



Identifying high influencing factors on innovative behaviour: a meta-analysis

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Identifying high influencing factors on innovative behaviour : a meta-analysis

Abstract

Purpose – Economic competition intensifies due to technological advances, and innovations and organisation survival. Organisations with innovative employees gain have an economic competitive advantage. Numerous studies have investigated the antecedents of IB and focused on individual-leader level factors (especially, psychological empowerment, creative self-efficacy, transformative leadership) that influence innovative behaviour, but the current conclusions are scattered and contradictory. Therefore, the aim of this study is to disentangle confused findings regarding factors affecting innovative behaviour.

Design/methodology/approach– A total of 69 studies that match the properties, published between 2010 and 2021 were retrieved and encoded to conduct a meta-analysis for examining the relationship between identified influencing factors on innovative behaviour, and the moderating effects of potential variables were investigated.

Findings- The results indicated that all proposed factors had significant positive relationships with IB and a moderately to largely strong relationship, whereas the moderating effect of measurement of IB variable was not significant. Thus, further research is required on moderating factors.

Research limitations/implications– One of the limitations of this study is that the moderator only available for three established conditions; therefore, there are cannot be an appropriate moderator of the relationship between influencing factors and IWB. Thus, further research is required on moderating factors.

Practical implications – This finding suggests that systematic differences in correlations result from various employee perspectives, so organizations or managers can better understand the strong factors that influence employees' innovative behaviour well-being.

Originality/value–The first study to examine highly influential factors and innovative behaviour, and identify the moderator. The results are astounding.

Keywords: creative self-efficacy, innovative behaviour, meta-analysis, psychological empowerment, transformational leadership

Paper type Literature review

Introduction

To survive in today's competitive environment, organisations are required to remain innovation-driven. Innovation is widely recognised as an ultimate success factor in the formulation process of competitiveness and the preservation of sustainable advantages for organisations performance in global economies (Al-Omari et al., 2020; Černe et al., 2017;

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3 Choi et al., 2016; Khan et al., 2021; Mendoza-Silva, 2020; Newman et al., 2018; Rehman et
4 al., 2019; Yasir et al., 2021). Innovative behaviour (IB) encouragement among employees is
5 one of the most effective strategies, which marks the beginning of innovation activities
6 (Alessa & Durugbo, 2021; Javed et al., 2020; Kanter, 1988; Knezović & Drkić, 2020; Li et
7 al., 2019; Liu et al., 2017; Shah et al., 2022; Stanescu et al., 2020), employees are significant
8 sources of innovation in most organizations, responsible for approximately 80% of
9 implementation innovative ideas (Newman et al., 2018).

10
11 Under the typical innovation paradigms, IB focuses more on human behaviour and
12 processes than the technical or technology (Yuan & Marquardt, 2021), and the process of
13 generating IB is predicated primarily on theories that explain factors internal and external at
14 workplaces. In especially, the theory of the internal factors that influence individuals and
15 leaders level, are process that enables employees to participate in innovation by encouraging
16 them to generate products, processes, and procedures and to implement novel work-related
17 ideas considered important and worthwhile to be developed. (Knezović & Drkić, 2020).
18 (Alessa & Durugbo, 2021; Bak et al., 2021; Li & Hsu, 2016; Scott & Bruce, 1994).

19
20 Previous empirical research confirmed that the innovative person-organization factor
21 contribution increases positive innovative behavioural and attitudinal outcomes, and can
22 describe results from the relationship among individuals, leaders, and organisational levels
23 (Alessa & Durugbo, 2021; Kristof-Brown et al., 2005). There are many factors related to IB,
24 especially psychological empowerment (PE), creative self-efficacy (CSE), and
25 Transformative leadership (TL), is the most popular topic in the study on leadership related to
26 IB. Which is consistent with a systematic review by Alessa and Durugbo (2021) that
27 presented a multi-dimensional framework of IB in [Figure. 1](#) summarizes antecedents
28 (person-organization factors relationship) that affect IB based on management concepts and
29 work challenges.

30
31 An increasing amount of research in this domain has examined the determinants
32 influencing factors on IB. However, individual empirical studies often come up with
33 fragmented results and cannot summarize the effect size of the influence due to differences in
34 the measurement and participants context. For example, base on the findings of employees in
35 organisations, Bin Saeed et al. (2019) found a positive correlation between PE, TL on
36 innovative behaviour but CSE not significant, in IT organization. This conclusion is in
37 accordance with Grošelj et al. (2020) 's findings that PE and TL are impact on IB, collect
38 data from IT company . In contrast, Ali et al. (2020) found that PE a negative relationship on
39 IB in the construction industry, and Rizki et al. (2019) TL does not influence IB in employees
40 of bank, but Iqbal et al. (2020) conclusion that CSE had a high correlation with IB in
41 employees of the IT industry. The aforementioned conflicting results have caused
42 uncertainty, which not only affects future academic study but also impedes the understanding
43 and implementation of effective conceptual processes in practice.

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45 based on the demonstrated gaps in previous studies, our study endeavors to explore the
46 effects of influencing factors, that we are interested in determinants on IWB and find
47 moderating factors that might reconcile the inconsistent findings noted above by answering
48 the following two questions:
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3 (1) What is the degree of strength of the relationship between influencing factors and IB?
4 Focus on PE, CSE, and TL.

