loaded only on the relevant first-order latent construct. After dropping one item due to the low factor loading, the confirmatory model achieved a satisfactory fit (absolute index: goodness-of-fit index [GFI] = 0.856, root mean square error of approximation [RMSEA] = 0.039, root mean square residual [RMR] = 0.039; incremental index: incremental fit index [IFI] = 0.864, normed fit index [NFI] = 0.814, comparative fit index [CFI] = 0.862). All factor loadings were highly significance (p<.001). All composite reliabilities of construct exceeded (0.677 – 0.991) the minimum threshold point of 0.6 (Bagozzi & Yi, 1988). Also, the average variance extracted (AVE) of all constructs (0.505 – 0.668. AVE for a contract was 0.497) exceeded the cut-off-point of 0.50 (Hair, Black, Babin, & Anderson, 2009). These values confirmed adequate convergent validity and reliability (Fornell & Larcker, 1981). The discriminant validity of the measures was tested by calculating the squire of the correlation between all possible pairs of construct and then comparing with AVE to determine whether they are lower than the AVE of the individual constructs (Fornell & Larcker, 1981). The results show that all AVE values (minimum 0.497) are adequately higher than the squire of the correlation with the other construct (0.000 – 0.475), in support of discriminant validity. Thus, the results show that the measures of the study possess adequate reliability and validity.

Also, the study considered several control variables focusing personal characteristics such as management hierarchy, level of education and gender. Management hierarchy was measured in three-point scale (top, middle and lower levels). Five-point scale was adapted to measure level of education (below bachelor, bachelor, postgraduate diploma, master and doctoral level). The majority of the sample (63.9 per cent) was at middle level, and 32.2 per cent represented the lower level management. Higher number of respondents (72 per cent) possessed postgraduate qualifications and 22 per cent possessed bachelor level qualifications. 64.7 per cent of the sample was male, and 84 per cent was above 30 years of age. Half of the respondents (50.4 per cent) possessed more than 10 years of work experience while 77.4 percent were working for firms having more than 150 employees.

4. Analysis and Results

The table 1 summarizes basic descriptive statistics and correlations among the measures. It indicates that the managers in technologically less advanced countries are moderately inclined to OI (M = 3.34, SD = .64), and to creativity (M = 3.98, SD = .56). The technological environment is moderately turbulent(M = 3.46, SD = .77). Also, OI proclivity, job complexity (MPS) and technology turbulence positively and significantly associate with creativity as per the theoretical speculations. The issue of multicollinearity is examined by the variance inflation factor (VIF) for each construct in regression equations. The maximum VIF value, 1.25 within the models is far below the cut off value of 10 (Neter, Wasserman, & Kutner, 1990), alleviating the concern of multicollinearity.

The hierarchical regression method was applied to test hypotheses and assess the explanatory power of each set of variables (Aiken & West, 1991). Also, this method helps explain whether or not the interaction term has a significant effect over and above the direct effect of the independent variables, and thereby the

existence of interaction effect (Wiklund & Shepherd, 2003). The results of hierarchical regression analysis are presented in the Table 2. The base model, Model 1, includes only control variables, and explains statistically significant amount of the variance in creativity ($R^2 = 0.029$, $p < 0.05$). In the Model 2, direct variables are included to assess the main effect, and this set of variables contributes to significant amount of variance in creativity ($R^2 = 0.430$, $\Delta R^2 = 0.401$, $p < 0.001$). In particular, coefficients of direct relationships indicate that OI proclivity ($\beta = 0.136$, $p < 0.001$), MPS ($\beta = 0.478$, $p < 0.01$) and technology turbulence ($\beta = 0.248$, $p < 0.001$) have significant positive influenceon creativity. The result supports the hypothesis$_1$ that posits a positive effect of proclivity to OI on managers' creativity. It also supportshypothesis$_2$ that postulates a positive effect of technology turbulence on managers' creativity. The hypothesis$_4$ that proposes a positive effect from the job complexity to the managers' creativity is also supported. Model 3 measures the interaction effect of the MPS index and technology turbulence on the relationship between the OI proclivity and the creativity, and these interactions account for a significant variance in creativity over and above the main effects ($R^2 = 0.448$, $\Delta R^2 = 0.058$, $p < 0.001$). Both interaction terms have a significant negative moderating effect (OI proclivity × MPS index: $\beta = -0.794$, $p < 0.001$; OI proclivity × technology turbulence: $\beta = -0.653$, $p < 0.01$), contrary to hypothesis$_3$ and Hypothesis$_5$, which propose positive effects. Thus, both hypotheses are not supported. Also, adjusted R^2 increases gradually from model 1 to 3 (R^2 (adj) = 0.021, 0.42, 0.477 respectively).

