Journal of Innovation Management
JIM 7, 3 (2019) 15-40
HANDLE: https://hdl.handle.net/10216/122981
DOI:https://doi.org/10.24840/2183-0606_007.003_0003
SM: Mar/2018 AM: Apr/2019

Employee Innovation Process: An Integrative Model

Oladimeji J. Odetunde
oodetunde@unilag.edu.ng | Department of Employment Relations and Human Resource Management, University of Lagos, Akoka, Lagos, Nigeria

Abstract. Enormous research has focused on investigating innovation process in organisations but only a few are devoted to employee innovation process, thus limiting our understanding of how to organise, foster and successfully manage employee innovation in organisation. Drawing from the literature, this study extends the two-phase model of innovation process comprising creativity and innovation by proposing a three-phase employee innovation process model that integrates innovation adoption. Using stratified sampling technique and structured questionnaires, data were collected from 430 middle managers of four mobile telecommunication companies in Nigeria. Results of the regression and path analyses to test the hypotheses and model fit support a revised three-phase model of employee innovation process showing employee creativity has a direct causal effect on employee innovation and employee innovation adoption, and employee innovation as a direct causal effect on employee innovation adoption. Dispositional factors have stronger causal effects on employee creativity than contextual factors and contextual factors have stronger causal effects on employee innovation than dispositional factors. Both dispositional and contextual factors have comparably strong direct causal effects on employee innovation adoption, with the effects of dispositional factors slightly stronger. By providing evidence in support of a three-phase innovation process with innovation adoption as a concluding phase of the innovation process, this study has provided new, empirically based insights into the study of innovation process from employee unit of analysis. Implications for theory and practice are discussed.

Keywords. Dispositional and Contextual Factors; Employee Innovation Process; Integrative Model.

Cite paper as: Odetunde, O., (2019). Employee Innovation Process: An Integrative Model, *Journal of Innovation Management*, www.open-jim.org, 7(3), 15-40.

ISSN 2183-0606
http://www.open-jim.org

1 Introduction

Continuous innovation and adoption of innovative business model have been recognised as vital to both competitive advantage and long-term success of organisations. It is also recognised that innovation is one of the three top challenges facing organisations in today's business world. Without innovation, organisations fail to create the conditions needed for sustainable growth (Rao, 2016). The foundation of many of the innovations in organisations are the employees who invent, implement and adopt new technologies and business ideas in their individual work roles (Korzilius, Bücker and Beerlage, 2017).

The importance of innovation to organisational performance has attracted enormous research to be focused on innovation process and the antecedent factors in organization. Research has generally established innovation as a two-phase process of creativity (idea generation) and innovation (idea implementation) (e.g., Anderson *et al.*, 2004; Brennam and Dooley, 2005; Shalley and Gilson, 2004) with different factor implication. However, despite the recognition that adoption of innovation by individuals and organisations is a critical element of the innovation process leading to improved production process and operational efficiency, improved quality of products and services, organisational transformation and sustainable innovation, the implied linkage of innovation adoption to the process of innovation in literature has not been investigated. Isolating adoption from the innovation process has therefore made the process differentiation incomplete and the implications of this for theory and innovation management in organisations are enormous.

Besides creativity and innovation, adopting innovation is a critical element of the innovation process. Integrating adoption should therefore provide a clearer differentiation of the innovation process (Rank *et al.*, 2004) and better understanding of how employee innovation can be organised, fostered and successfully managed in organisations. Echoing the opinion of Jain (2010), better understanding of how organisations evolve in meeting the challenges of change and fulfilling the expectations of internal and external stakeholders requires a more sophisticated understanding of their innovation process. Consequently, building upon the extant literature which considers innovation as a two-phase process of creativity and innovation, this study conceptualises, tests and clarifies a three-phase model that integrates innovation adoption as the concluding phase of the innovation process and distinguishes among the antecedent factors of the different phases.

2 Literature, Hypotheses and Model Specification

2.1 Employee Innovation

Plessis (2007) views innovation as the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services. Walker (2006) defines innovation as a process through which new ideas, objects, and practices are created, developed or reinvented and which are new and novel to the unit of adoption. According to Baregheh *et al.*, (2009), innovation in organizational term is the process by which organizations transform ideas into new and improved products,

service or processes, in order to advance, compete and differentiate themselves successfully in the market.

Employee innovation implies that employees contribute actively to the innovation process in organisation. They engage in activities to generate and transform creative ideas into innovative outcomes for organisations. Employees engage in innovation when they intentionally create, introduce and apply new ideas, processes, products or services within their work role, group, or organization (De Jong and Den Hartog, 2010; Yuan and Woodman, 2010; Abstein and Spieth, 2014).

Employee innovation is a critical element in organisational innovation process as the innovation capability of organisations derives from their employees' innovation capabilities. Buttressing the importance of employees to the organisational innovation outcomes, Patterson *et al.* (2009) opine that the innovative potential of an organisation resides in its employees who build, promote and breathe life into the innovative culture of organisation. Chen and Sawhney (2010) also stressed that human resources in organisation are the single most important ingredient in the organisation innovation success formula.

Employees can help their organisations to develop incremental improvements in features of existing process and products and services to maintain or increase market shares or to develop radically different novel ones to create new markets (Axtell *et al.*, 2000). Mild changes to technology, product process, administrative procedure, etc without complete or total replacement constitutes incremental innovation. Radical innovation tends to replace existing ideas, products, services, or processes, create new business model, etc. A typical example of radical innovation is the introduction of iPhone by Apple in 2007 which converted mobile phone to smartphone, converging the traditional cell-phone, Internet connectivity, and personal computing in a single device. This innovation created new needs and new market, setting new rules, redefining and revolutionising telecommunication. Incremental innovation is relatively easier and may be within the capability of many employees. Radical innovation is rather more complex, somewhat rare and within the capability of only few employees in strategic positions in organization. Employees' capabilities for both incremental and radical innovations help their organisations to grow and be successful in the world markets.

2.2 Two-Phase Employee Innovation Process: Creativity and Innovation

Innovation as a process denotes a chain of inter-connected activities involved in bringing forth and turning new ideas and possibilities into reality (Bessant and Tidd, 2007). Two phases of creativity and innovation have traditionally been conceptualised to comprise the innovation process. However, the two phases have been confused and used interchangeably in literature (Paulus, 2000), thus necessitating the need for a clearer process differentiation and set the boundaries and clarify the activities that constitute each (e.g. Rank *et al.*, 2004).

Clarifying the process, many authors have shown that the two processes differ and individually refer to distinct activities. Creativity refers to the generation of novel (i.e., original, unexpected) and useful ideas, products or problem solutions. Innovation however refers to the first introduction and successful implementation of the novel ideas and bringing of the new ideas to fruition. For example, Yuan and Woodman (2010) define innovation as a complex behaviour consisting of activities pertaining to both the generation of new ideas and their implementation. Parzefall

et al. (2008) and De Jong and Den Hartog (2010) view innovative behaviour as consisting of two major stages of idea initiation/generation and idea implementation. Mulgan and Albury (2003) view successful innovation as the creation and implementation of new processes, products, services and methods of delivery which result in entirely new or significant improvements in outcomes.

Employee innovation process can therefore be regarded as the sequence of activities employees engage in to generate and transform creative ideas into concrete and successful organizational outcomes. Creativity occurring at the front-end of the process, is a prerequisite and necessary starting point - but an insufficient condition – for innovation to occur (Dewulf, 2013; Yidong and Xinxin, 2013; Abstein and Spieth, 2014; Anderson *et al.*, 2014). Amabile (2004) further states that no innovation is possible without the creative processes that mark the beginning stage of the process. Therefore, without creative ideas to feed the innovation pipeline, so they may be promoted and developed, innovation is an engine without fuel (McLean, 2005).

2.3 Integrating Innovation Adoption

While innovation may be generated and implemented by employees within an organisation, innovation may also be generated outside of the organization (Zhou and Shalley, 2010). According to Anderson *et al.* (2004), innovation also includes ideas that have been adopted and adapted from other organizations but that are new to the unit of adoption. Adoption occurs when employees accept and decide to make full use of innovations generated from outside their organisation as the best course of action available (Rogers, 2003). The value and the success of innovation manifests in its ultimate adoption (Agarwal and Prasad, 1999). As noted by Rogers, innovation is successful only if it is accepted and integrated into the organisation and the target adopters demonstrate commitment to using it over time. Adoption therefore is the sourcing and using of innovation developed outside the unit of adoption. As most innovations result from "borrowing" rather than "invention" (Cohen and Levinthal, 1990; Garner and Ternouth, 2011), employee adoption of innovation and new knowledge from outside sources is critical to organisations' innovativeness and competitiveness.

Successful adoption of innovation is a function of personal innovativeness of adopter which refers to the innate tendency to produce and adopt innovation (Frambach and Schillewaert, 2002). The adoption component is determined by the employees' absorptive capacity; the ability of adopters to recognise potential value in outside innovations and new knowledge and their degree of receptiveness and willingness to convert and apply them to their use (Cohen and Levinthal, 1990). The speed and success of adoption are also determined by absorptive capacity. Based on absorptive capacity and speed of adoption, Rogers (2003) identified five adopter categories. The *innovators* and *early adopters* are the most successful adopters with high propensity to adopt and adapt innovation to their need. The *early majority* and *late majority* are sceptical of innovation and wait till the majority is using the innovation before adopting. This makes them less successful adopters as they often lose out on the advantages of early adoption. *Laggards* are particularly suspicious of and accept innovation only when it is indispensable. Innovators and early adopters who are better skilled in evaluating innovations more easily and are quick at recognising values in innovations and can help their organisation take advantage of first and early adoption of innovation are most suited for modern organisations as employees.

The above exposition suggests that employee innovation transcends simply developing and implementing innovation. Employee innovation includes the capacity to adopt, adapt and exploit existing innovation. Any study of employee innovation process should therefore include adoption of innovation. Supporting this position, Vincent *et al.* (2002) and Parzefall *et al.* (2008) asserted that employee innovation spans initial idea generation to new process development, and the adoption of new processes or structures in the organisation. Other authors also implied innovation process as comprising three phases with adoption as an integral phase. Rogers (2003) conceives innovation process as beginning with the invention of an idea (creativity), through its development, production and testing into a concrete device or programme (innovation) and culminating in its diffusion to and adoption by users. Hansen and Birkinshaw (2007) represent innovation value chain as involving idea generation, idea conversion and development, and diffusion to others of the developed concepts. Kamal (2006) and Baregheh *et al.* (2009) also portray innovation as comprisingof idea (invention) of something new; development (production) of something new, and commercialization (diffusion/adoption) of something new. Employee innovation can therefore be considered as the process by which employee generate, implement and adopt innovation in their work role.

Failure of previous studies to integrate adoption as a phase of employee innovation and clearly discern the processes involved and their antecedents have limited our understanding of the innovation process and how to manage the employee innovation process in organisation. For this reason, calls have been made for integrative frameworks to broaden the understanding of the innovation process (e.g., Anderson *et al.*, 2014). Accordingly, the two-phase innovation process of creativity (idea generation) and innovation (idea implementation) established in literature is considered inadequate to explain the employee innovation process and this study conceives an integrative three-phase employee innovation process of creativity (new idea generation) occurring at the front-end of the process with innovation (first introduction and implementation of the new idea) as a mid-process and adoption (acceptance and use of innovation and the new idea) concluding the process. To test this assumption, it is hypothesised that:

> *Hypothesis 1*: Employee creativity has a direct causal effect on employee innovation and employee innovation has a direct causal effect on employee innovation adoption.

2.4 Dispositional and Contextual Factors Facilitating Employee Innovation Process

Employee innovation as a complex phenomenon has been established to have multiple antecedent factors including the dispositional and contextual factors of the individuals and organisations (Anderson *et al.*, 2014; Baer, 2012). The initiative toward innovation in organisation originates from the employees and this is rooted in their dispositional characteristics which include personality factors, abilities, orientation, motivational factors etc. The initiative is however facilitated by contextual factors encompassing types of job, nature of work team and task, and organisation-related factors like work environment that provide the boundaries for employee innovative behaviour (Stock, 2015; Fay *et al.*, 2014; Naranjo-Valencia *et al.*, 2017). According to Åmo and Kolvereid (2005), even with the right individual characteristics, how employees perceive the organisational context influences their innovative behaviour, thus implying that individual

and organisational factors act interactively to influence employee innovative work behaviours (Hannele and Parzefall, 2007).

With the conceptual differences in the innovation process established in literature, the different phases may not necessarily be influenced by the same factors. While it has been established that dispositional factors correlate more strongly with creativity (idea generation) phase and contextual factors more strongly with innovation (idea implementation) (Damanpour, 2017; Rank *et al.*, 2004), both dispositional and contextual factors have been implied to relate equally to adoption. As noted by Moore (2002), while management may wish to encourage and facilitate individual adoption of innovation by providing the necessary organisational support and enabling work context, eventual acceptance and decision to adopt innovation depends on the individual adopters and some individuals may accept and adopt innovation more readily than others. Conversely, while an individual may be willing to adopt innovation, the prevailing organisational context may not encourage such decision. The context provides the opportunities for individuals with the right disposition to adopt innovation. This implies that innovation adoption depends not only on the individual adopter but, also on the work context.

Thus, innovation adoption may fail if either the dispositional or the contextual factors are missing. Both dispositional and contextual factors are therefore equally important in innovation adoption. In particular, studies have correlated dispositional factors like achievement orientation, proactivity, role breadth self-efficacy and individual competitiveness (e.g., Gautam *et al.*, 2008; Kim *et al.*, 2010; Odetunde, 2012) and contextual factors like participation in decision making, work autonomy, organisational communication and management support (e.g., Damanpour and Schneider, 2006; Sá and Abrunhosa, 2007; Damanpour and Aravind, 2012; Crossan and Apaydin, 2010; Odetunde, 2012) with adoption of innovation. Therefore, it is hypothesised that:

> *Hypothesis 2(a):* Dispositional factors have stronger direct causal effects on employee creativity than contextual factors.
>
> *Hypothesis 2(b)*: Contextual factors have stronger direct causal effects on employee innovation than dispositional factors.
>
> *Hypothesis 2(c)*: Both dispositional and contextual factors have comparably strong direct causal effects on employee innovation adoption.

2.5 Model Specification

Bean (2002) advocates for a model to manage innovation process in organisation and believes a model allows the situation to be seen more clearly and assists in the understanding of how employee innovation is generated, supported and sustained. It is therefore important within the framework being considered to conceptualise a model that integrates the adoption phase into the employee innovation process and clarify variable implication for the different facets for a clearer understanding and better management of the employee innovation process. Consequently, from the literature reviewed above and the derived hypotheses, a model of employee innovation process is conceptualised as depicted in Figure 1.

The model assumes direct causal relationships between employee creativity $_{(3)}$ and employee innovation $_{(4)}$ (P_{43}) and employee innovation $_{(4)}$ and employee adoption of innovation $_{(5)}$ (P_{54})

(Hypothesis 1), dispositional factors $_{(1)}$ and employee creativity $_{(3)}$ (P_{31}) (Hypothesis 2a), contextual factors $_{(2)}$ and employee innovation $_{(4)}$ (P_{42}) (Hypothesis 2b) and dispositional $_{(1)}$ and employee adoption of innovation $_{(5)}$ (P_{51}), and contextual factors $_{(2)}$ and employee adoption of innovation $_{(5)}$ (P_{52}) (Hypothesis 2c). The model also assumes no direct causal relationships between employee creativity and employee adoption of innovation, dispositional factors and employee innovation, and contextual factors and employee creativity.

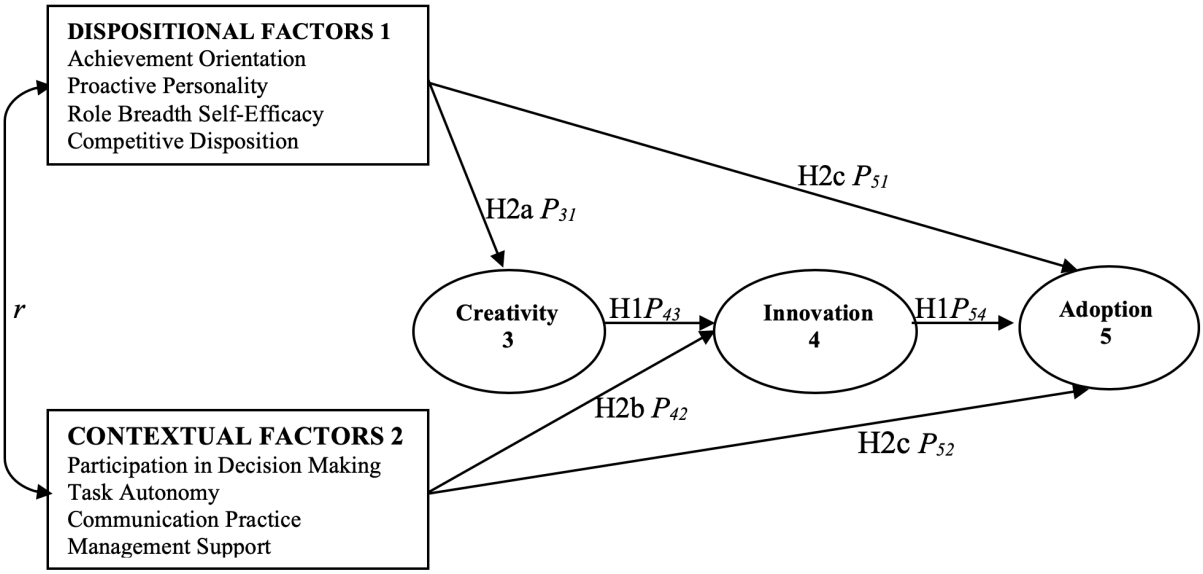

Fig. 1. Integrated model of employee innovation process showing the hypothesised phases and their antecedent factors.