Table 1. Basic Descriptive Statistics and Correlations

Variables	Mean	SD	1	2	3	4	5	6	7
1. Creativity	3.98	.56	1.00						
2. OI Proclivity	3.34	.64	.19**	1.00					
3. Tech. Turbulence	3.46	.77	.45**	.12*	1.00				
4. MPS	57.57	19.54	.56**	-.01	.40**	1.00			
5. Hierarchy	1.72	.53	.06	-.01	.07	.09	1.00		
6. Gender	1.35	.48	-.15**	-.15**	.08	.00	.04	1.00	
7. Education	3.06	.95	-.023	-.01	-.06	.17**	.07	-.14**	1.00

Notes: *MPS = Motivating Potential Score, N = 363, **p < 0.01, * p< 0.05*

Table 2. Results of Hierarchical Regression Analysis

	Model 1		Model 2		Model 3	
Variables	b (s.e)[a]	β	b (s.e)[a]	β	b (s.e)[a]	β
Control variables						
Hierarchy	-.185(.062)	-.157**	-.192(.048)	-.163***	-.210(.046)	-.179***
Gender	.075(.055)	.070	.015(.043)	.014	-.030(.041)	-.029
Education	-.029(.031)	-.050	-.067(.024)	-.113**	-.043(.024)	-.073*
Direct effects						
OI Proclivity (OIP)			.120(.036)	.136***	.888(.140)	1.007***
Tech. Turbulence (TT)			.180(.032)	.248***	.477(.135)	.655***
MPS			.014(.001)	.478***	.031(.005)	1.089***
Moderating effects						
OIP × MPS					-.006(.001)	-.794***
OIP × TT					-.106(.041)	-.653**
R	0.17		0.656		0.699	
R^2	.029		.430		.488	
ΔR^2	.029		.401		.058	
R^2 *(Adj.)*	.021		.420		.477	
F	3.547		44.736		42.212	
p for F and Change	.015		.000		.000	

Note: *MPS = Motivating Potential Score, Dependent variable: Creativity, N = 363*
[a] *Unstandardized coefficients with standard errors in the parentheses and standardized coefficients are reported*
****p<.001, **p<.01, *p<.05*

5. Discussion and Conclusions

Among the extent OI literature, individual level studies and studies in technologically less advanced countries are scare. Though effect of various antecedent conditions on creativity has been inquired, there are no studies that consider the effect of the OI proclivity. The knowledge on the effect of the job complexity and the technologically turbulent environment on creativity in the technologically less advanced countries is scare. Thus, this empirical study attempts to fill in this gap by exploring the level of the OI proclivity of managers, job complexity and technology turbulence, and their effect on creativity.

The findings of the study confirm and further advance the literature related to OI, job characteristics and creativity literature in several ways. Firstly, Managers in technologically less advanced countries are creative at moderately higher level. Also, those managers show an above average level of inclination to open innovation, and face with instable technological environment at above average level. Secondly, building on componential theory of creativity, this study examines the effect of OI proclivity on managers' creativity. The results show that the OI proclivity has a positive effect on creativity. Thus, employees who are more inclined to OI are more creative. According to the theoretical speculations, the employees' baseline attitudes are part of intrinsic motivation (Amabile, 1996). The proclivity to OI can be recognized asa baseline attitude ofemployees that enhances intrinsic motivation.Also, these findings confirm the theoretical speculation on the effect of intrinsic motivation on creativity. Thirdly, the results find a positive effect of MPS on creativity suggesting that more complex job design leads to higher creativity. This is in consistent with the results of previous studies that discuss job characteristics as an individual job-level factor affecting creativity (i.e. Hackman & Oldham, 1975, West & Farr, 1989; Oldham & Cummings, 1996; Kanter, 1988). The results are also in line with the conclusions of Coelho &Augusto (2010) thatadapted a component-wise analysis of job characteristics. Fourthly, the established positive relationship between the technology turbulence and