3 Methods

3.1 Research Setting

The setting for this research is the head offices and 20 regional offices and outlets of four mobile telecommunication companies in Nigeria. As a high technology, innovation intensive and highly competitive industry where employee innovation is a required capability for organisational growth and survival, mobile telecommunication industry offers appropriate setting for the study. Studies assert that innovation in such high technology industry does not so much rely on R&D-based knowledge, but on the internal sources for knowledge from employees and managers, especially the middle managers who implement, facilitate, synthesise and drive the innovation process as part of their core responsibilities (Birken et al., 2012; Engle et al., 2017). The setting for this research is the head offices and 20 regional offices and outlets of four mobile telecommunication companies in Nigeria. As a high technology, innovation intensive and highly competitive industry where employee innovation is a required capability for organisational growth and survival, mobile telecommunication industry offers appropriate setting for the study. Studies assert that innovation in such high technology industry does not so much rely on R&D-based knowledge,

but on the internal sources for knowledge from employees and managers, especially the middle managers who implement, facilitate, synthesise and drive the innovation process as part of their core responsibilities (Birken *et al.*, 2012; Engle *et al.*, 2017).

3.2 Participants and Data Collection Procedure

Participants were middle managers of four mobile telecommunication companies in Nigeria. Stratified random technique was adopted to ensure that data were collected from all the departments in their head offices and 26 regional offices and outlets. From a total of 660 middle managers initially sampled from across all departments of the telecommunication companies, 442 (67%) participated in the study with usable data from 430 (65%). Two hundred and seventy-eight (64.7%) were males and 152 (35.3%) females. Their ages ranged from 24 to 52 years (x = 33.2). Three hundred and forty-seven (80.7%) have first university degree and eighty-three (19.3%) have post-graduate degree/diploma. Their job experience in their respective companies ranged from 2 to above 10 years (x = 4.8).

The departments across the four companies are diverse in nature and activities. To facilitate data collection, the departments were clustered into 5 based on similarity of their functions and activities. A proportion of 50% of total number of middle managers in each department was selected to be able to generate enough data. Their distribution across the 5 departments is as follows: Administration - 40 (9.3%), Commercial - 156 (36.3%), Technical/Maintenance - 151 (35.1%), Operations - 73 (17%) and Finance - 10 (2.3%). Participants filled self-administered structured questionnaires during their lunch break. Data collection lasted 16 weeks with two to four visits made to each participant.

3.3 Measures

Employee Creativity, Innovation and Innovation Adoption: Employee creativity and innovation were measured by Borill *et al.*'s (1998) measures of idea and suggestion making and implementation as modified by Odetunde (2012). The two scales, each with 9 items, tap information on the extent to which employees propose improved changes to various aspects of their work and the suggested changes were implemented. Six items on each of the two original scales were modified and 3 new items derived from the literature of creativity and innovation added to tap information on other work domains not covered in the original scales. Sample items on the creativity scale include: *In the last one year or so, to what extent have you*: 1) suggested new ways of performing your job or jobs of others, 2) provided new solutions to problems identified in your job or jobs of others, 3) suggested new methods of improving operational efficiency of your work unit. Sample items on the innovation scale include: *In the last one year or so, to what extent have you implemented*: 1) your suggestions on new ways of performing your job or jobs of others, 2) your new solutions to problems identified in your job or jobs of others, 3) your suggestions on new methods of improving operational efficiency of your work unit.

The employee innovation adoption scale also consists of 9 items derived from literature of innovation adoption (for example, Roger's theories of adoption, 2003; Lenox *et al.*, 2000). Items

on the scale were structured to explore the extent to which employees adopt or have adopted innovation in the same job domains covered by the creativity and innovation scales. Sample items include: *In the last one year or so, to what extent have you adopted from others*: 1) new ways of performing your job, 2) new solutions to problems identified in your job, 3) new methods of improving operational efficiency of your work unit.

Dispositional and Contextual Factors: The dispositional scales comprise of validated scales of achievement orientation (10 items), proactive personality (Bateman and Crant, 1993) (6 items), role breadth self-efficacy (Parker, 1998) (10 items) and competitive disposition (Odetunde, 2012) (9 items). The contextual scales comprise of validated scales of participation in decision-making (Parker *et al.*, 1997) (5 items), task autonomy (Jackson *et al.*, 1993) (5 items), communication practices (Parker, 1998) (9 items) and management support (Parker *et al*, 1998) (10 items).

Response to the employee creativity, innovation and innovation adoption scales is a 5-point Likert format ranging from 1 (to no extent) to 5 (to a very great extent) and a 5-point Likert format ranging from 1 (Strongly disagree) to 5 (Strongly agree) for the dispositional and contextual scales. Test of reliability with item-total correlation coefficients ranged from 0.59 to 0.76 for creativity, 0.63 to 0.81 for innovation and 0.65 to 0.81 for innovation adoption scales, and 0.53 to 0.77 and 0.53 to 0.80 respectively for dispositional and contextual scales. Howitt and Cramer (1997) suggested item-total correlation coefficient of 0.40 as sufficient to establish internal consistency of a scale. Cronbach alphas for creativity, innovation and innovation adoption range from 0.74 to 0.93; dispositional factors from 0.86 to 0.92 and contextual factors from 0.85 to 0.94.

4 Results

Means, standard deviations, and zero-order correlations of all the variables are shown in Table 1. Employee creativity positively relates to employee innovation ($r = 0.69$, $p<.001$) and employee innovation adoption ($r =0.62$, $p<.001$). Employee innovation also positively relates to employee innovation adoption ($r =0.71$, $p<.001$). As expected, dispositional factors show stronger positive relationships with employee creativity ($r =0.53$, $p<.001$) than contextual factors ($r =0.42$, $p<.001$) and contextual factors show stronger positive relationships with employee innovation ($r =0.54$, $p<.001$) than dispositional factors ($r =0.46$, $p<.001$). Contextual factors show stronger relationship with employee innovation adoption ($r =0.53$, $p<.001$) than dispositional factors ($r =0.49$, $p<.001$).

4.1 Hypotheses Testing

Hypotheses were tested with hierarchical regression analyses. Sequence of the employee innovation process and their antecedent factors as established in literature informed the entry of variables into the regression equations. Demographic variables were entered en-block in step 1 of the regression equations, followed in steps 2 and 3 by the appropriate dispositional and contextual factors to determine their respective causal effects on each phase of the innovation process. Employee creativity was used as a precursor of employee innovation and employee in-

Table 1. Descriptive statistics, correlations among all variables

	Variable	Means	SD	1	2	3	4	5
1	Employee Creativity	31.30	6.47	1.00				
2	Employee Innovation	30.67	7.16	0.69**	1.00			
3	Employee Innovation Adoption	31.63	7.05	0.62**	0.71**	1.00		
4	Dispositional Factors	136.58	20.49	0.53**	0.46**	0.49**	1.00	
5	Contextual Factors	117.36	20.38	0.42**	0.54**	0.53**	0.50**	1.00

$^{**}p<.01$, N= 430

novation as a precursor of employee innovation adoption in the analysis. Similarly, dispositional and contextual factors were used as determinants of the employee innovation process.

Results of the analyses of casual effects of employee creativity on employee innovation and employee innovation on employee innovation adoption are shown in Table 2. Employee creativity accounted for 56% of the variance in employee innovation ($R^2= 0.56,\ p<.001$), resulting in a change of 43% of the variance in employee innovation ($\Delta R^2= .43,\ p<.001$) and employee innovation adoption accounted for 65% of the variance in employee innovation ($R^2= .65,\ p<.001$), resulting in additional change of 9% of the variance in employee innovation ($\Delta R^2= .09,\ p<.001$). Employee innovation also accounted for 55% of the variance in employee innovation adoption ($R^2= .55,\ p<.001$) with 42% change of the variance ($\Delta R^2= .42,\ p<.001$) and employee creativity accounted for a variance of 58% ($R^2= .58,\ p<.001$) resulting in a change of 3% of the variance ($\Delta R^2= .03,\ p<.001$). Assessment of their unique causal effects using their beta weights revealed that employee creativity accounted for more unique variance in employee innovation ($\beta=.43,\ p<.001$) than employee innovation adoption ($\beta=.41,\ p<.001$). Employee innovation also accounted for more unique variance in employee innovation adoption ($\beta = .50,\ p<.001$) than employee creativity ($\beta = .42,\ p<.001$). Therefore, Hypothesis 1 was confirmed that employee creativity has direct causal effect on employee innovation and employee innovation has direct causal effect on employee innovation adoption.

Results of the analyses of causal effects of dispositional and contextual factors on employee creativity, employee innovation and employee innovation adoption in Table 3 show that dispositional factors produced a variance of 35% in employee creativity ($R^2=0.35,\ p< .001$) resulting in a change of 27% of the variance ($\Delta R^2=0.27,\ p< .001$) and contextual factors produced a variance of 38% ($R^2=0.38,\ p< .001$) resulting in a change of 3% ($\Delta R^2=0.03,\ p< .001$). Thus, both dispositional and contextual factors significantly produced variance in employee creativity thereby having causal effect on employee creativity. Assessment of their unique causal effect using their beta weights (β) shows that the dispositional factors have stronger causal effect on employee creativity ($\beta=0.45,\ p<.001$) than the contextual factors ($\beta=0.21,\ p<.001$).

ISSN 2183-0606
http://www.open-jim.org

Table 2. Hierarchical Regression Analyses of the Causal Effects of Employee Creativity on Employee Innovation and Employee Innovation Adoption.

Dependent Variables	Independent Variables	F	R^2	$Adj\text{-}R^2$	ΔR^2	β
Employee Innovation	Step 1: Demographic Variables	8.37**	0.12**	0.11	0.12**	-
	Step 2: Employee Creativity	409.73**	0.56**	0.55	0.43**	0.43**
	Step 3: Employee Innovation Adoption	112.87**	0.65**	0.64	0.09**	0.41**
Employee Innovation Adoption	Step 1: Demographic Variables	8.78**	0.13**	0.11	0.13**	-
	Step 2: Employee Innovation	391.97**	0.55**	0.54	0.42**	0.50**
	Step 3: Employee Creativity	32.15**	0.58**	0.57	0.03**	0.26**

$^{**}p < .001$

Table 3. Hierarchical Regression Analyses of Causal Effects of Dispositional and Contextual Factors on Employee Creativity, Innovation and Innovation Adoption.

Dependent Variables	Independent Variables	F	R^2	$Adj\text{-}R^2$	ΔR^2	β
Employee Creativity	Step 1: Demographic Variable	5.08**	0.08*	0.06	0.08*	-
	Step 2: Dispositional Factors	176.97**	0.35**	0.34	0.27**	0.45**
	Step 3: Contextual Factors	18.63**	0.38**	0.37	0.03*	0.21**
Employee Innovation	Step 1: Demographic Variables	8.37**	0.12**	0.11	0.12**	-
	Step 2: Contextual Factors	130.15**	0.33**	0.32	0.21**	0.34**
	Step 3: Dispositional Factors	44.97**	0.39**	0.38	0.07*	0.30**
Employee Innovation Adoption	Step 1: Demographic Variables	8.78**	0.13**	0.11	0.13**	-
	Step 2: Dispositional Factors	133.13**	0.34**	0.32	0.21**	0.34**
	Step 3: Contextual Factors	39.51**	0.39**	0.38	0.06*	0.30**

$^{**}p < .001$, $^{*}p < .01$

Contextual factors produced a variance of 33% ($R^2=0.33,\ p< .001$) resulting in a change of 21% of the variance in employee innovation ($\Delta R^2=0.21,\ p< .001$) and dispositional factors accounted for a variance of 39% ($R^2=0.39,\ p< .001$) resulting in a change of 7% of the variance ($\Delta R^2=0.07,\ p< .001$). Thus, both contextual and dispositional factors significantly produced variance in employee innovation thereby having causal effect on employee innovation. Their beta weights (β) however shows that the contextual factors have stronger causal effect on employee innovation ($\beta=0.34,\ p<.001$) than the dispositional factors ($\beta=0.30,\ p<.001$).

Dispositional factors produced 34% variance ($R^2=0.34,\ p< .001$) with in a change of 21% of the variance in employee innovation adoption ($\Delta R^2=0.21,\ p< .001$) and contextual factors accounted for 39% variance ($R^2=0.39,\ p< .001$) with a change of 6% of the variance in employee innovation adoption ($\Delta R^2=0.06,\ p< .001$). Both dispositional and contextual factors, therefore, produced

significant variance in employee innovation adoption thereby having causal effects on employee innovation adoption. However, their beta weights (β) reveals that the dispositional factors have unique stronger causal effect on employee innovation adoption *(β=0.34 p<.001)* than the contextual factors *(β=0.30, p<.001)*.

4.2 Assessment of Model Fit

The hypothesised model was tested with path analysis to determine the causal effects of the exogenous variables (dispositional and contextual factors) on the endogenous variables (employee creativity, employee innovation and employee innovation adoption). The correlation matrix was first determined as shown in Table 1. Then, multiple regression analysis was conducted to obtain the coefficients of each of the direct paths from the exogenous to the endogenous variables in the model. The beta weights obtained from these analyses were then used as path coefficients (see Table 4). Tolerance statistics obtained range from 0.58 to 0.94 to indicate that multi-collinearity cannot be assumed among the study variables (Pedhasur, 1982; Mertler and Vannatta, 2005). Fig. 2 depicts the path diagram with the path coefficients.

Table 4: Path Coefficients of the Included Paths for the Exogenous and Endogenous Factors in the Hypothesised Model in Figure 2.

Paths	Variables	β	Tolerance
P_{31}	Employee Creativity $_{(3)}$ vs. Dispositional Factors $_{(1)}$	0.54**	0.94
P_{42}	Employee Innovation $_{(4)}$ vs. Contextual Factors $_{(2)}$	0.24**	0.71
P_{43}	Employee Innovation $_{(4)}$ vs. Employee Creativity $_{(3)}$	0.59**	0.76
NN P_{51}	Employee Innovation Adoption $_{(5)}$ vs. Dispositional Factors $_{(1)}$	0.17**	0.65
P_{52}	Employee Innovation Adoption $_{(5)}$ vs. Contextual Factors $_{(2)}$	0.11**	0.58
P_{54}	Employee Innovation Adoption $_{(5)}$ vs. Employee Innovation $_{(4)}$	0.56**	0.61

$^{**}p < .001$

Model fit was assessed by obtaining reproduced correlations through decomposition of the path coefficients into direct and indirect paths as reflected by the arrows in the model. Direct causal effects (D) consist of straight arrows that flow in only one direction from the exogenous to the endogenous variables. Indirect causal effects (I) consist of arrows going in two or more directions. Spurious effects (S) are path components resulting from paths that have reversal causal direction at some point, indicating that the relationship is caused by a common third factor (Tate, 1992). This implies that portions of the effects are not due to either direct or indirect causal effects. In the hypothesised model in Fig. 2, the paths between the exogenous variables which include a curved arrow are spurious effects. Unanalysed effects (U) are causal effects in the endogenous variables due to the correlations among the exogenous variables. This is indicated by a double-headed arrow connecting them. The reproduced correlations were obtained by summing all the decomposed correlations and comparing them with the empirical correlations and then evaluating them against the difference criterion of .05 using chi-square goodness-of-fit tests. Chi-square goodness-of-fit tests show that there is no significant difference between reproduced and the empirical correlations (χ^2 = *0.00* to *0.09, ns*), indicating model fit. Table

5 shows the procedure of path decomposition and calculation of reproduced correlations for the Exogenous and Endogenous Factors in the Hypothesized Model in Figure 2.

Table 5. Path Decompositions and Calculation of Reproduced Correlations for the Endogenous and Exogenous Factors in the Hypothesized Model in Figure 2.

Reproduced Correlation	Path Decomposition and Calculations of Reproduced Correlations
r_{12}	**0.50**
r_{13}	P_{31} = **0.54** (D)
r_{14}	$(P_{31}P_{43})$ + $(r_{12}P_{42})$ (I) (U) (0.54×0.59) + (0.50×0.24) = 0.32+0.12 = **0.44**
r_{15}	P_{51} + $(P_{31}P_{43}\ P_{54})$ + $(r_{12}P_{42}P_{54})$ + $(r_{12}P_{52})$ (D) (I) (U) (U) $0.17+ (0.54\times0.59\times0.56)$ + $(0.50\times0.24\times0.59)$ + (0.50×0.11) $0.17+0.18 +0.07+0.05$ = **0.47**
r_{23}	$(r_{12}P_{31})$ (U) (0.50×0.54) = **0.27**
r_{24}	P_{42} + $(r_{12}P_{31}P_{43})$ (D) (U) 0.24 + $(0.50\times0.54\times0.59)$ $0.24+0.16$ = **0.40**
r_{25}	P_{52} + $(P_{42}P_{54})$ + $(r_{12}P_{31}P_{43}\ P_{54})$ + $(r_{12}P_{51})$ (D) (I) (U) (U) $0.11+ (0.24\times0.56)$ + $(0.50\times0.54\times0.59\times0.56)+(0.50\times0.17)$ $0.11+0.13+0.09+0.08$ = **0.41**
r_{34}	P_{43} + $(P_{31}r_{12}P_{42})$ (D) (S) 0.59 + $(0.54\times0.50\times0.24)$ $0.59+0.06$ = **0.65**
r_{35}	$(P_{43}P_{54})$ + $(P_{31}r_{12}P_{42}P_{54})$ + $(P_{31}r_{12}P_{52})$ + $(P_{31}P_{51})$ (I) (S) (S) (S) (0.59×0.56) + $(0.54\times0.50\times0.24\times0.56)$ + $(0.54\times0.50\times0.11)$ + (0.54×0.17) $0.33+0.04+0.03+0.09$ = **0.49**

ISSN 2183-0606
http://www.open-jim.org

r_{45}	$P_{54} + (P_{43}P_{31}r_{12}P_{42}P_{54}) + (P_{43}P_{31}r_{12}P_{52}) + (P_{43}P_{31}P_{51})$ $(D) \quad (S) \quad (S) \quad (S)$ $0.56 + (0.59\times0.54\times0.50\times0.24\times0.56) + (0.59\times0.54\times0.50\times0.11) +$ $(0.59\times0.54\times0.17)$ $0.56+0.02+0.02+0.05 =$ **0.65**

Key: D = Direct Effects, I = Indirect Effects, S = Spurious Effects and U = Unanalysed Effects