creativity reveals that turbulent environment makes managers be more creative than in a non-turbulent environment. Higher opportunities and challenges created by the turbulent environment demand a higher level of creativity. This confirms the influence of contextual elements on creativity as suggested by previous studies (i.e. Woodman et al., 1993).

Surprisingly, the results find the negative moderating effect of both MPS and technology turbulence on the relationship between OI proclivity and creativity, contrary to the theoretical speculations. Firstly, negative effect of MPS may be due to the different mechanism through which OI proclivity is influenced by each job characteristic since each of them has its own locus of interest and involves different cognitive activities (Coelho & Augusto, 2010). Secondly, the results reveal that the managers in a turbulent setting are less inclined to technology exploration and exploitation. A technologically turbulent environment does not motivate managerial employees intrinsically, thereby reduce the proclivity to OI. Possible explanations for these results are that the managers in a turbulent environment are more defensive in nature thus, tend to avoid possible risks; the managers experiencing less opportunities and challenges in non-turbulent environment strive to create and chase them. Also, due to this result, MPS and technology turbulencecan be explained as some motivational interactions having an adverse effect on the relationship between OI proclivityand creativity since they may direct the attention of employees away from heuristic aspects of OI proclivity and creativity.

The outcome of this study has several implications to managers. The results of this study indicate that managers in technologically less advanced countries are creative and have inclination towards OI. OI proclivity can be identified as an important intrinsic motivator. The managers' creativity can be spurred by enhancing the inclination to OI thus, implementation of OI further increases creativity. The decision to adopt OI is better in term of motivation than merely providing extrinsic motives. Also, the findings confirm that the job design has an impact on creativity. A firm can increase the level of managers' creativity by designing more complex jobs. Further, the environment turbulence also has an effect on creativity. Managers' creativity is higher in a technologically turbulent environment than in less-turbulent environment. However, managers should be aware of the limitations and negative influences of the job complexity and the technology turbulence in implementing OI. The practitionersshould be careful and selective in adapting OI and enhancing job complexity simultaneously. And, firms operating in technologically turbulent environment need to be cautious on acting upon their OI initiatives. Also, managers should not find that these recommendations are universal since differences such as industry, technology intensity of the country and the firm, experience, size of the firm, sector (private vs. public, manufacturing vs. service), need for growth etc. may have an effect on the findings of this research.

This research focuses on new area of study, investigating the effect of proclivity of managers towards OI on their creativity. Apart from the merits, contributions of this study should be considered with the appropriate understanding of limitations which open opportunities for future studies. First, this study considered managers from various industries and sectors together. For specific understanding, further narrowed investigations such as industry level, technology intensity level and sectorial analysis may be required. Also, the study considered managers occupying different positions (i.e. marketing, finance etc.) together. However, there is a possibility that managers from different positions may respond differently to job characteristics, OI proclivity and creativity. Therefore, it would be interesting to inquire how managers from different position respond to job characteristics, OI proclivity and creativity. Proposed narrow studies would possibly lead to a lower sample variability and thereby reduce the variance of independent variables resulting more meaningful hypotheses testing. Also, this study adopted a composite approach on job characteristics, and concentrated only on the direct effect. This approach ignored interactive effect among job characteristics, creating an opportunity for further investigation by a component-wise analysis. This study assumed a causation mechanism from OI proclivity, technology turbulence and MPS to creativity. Though a longitudinal research design is much appropriate for studies in this nature, this study used a cross sectional approach, opening an opportunity for further investigation.

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