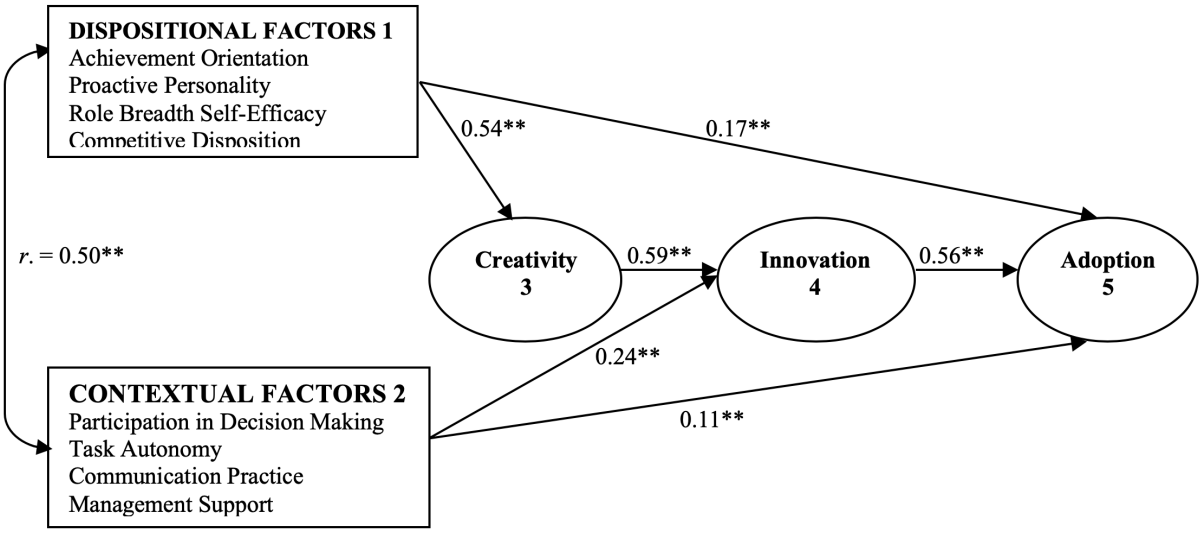

Fig. 2. Path Diagram of the Hypothesized Model of Employee Innovation Process Showing Path Coefficients.

A revised model was assessed for a better fit by retaining all paths and including all missing paths in the model. Table 6 shows the beta weights of the supplementary regression analyses conducted on the missing paths. Results suggest that missing paths from contextual factors to creativity ($\beta = 0.21$, $p<.001$) and creativity to adoption ($\beta = 0.20$, $p<.001$) be included in the model. The revised path diagram with path coefficients is shown in Fig. 3.

Model fit was reassessed following the same procedure as above. Calculations of the re-decomposed correlations can be seen in Table 7. Chi-Square Goodness-of-Fit tests show that the reproduced and empirical correlations are consistent ($\chi^2 = 0.00$ to 0.06, ns) indicating better model fit. Thus, the revised model fits the empirical data better than the hypothesised model.

Table 6: Path Coefficients of the Included and Missing Paths for the Exogenous and Endogenous Factors in the Hypothesised Model in Figure 2.

Paths	Variables	β	Tolerance
P_{32}	Employee Creativity $_{(3)}$ vs. Contextual Factors $_{(2)}$	0.21**	0.65
P_{31}	Employee Creativity $_{(3)}$ vs. Dispositional Factors $_{(1)}$	0.45**	0.72
P_{41}	Employee Innovation $_{(4)}$ vs. Dispositional Factors $_{(1)}$	0.05	0.58
P_{42}	Employee Innovation $_{(4)}$ vs. Contextual Factors $_{(2)}$	0.22**	0.63

Paths	Variables	β	Tolerance
P_{43}	Employee Innovation $_{(4)}$ vs. Employee Creativity $_{(3)}$	0.57**	0.62
P_{51}	Employee Innovation Adoption $_{(5)}$ vs. Dispositional Factors $_{(1)}$	0.11**	0.58
P_{52}	Employee Innovation Adoption $_{(5)}$ vs. Contextual Factors $_{(2)}$	0.10**	0.58
P_{53}	Employee Innovation Adoption $_{(5)}$ vs. Employee Creativity $_{(3)}$	0.20**	0.41
P_{54}	Employee Innovation Adoption $_{(5)}$ vs. Employee Innovation $_{(4)}$	0.44**	0.40

**p< .001

Table 7. Path Decompositions and Calculation of Reproduced Correlations for the Exogenous and Endogenous Factors in the Revised Model in Figure 3.

Reproduced Correlation	Path Decomposition and Calculations of Reproduced Correlations
r_{12}	**0.50**
r_{13}	$P_{31} + (r_{12}P_{32})$ (D) (U) $0.45+(0.50 \times 0.21)$ $0.45+0.10 =$ **0.55**
r_{14}	$(P_{31}P_{43}) + (r_{12}P_{32}P_{43}) + (r_{12}P_{42})$ (I) (U) (U) $(0.45\times0.59) + (0.50\times0.21\times0.59) + (0.50\times0.24)$ $0.26+0.06+0.12 =$ **0.44**
r_{15}	$P_{51} + (P_{31}P_{43}\ P_{54}) + (r_{12}P_{32}P_{43}P_{54}) + (r_{12}P_{42}P_{54}) + (r_{12}P_{52})$ (D) (I) (S) (U) (U) $0.11+ (0.45\times0.59\times0.44) + (0.50\times0.21\times0.59\times0.44) + (0.50\times0.24\times0.44) + (0.50\times0.10)$ $0.11+0.12 +0.03+0.05+0.05 =$ **0.36**
r_{23}	$P_{32} + (r_{12}P_{31}) = 0.21+ (0.50 \times 0.45)$ (D) (U) $0.21+0.22 =$ **0.43**
r_{24}	$P_{42} + (P_{32}P_{43}) + (r_{12}P_{31}P_{43})$ (D) (I) (U) $0.24 + (0.21\times0.59) + (0.50\times0.45\times0.59) = 0.24+0.12+0.13 =$ **0.49**
r_{25}	$P_{52} + (P_{42}P_{54}) + (P_{32}P_{43}P_{54}) + (r_{12}P_{31}P_{43}\ P_{54}) + (r_{12}P_{51})$ (D) (I) (I) (S) (U) $0.10+ (0.24\times0.44) + (0.21\times0.59\times0.44) + (0.50\times0.45\times0.59\times0.44) + (0.50\times0.11)$ $0.10+0.11+0.05+0.06+0.06 =$ **0.38**
r_{34}	$P_{43} + (P_{31}r_{12}P_{42}) + (P_{31}r_{12}P_{32}P_{43})$ (D) (U) (S) $0.59 + (0.45\times0.50\times0.24) + (0.45\times0.50\times0.21\times0.59)$ $0.59+0.05+0.03 =$ **0.67**

ISSN 2183-0606
http://www.open-jim.org

r_{35}	$P_{53}+ (P_{43}P_{54}) + (P_{31}P_{51}) + (P_{31}r_{12}P_{32}P_{43}P_{54}) + (P_{31}r_{12}P_{42}P_{54}) + (P_{31}r_{12}P_{52})$ *(D) (I) (S) (S) (S) (U)* $0.20+(0.59\times0.44)+(0.45\times0.11)+(0.45\times0.50\times0.21\times0.59\times0.44)+(0.45\times0.50\times0.24\times0.44)+(0.45\times0.50\times0.10)$ $0.20+0.26 +0.05+0.01+0.03+0.02 = \mathbf{0.57}$
r_{45}	$P_{54} + (P_{43}P_{31}P_{51}) + (P_{43}P_{31}r_{12}P_{32}P_{43}P_{54}) + (P_{43}P_{31}r_{12}P_{42}P_{54}) + (P_{43}P_{31}r_{12}P_{52})$ *(D) (I) (S) (S) (S)* $0.44+(0.59\times0.45\times0.11)+(0.59\times0.45\times0.50\times0.21\times0.59\times0.44)+(0.59\times0.45\times0.50\times0.24\times0.44)+(0.59\times0.45\times0.50\times0.10)$ $0.44+0.03+0.01+0.02+0.01 = \mathbf{0.51}$

Key: D = Direct Effects, I = Indirect Effects, S = Spurious Effects and U = Unanalysed Effects

Summary of comparison of the reproduced and the empirical correlations for both the hypothesised and the revised models are presented in Table 8.

Table 8. Summary of the Empirical and Reproduced Correlations for the Endogenous and Exogenous Factors in the Hypothesized and the Revised Models.

	Dispositional Factors	Contextual Factors	Creativity	Innovation	Adoption
	1	2	3	4	5
			Empirical Correlations		
1	1.00				
2	0.50	1.00			
3	0.53	0.42	1.00		
4	0.46	0.54	0.69	1.00	
5	0.49	0.53	0.62	0.71	1.00
			Reproduced Correlations (Hypothesized Model)		
1	1.00				
2	0.50	1.00			
3	0.54	0.27	1.00		
4	0.44	0.40	0.65	1.00	
	1	2	3	4	5
			Reproduced Correlations (Revised Model)		
1	1.00				
2	0.50	1.00			
3	0.55	0.43	1.00		
4	0.44	0.49	0.67	1.00	
5	0.36	0.38	0.57	0.51	1.00

Direct and indirect causal effects of the exogenous variables on the endogenous variables were calculated to obtain the causal effects on the revised model (Mertler and Vannatta, 2005). The summary of the direct, indirect and total causal effects of the exogenous variables on the endogenous variables in the revised model are presented in Table 9. In addition, R^2 is noted for each exogenous variable in the revised model within the summary Table.

The outcomes of primary interest were employee creativity, employee innovation and employee innovation adoption. The major determinant of employee creativity with the largest total causal effect are the dispositional factors (*0.45*). Other determinants of employee creativity are contextual factors (*0.21*). Approximately 43% ($R^2 = 0.43$) of the variance in employee creativity was explained by this model.

Table 9: Summary of the Causal Effects of the Exogenous on the Endogenous Factors in the Revised Model in Figure 3.

		Causal Effects		
DVs	IVs	Direct	Indirect	Total
Employee Creativity	Dispositional Factors	0.45**	-	0.45†
($R^2 = 0.43$)	Contextual Factors	0.21**	-	0.21†
Employee Innovation	Employee Creativity	0.59**	-	0.59†
($R^2 = 0.62$)	Dispositional Factors	-	0.26	0.26†
	Contextual Factors	0.24**	0.12	0.46†
Employee Innovation Adoption	Employee Creativity	0.20**	0.26	0.46†
($R^2 = 0.62$)	Employee Innovation	0.44**	-	0.44†
	Dispositional Factors	0.11**	0.12	0.23†
	Contextual Factors	0.10**	0.16	0.26†

***Direct effect is significant at .001 Level*
†Total effect may be incomplete due to unanalysed components.

The major determinant of employee innovation with the largest total causal relationship is employee creativity (*0.60*). Other determinants of employee innovation are the contextual factors (*0.46*) and the dispositional factors (*0.26*). Approximately 62% ($R^2 = 0.62$) of the variance in employee innovation is explained by this model. The major determinant of employee innovation adoption with the largest total causal effect is employee creativity (*0.46*). Employee innovation (*0.44*), contextual factors (*0.26*) and dispositional factors (*0.23*) are other determinants of employee innovation adoption. This model explains 62% of the variance in employee innovation adoption.

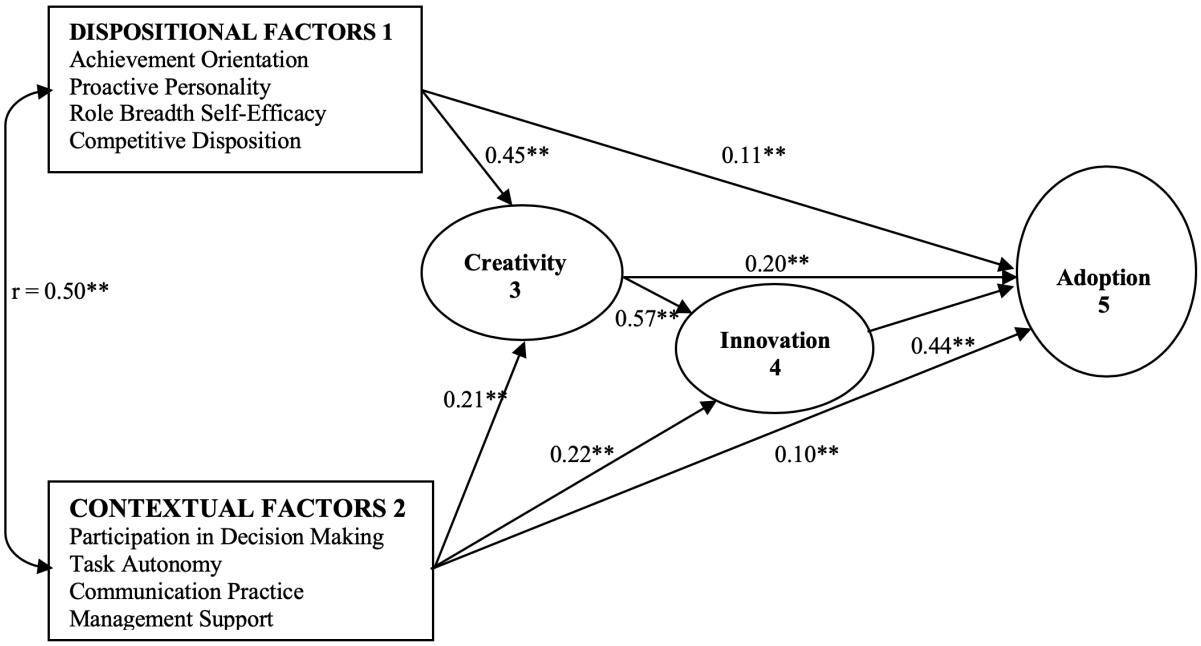

Fig. 3. Revised model of employee innovation process showing the phases and their antecedent factors

5 Discussion and Conclusion

Guided by the gap in literature, this study conceptualized a three-phase employee innovation process to facilitate our understanding of how to manage the process in organisations. The study has achieved its objectives by providing empirical support for its theoretical conceptualizations. First, beyond the two-phase process of creativity and innovation established in literature, this study found support for the hypothesised three-phase model of employee creativity, employee innovation and employee innovation adoption. In progressive sequence, employee creativity has direct causal effect on employee innovation which also has direct causal effect on employee innovation adoption. Employee creativity also has direct causal effect on employee innovation adoption. Thus, the study has been able to extend the innovation process by integrating adoption. Thus, the three-phase employee innovation process comprises: 1) employee creativity (idea generation phase) that occurs at the front end of the process, 2) employee innovation (idea implementation phase) occurring in the middle of the process and 3) employee innovation adoption (innovation acceptance and use phase) that concludes the process.

Second, the study has also confirmed antecedent factor implication for the three phases. Results show that dispositional factors have stronger causal effect on employee creativity than contextual factors and contextual factors have stronger causal effect on employee innovation than dispositional factors and both dispositional and contextual factors have strong causal effect on employee innovation adoption. Evidence however suggests that dispositional factors more strongly impact employee innovation adoption than contextual factors. This result has thus confirmed the position in literature that creativity is a process oriented in the individual, innovation is a social process oriented in a social context and innovation adoption is oriented both in the individual and context, though it is more of an individual decision process (West, 2002).

Finally, two significant unexpected shifts occurred in assessing the model fit. One, creativity showed direct causal effect on innovation adoption. This implies that creativity does not only have indirect causal effect

on innovation adoption through innovation, it also has direct causal effect on innovation adoption. This suggests that inventions can be adopted and used outside the unit of invention before they are introduced by the inventor(s). This is possible through spill-over of information about invention to other interest parties like competitors, which can occur through movements of employees or through common input suppliers and customers (Baptista, 2000).Finally, two significant unexpected shifts occurred in assessing the model fit. One, creativity showed direct causal effect on innovation adoption. This implies that creativity does not only have indirect causal effect on innovation adoption through innovation, it also has direct causal effect on innovation adoption. This suggests that inventions can be adopted and used outside the unit of invention before they are introduced by the inventor(s). This is possible through spill-over of information about invention to other interest parties like competitors, which can occur through movements of employees or through common input suppliers and customers (Baptista, 2000).

Two, contextual factors showed direct causal effects on employee creativity, which suggests that contextual factors not only have direct impact on employee innovation, they also directly impact employee creativity. This supports the position of authors in literature that the organisational context has impact on individual creativity efforts and that creativity cannot be understood outside a larger system of social networks, problem domain and fields of activity (e.g., Amabile, 2012; Gomes et al., 2016).Two, contextual factors showed direct causal effects on employee creativity, which suggests that contextual factors not only have direct impact on employee innovation, they also directly impact employee creativity. This supports the position of authors in literature that the organisational context has impact on individual creativity efforts and that creativity cannot be understood outside a larger system of social networks, problem domain and fields of activity (e.g., Amabile, 2012; Gomes *et al.*, 2016).

5.1 Implications of the Study

There are theoretical and practical implications of the study. Theoretically, the study has extended the two-phase innovation process in literature and confirmed employee innovation process as a three distinct, sequentially linked phases of creativity (idea generation) at the front-end, innovation (idea implementation) in the middle linking idea generation stage with innovation adoption at the concluding end. The study also shows the factor implication of the different phases. Since numerous factors differentially relate to the different facets, failure to make such distinction in previous studies limited our understanding of the employee innovation process. A point to note is that employee innovation process extends beyond the capacity to generate and implement new ideas, but innovative employees are characterised by receptiveness, willingness and absorptive capacity to adopt and exploit the values in the innovation of others. It is hoped that this study will stimulate more theory building discuss to further enhance better understanding of the employee innovation process.

Practically, the study has implication for employee innovation management. To foster employee innovation and organisational innovation capabilities, the study suggests that both dispositional and contextual factors are important. Specifically, attention should be focused more importantly on the employee dispositional factors to facilitate employee creativity/idea generation, though instituting the appropriate organisational context will help to accentuate the employee creativity process. Similarly, contextual factors are more important to facilitate innovation/idea implementation and having employees with the appropriate dispositional factors will enhance innovation/idea implementation success. Having employees with the requisite dispositional characteristics with the appropriate organisational context will facilitate the employee innovation adoption.

The study also has implication for training and development and workplace design to increase employee innovation. It is widely believed that innovation-relevant skills can be trained and learned by anyone (Bharadwaj and Menon, 2000; Shalley and Gilson, 2004) and as Tynjälä (2003) reasoned, the innovative skills, abilities and personality required in the contemporary organisations which include those exposed

in this study can be trained. Although these attributes can be tested during selection process, they are more context-specific and can only be developed in the real work setting. Therefore, in addition to hiring individuals with the right dispositional characteristics, findings of this study can be used to design training and development packages to sustain and enhance employee innovation capabilities. Apart from training employee innovation skills, employee work context can be designed with the contextual factors in this study to further stimulate and enhance their innovation capabilities.

5.2 Limitations and Directions for Future Studies

The study has some limitations which suggest directions for future studies. First, the study focused on middle managers of mobile telecommunications industry. This implies limited external validity. As such the findings of the study cannot be generalized beyond the context of study. Consequently, the study can be replicated in other service and manufacturing contexts like finance, communication and advertising, small and medium scale enterprises (SMEs) and the public sector. Studies should also consider other employees, especially top managers in organisations. Studies have highlighted the strategic position of top managers in organisational innovation process. Top managers affect innovation because they modulate the process of scanning the environment and formulating policy to respond to environmental change; they control resources and influence major decisions, especially strategic decisions on innovation. They are a potent force for or against innovation and are largely responsible for the cultural values that prevail in support of innovation within the organization (Damanpour and Schneider, 2006; Elenkov *et al.*, 2005).

Second, measures of innovation process used are not concrete and specifically defined because the middle managers used in this study perform varied and diverse tasks across their different work settings which made it difficult to explore specific work innovations common to all. The feasible thing to do was to rely on their self-report of innovation at work. Self-report scales are however fraught with response bias. It is possible for the managers to inflate their innovative performances than they truly are. Such responses compromise the internal validity of a study. Thus, it is important to state that the findings of this study apply only to employee self-reported innovative performance but may not generalize to more objective measures of innovative performance. Future studies should therefore consider using managers with similar work roles in order to adopt more detailed and comprehensive research method like longitudinal approach using combined observation and interviews in addition to structured questionnaires. This will allow for more objective assessments of actual employee innovative performance and provide a richer understanding of the employee innovation process.

Future studies should also consider exploring further innovation process differentiations and their antecedent factor implications. Studies have highlighted some sub-processes within each phase of the innovation process. For example, sub-stages of creativity phase are said to include, needs and opportunity identification, idea generation, preparation, incubation, illumination and verification, and idea promotion (West, 2002; Howell and Boies, 2004). Sub-stages in innovation phase include innovation development, first introduction and implementation. Adoption sub-stages include pre-adoption, adoption and post-adoption stages (Jasperson *et al.*, 2005; Damanpour and Schneider, 2006). Antecedent dispositional and contextual factors in this study may impact differently on these sub-processes. Studies have also emphasized the importance of job characteristics and team compositions with complementing skills and knowledge, education and work history to enhance employee innovative behaviour (Bogers *et al.*, 2018; Zhou and Velamuri, 2018). There is need for future studies to integrate and explore how these factors impact the different phases of the employee innovation process.

Several researchers have hinted that innovation process is cyclical (e.g. Björk *et al.*, 2010; Škerlavaj *et al.*, 2014). The implication of this is that innovation adoption can be a precursor of creativity leading to generation of fresh ideas that could lead to modification of and improvement in existing innovation.

This suggests that while innovation adoption marks the end of one cycle of innovation, it could also be a good feedback loop for further idea generation which marks the beginning of another innovation cycle. Therefore, it will be a good idea for future research to explore adoption as a possible feeder of the innovation pipeline.

6 References

Abstein, A., & Spieth, P. (2014). Exploring HRM meta-features that foster employees' innovative work behaviour in times of increasing work-life conflict. *Creativity and Innovation Management*, 1–15.

Agarwal, R., & Prasad, J. (1999). Are individual differences germane to the acceptance of new information technologies? *Decision Sciences*, *30*(2), 361-391.

Amabile, T. M. (2004). Innovation and creativity quotes. Accessed 20 December 2007. `http://www.innovationtools.com/Quotes/Quotes.asp`

Amabile, T.M. (2012). Componential Theory of Creativity. *Working Paper 12–096*, Harvard Business School.

Åmo, B.W., & Kolvereid, L. (2005). Organisational strategy, individual personality and innovative behaviour. *Journal of Enterprising Culture, 13*(1), .7–20.

Anderson, N. R., De Dreu, C.K.W., & Nijstad, D.A. (2004). The routinisation of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organisational Behaviour,* 25, 147–172.

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organisations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of Management*, 40, 1297-1333.

Axtell, C.M, Holman, D.J., Unsworth, K.L, Wall, T.D., Waterson, P.E., & Harrington, E. (2000). Shop-floor innovation: Facilitating the suggestion and implementation of ideas. *Journal of Occupational and Organisational Psychology*, 73, 265 – 285.

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management Decision, 47*(8), 1323–1339.

Baer, M. (2012). Putting creativity to work: The implementation of creative ideas in organisations. *Academy of Management Journal,* 55, 1102-1119.

Bateman, T.S., & Crant, J.M. (1993). The proactive component of organisational behaviour: a measure and correlates. *Journal of Organisational Behaviour*, 14, 104–118.

Baptista, R. (2000). Do Innovations Diffuse Faster within Geographic Clusters? *International Journal of Industrial Organization*, *18*(3), 515-535.

Bean, R. (2002). *The business of innovation: Managing the corporate imagination for maximum results.* New York: AMACOM.

Bessant, J., & Tidd, J. (2007). *Innovation and entrepreneurship.* John Wiley & Sons. Chichester, West Sussex, UK.

Bharadwaj, S., & Menon, A. (2000) Making innovation happen in organisations: Individual creativity mechanisms, organisational creativity mechanisms or both? *Journal of Product Innovation Management*, *17(*6), 424–434.

Birken, S.A., Lee, S.Y., & Weiner, B.J. (2012). Uncovering middle managers' role in healthcare innovation implementation. *Implementation Science*, 3, 7-28.

Björk, J., Boccardelli, P., & Magnusson, M. (2010). Ideation Capabilities for Continuous Innovation. *Creativity and Innovation Management*, *19*(4), 385-396.

Bogers, M., Foss, N. J., & Lyngsie, J. (2018). The "human side" of open innovation: The role of employee diversity in firm-level openness. *Research Policy*, *47*(1), 218–231. doi:10.1016/j.respol.2017.10.012.

Borill, C.S. Wall, T.D., West, M.A., Hardy, G.E., Shapiro, D.A., Haynes, C.E., Stride, C.B., Woods, D., & Cater, A.J. (1998). *Stress among staff in NHS trusts.* Final report for the National Health Executive, August 1998. Sheffield: Institute of Work Psychology.

Brennam, A., & Dooley, L. (2005). Networked creativity: A structured management framework for stimulating innovation. *Technovation*, 25, 1388 – 1399.

Chen, J., & Sawhney, M. (2010). *Beyond Product innovation: The Innovation Radar.* Proceedings of Product Development Management Association Research Forum, Oct 16-17, Orlando, Florida.

Cohen, W.M., & Levinthal, D.A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. Special Issue: Technology, Organisations and Innovation, *Administrative Science Quarterly*, *35*(1), 128-152.

Crossan, M. M., & Apaydin, M. (2010). A multi-dimensional framework of organisational innovation: A systematic review of the literature. *Journal of Management Studies*, *47*(6), 1154–1191.

Damanpour, F. (2017). Organisational Innovation. Oxford Research Encyclopedia of Business and Management. Accessed 8 October 2018. http: `http://oxfordre.com/business/view/10.1093/acrefore/9780190224851.001.0001/acrefore-9780190224851-e-19`. DOI: `https://dx.doi.org/10.1093/acrefore/9780190224851.013.19`

Damanpour, F., & Aravind, D. (2012). A review of research on organisational structure and innovation: From organic to ambidextrous structure. In M. D. Mumford (Ed.), *Handbook of organisational creativity* (pp. 483–513). Boston: Academic Press.

Damanpour F., & Schneider, M. (2006). Phases of the adoption of innovation in organisations: Effects of environment, organisation, and top managers. *British Journal of Management*, *17*, 215–236. DOI: 10.1111/j.1467-8551.2006.00498.x

De Jong, J. & Den Hartog, D. (2010). Measuring innovative work behaviour. *Creativity and Innovation Management*, *19*(1), 23-36.

Dewulf, K. (2013). *Sustainable Product Innovation: The Importance of the Front-End Stage in the Innovation Process.* `http://dx.doi.org/10.5772/52461`

Elenkov, D. S., Judge, W., & Wright, P. (2005). Strategic Leadership and Executive Innovation Influence: An International Multi-Cluster Comparative Study. *Strategic Management Journal*, 26, 665–682.

Engle, R.L., Lopez, E.R., Gormley, K.E., Chan, J.A., Charns, M.P., & Lukas, C.V. (2017). What roles do middle managers play in implementation of innovative practices? *Health Care Management Review*, *42*(1), 14-27.

Fay, D., Shipton, H., West, M.A., & Patterson, M. (2014). Teamwork and Organisational Innovation: The Moderating Role of the HRM Context. *Creativity and Innovation Management, 24*(2), 1-17.

Frambach, R.T., & Schillewaert, N. (2002). Organisational innovation adoption: A multi-level framework of determinants and opportunities for future research. *Journal of Business Research Special Issue: Marketing Theory in the Next Millennium*, 55, 163–176.

Gautam, U.S., Chand, R., & Singh, D.K. (2008). Effect of Motivation and Knowledge on Decision-making and Adoption of Dairy Practices. *Indian Research Journal of Extension Education,* 8: 2 & 3.

Garner, C., & Ternouth, P. (2011). Absorptive capacity and innovation in the triple helix model. *International Journal of Knowledge-Based Development*, *2*(4), 357-371. DOI: 10.1504/IJKBD.2011.044313

Gomes, J., Rodrigues F., & Veloso, A. (2016). Creativity at Work: The Role of Context. In: Shipton H., Budhwar P., Sparrow P., Brown A. (eds.), *Human Resource Management, Innovation and Performance.* Palgrave Macmillan, London.

Hannele, H., & Parzefall, M.R. (2007). A Review of Employee Well-being and Innovativeness: An Opportunity for a Mutual Benefit. *Creativity and Innovation Management, 16*(3), 299-306.

Hansen, M. T., & Birkinshaw, J. (2007). The innovation value chain. *Harvard Business Review, 85*(6), 121–130.

Howell, J.M., & Boies, K. (2004). Champions of technological innovation: The influence of contextual knowledge, role orientation, idea generation, and idea promotion on champion emergence. *The Leadership Quarterly,* 15: 123-143.

Howitt, D., & Cramer, D. (1997). *An introduction statistics in psychology.* London Prentice Hall/Harvester Wheatsheaf.

Jackson, P.R., Wall, T.D., Martin, R., & David, K. (1993). New measures of job control, cognitive demand and production responsibility. *Journal of Applied Behavioural Science*, 78, 753- 762.

Jain, R. (2010). Innovation in organisations: A comprehensive conceptual framework for future research. *South Asian Journal of Management, 17*(2), 81–111.

Jasperson, J., Carter, P. E., & Zmud, R. W. (2005). A Comprehensive Conceptualization of Post-Adoption Behaviours Associated with Information Technology Enabled Work Systems. *MIS Quarterly*, 29, 525–557.

Kamal, M.M. (2006). IT Innovation Adoption in the Government Sector: Identifying the Critical Success Factors. *Journal of Enterprise Information Management*, *19*(2), 192–222.

Kim, T., Hon, A. Y., & Deog-Ro, L. (2010). Proactive personality and employee creativity: The effects of job creativity requirement and supervisor support for creativity. *Creativity Research Journal, 22*(1), 37–45. doi:10.1080/10400410903579536

Korzilius, H., Bücker, J.J.L.E., & Beerlage, S. (2017). Multiculturalism and innovative work behavior: The mediating role of cultural intelligence. *International Journal of Intercultural Relations*, 56, 13–24.

Lenox, M., King, A., & Ehrenfeld, J. (2000). An assessment of design-for-environment practices in leading U.S. electronic firms. *Literatures, 30*(3), 83– 94.

McLean, L. D. (2005). Organizational culture?s influence on creativity and innovation: A review of the literature and implications for human resource development. *Advances in Developing Human Resources*, 7(2), 226-246. DOI: 10.1177/1523422305274528

Mertler, C.A., & Vannatta, R.A. (2005). *Advanced and Multivariate Statistical Methods: Practical Application and Interpretation.* Glendale, CA: Pyrczak Publishing.

Moore, G. A. (2002). *Crossing the chasm: Marketing and selling high-tech products to mainstream customers.* New York: HarperCollins.

Mulgan, G., & Albury, D. (2003). *Innovations in the public sector.* London: Cabinet Office.

Naranjo-Valencia, J. C., Jimenez, D. & Raquel, S. (2017). Organisational culture and radical innovation:

Does innovative behaviour mediate this relationship? *Creativity and Innovation Management, 26*(4), 407-417.

Odetunde, O. J (2012). *Dispositional and contextual factors predicting employee innovation in the mobile telecommunication industry in Nigeria.* Unpublished Doctoral Thesis, Department of Psychology, University of Ibadan.

Parker, S.K. (1998). Enhancing role breadth self- efficacy: The role of job enrichment and other organisational interventions. *Journal of Applied Psychology*, 83, 835 – 852.

Parker, S.K., Chmiel, N., & Wall, T. (1997). Work characteristics and employee well-being within a context of strategic downsizing. *Journal of Occupational Health Psychology*, 2, 289- 303.

Parker, S.K., Jackson, P.R., Sprigg, C. & Whybrow, A (1998). *Organisational interventions to reduce the impact of poor work design.* Norwich: HSE Books, HMSO.

Patterson, F., Kerrin, M., & Gatto-Roissard, G. (2009). Characteristics and Behaviors of Innovative People in Organisations. *Literature Review prepared for the NESTA Policy & Research Unit*, London: NESTA, 1-63.

Parzefall, M.R., Seeck, H., & Leppanen, A. (2008). Employee innovation in organisations: A review of the antecedents. *Finnish Journal of Business Economics,* 2, 165–182.

Paulus, P. B. (2000). Groups, teams, and creativity: The creative potential of idea-generating groups. *Applied Psychology: An International Review, 49*, 237–262.

Pedhazur, E. J. (1982). *Multiple regression in behavioral research: Explanation and prediction* (2nd ed.) New York: Holt, Rinehart & Winston

Plessis, M. D. (2007). The role of knowledge management in innovation. *Journal of Knowledge Management, 11*(4), 20–29.

Rank, J., Pace, V.L., & Frese, M. (2004). Three avenues for future research on creativity, innovation, and initiative. *Applied Psychology: An International Review, 53*(4), 518–528.

Rao, V. (2016). Innovation through employee engagement. *Asia Pacific Journal of Advanced Business and Social Studies*, *2*(2), 337-345.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Sá, P., & Abrunhosa, A. (2007). The role of TQM practices in technological innovation: the Portuguese footwear industry case. *Total Quality Management & Business Excellence, 18*(1-2), 57-66.

Shalley, C.E., & Gilson, L.L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *Leadership Quarterly*, *15*(1), 33–53.

Škerlavaj, M., Černe, M., Dysvik, A. (2014). I get by with a little help from my supervisor: Creative-Idea generation, idea implementation, and perceived supervisor support. *The Leadership Quarterly, 25(*5), 987-1000.

Stock, R. M. (2015). Is Boreout a Threat to Frontline Employees' Innovative Work Behaviour? *The Journal of Product Innovation Management, 32*(4), 574-592. `https://doi.org/10.1111/jpim.12239`

Tate, R. (1992). *General linear model applications.* Unpublished manuscript, Florida State University.

Tynjälä, P. (2003). Ammatillinen asiantuntijuus ja sen kehittäminen tietoyhteiskunnassa. Teoksessa J. Kirjonen (toim.) *Tietotyö ja ammattitaito* – Knowledge work and occupational competence (toinen täydennetty painos). Jyväskylä: Koulutuksen tutkimuslaitos ja Jyväskylän koulutuskuntayhtymä, 85–108.

Vincent, A.H., Decker, B.D., & Mumford, M.D. (2002). Divergent thinking, intelligence and expertise, a test of alternative models. *Creativity Research Journal*, 14, 163–178.

Walker, R. (2006). Innovation type and diffusion: an empirical analysis of local government, *Public Administration*, *84*(2), 311.

West, M.A. (2002). Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups. *Applied Psychology: An International Review, 51*(5), 355–387.

Yidong, T., & Xinxin, L. (2013). How ethical leadership influence employees' innovative work behavior: A perspective of intrinsic motivation. *Journal of Business Ethics*, *116*(2), 441-455.

Yuan, F., & Woodman, R. (2010). Innovative behavior in the workplace: The role of performance and image outcome expectations. *Academy of Management Journal*, *53*(2), 323–342.

Zhou, J., & Shalley, C. E. (2010). *Deepening our understanding of creativity in the workplace.* In S. Zedeck (Ed.), APA handbook of industrial-organizational psychology (Vol. 1, pp. 275?302). Washington, DC: American Psychological Association.

Zhou, W., & Velamuri, V.K. (2018). Key contextual success factors for employee innovative behavior: A study in a foreign manufacturing subsidiary in China. *Cogent Business & Management*, *5(*1-18), 1471770 https://doi.org/10.1080/23311975.2018.1471770

Biographies

Oladimeji J. Odetunde. Oladimeji Jamiu Odetunde is a Senior Lecturer in the Department of Employment Relations and Human Resource Management, University of Lagos, Nigeria. He received his PhD in Industrial/Organisational Psychology from University of Ibadan, Nigeria in 2012 and an MSc in Entrepreneurship and Innovation at the University of Essex Business School, United Kingdom in 2018. He has authored a book each on psychology and research and has published in reputable journals and presented papers at many international conferences and workshops. His core research areas include employee innovation management and entrepreneurship (including corporate, public sector, academic and MSME), and organisational development. He consults in these major research areas. Dr Odetunde reviews for many peer-reviewed local and international journals and between 2015 and 2017, reviewed conference papers for Research in Entrepreneurship and Small Business (RENT) of European Council for Small Business and Entrepreneurship (ECSB).

ISSN 2183-0606
http://www.open-jim.org