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6 (2) Are the effects of these proposed factors affected by potential moderators? If there are
7 potential moderators, how do these moderators moderate the main effects?
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9 The objectives of this study were to determine what influencing factors in the innovative
10 individual-organizational category. In particular PE, CSE and TL had positive significant and
11 moderate and high strength effect size on the IB correlation, and which of the defined
12 contextual variables was an effective moderator? Accordingly, this study used meta-analytic
13 techniques appropriate to solve controversial research objectives due to being able to acquire
14 a more accurate and robust conclusion as a result of the meta-analysis technique, which
15 allowed us to combine multiple single studies into one study (Caskurlu et al., 2020; Hu & Xu,
16 2021; Page et al., 2021; Schmidt & Hunter, 2014). The best of our knowledge, no previous
17 studies have strived to summarize the antecedents of PE, CSE, and PE of IB through meta-
18 analytic methods.
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23 “Insert Figure. 1 about here”
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28 **Theoretical background and hypotheses**

29 *Innovative behaviour (IB)*

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34 IB begins with a study by Van de Ven (1986), which provides an overarching view of the
35 most critical factors in managing the process of organizational innovation, and is followed by
36 West and Farr (1989), which describes the early literature on workplace innovation. Recently,
37 the authors urged researchers to regularly examine innovation (Yuan & Marquardt, 2021)
38 thus IB is a work in progress. The use of the term in research has led to different constructs,
39 synonyms, and related terms (e.g., innovative work behaviour, innovation competence,
40 individual innovation, and innovative behaviour).
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43 IB is one of the crucial ideas that gained scholarly attention and technology management
44 (Bak et al., 2021; West & Farr, 1989), especially essential to the long-term survival of
45 organisations, given the current economic and social environments for economic competitive
46 advantage (Scott & Bruce, 1994; Stanescu et al., 2020). Moreover, it is widely adopted and
47 utilised in many organisations, which leads to the resolution of work-related issues and the
48 development of new work processes. IB also involves coming up with idea generation and
49 implementation (Amabile et al., 2005; Bak et al., 2021; De Jong & Den Hartog, 2010; Helmy
50 et al., 2019; Li & Hsu, 2016).
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54 Empirical evidence on IB most identify that to start and consciously introduce new,
55 practical ideas. IB is described as a multi-dimensional, complex construct, including
56 opportunity exploration, problem recognition, idea generation, development, investigation,
57 championing, promotion, testing, implementation, realisation, and application (Dorenbosch et
58 al., 2005; Jadhav et al., 2017; Janssen, 2000; Janssen et al., 2004; Jong & Den Hartog, 2010;
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3 Kleysen & Street, 2001; Li & Hsu, 2016; Nijenhuis, 2015; Phung et al., 2018; Scott & Bruce,
4 1994; West, 1990).

5
6 Based on the previous studies, there have been several instruments used to examine the IB
7 perspectives. The most of which are adapted from (a) a six-item measure by Scott and Bruce
8 (1994) , (b-c) a nine-item measure by Janssen et al (Janssen, 2000, 2001a, 2003; Janssen et
9 al., 2004) and (d) a ten-item measure by De Jong and Den Hartog (Jong & Den Hartog,
10 2008; Jong & Den Hartog, 2010), Therefore, we only selected studies that reported using
11 these four instruments. See details in [Table.1](#).

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14 “Insert Table 1 about here,”

15 16 Factors influencing innovative behaviour

17 18 *Psychological empowerment (PE)*

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21 The concept of psychological empowerment was introduced in management writings by
22 Kanter (1977), which has received considerable attention within the field of organisational
23 science (Ashfaq et al., 2021; Seibert et al., 2011; Stanescu et al., 2020). PE is one type of
24 empowerment theory that embraces two perspectives, namely structural empowerment, and
25 psychological empowerment. Structural empowerment refers to power owned by employees
26 based on the position they occupy in the organisation, whereas PE is essentially a
27 motivational construct based on an individual's perception of motivation and the ability to
28 perform work roles (Grošelj et al., 2020; Knezović & Drkić, 2020; Spreitzer, 1995).

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31 PE is effective because it provides increased internal motivation manifested in a set of four
32 dimensions that reflect the active work role of an individual and represent an essential
33 component of organisational success (Stanescu et al., 2020). These dimensions are meaning,
34 competence, self-determination, and impact. Meaning refers to the value of a work goal with
35 respect to one's beliefs, ideals, and standards. If an individual considers that the work is
36 necessary, then the feeling of meaningfulness will emerge and encourage them to be more
37 proactive and innovative at work. Competency refers to belief in one's ability to perform
38 tasks with mastery or skill. When individuals feel competent to perform their job functions
39 and believe in their ability to solve problems related to work, they are more creative and
40 maintain high levels of IB. Self-determination refers to an individual's perception of
41 autonomy in making work-related decisions, behaviours, and processes. When an individual
42 is given increased opportunities to experiment or investigate new ideas, they feel more
43 creative ideas. Therefore, organisations should maintain employees' sense of autonomy and
44 control to promote feelings of self-determination and personal initiative in the workplace,
45 which should increase levels of interest in work activities that affect IB. Lastly, impact
46 denotes the perception or belief of an individual that influences their ability to achieve crucial
47 work outcomes (Helmy et al., 2019; Spreitzer, 1995; Stanescu et al., 2020). Consequently,
48 individuals or employees were more likely to generate, promote, and implement innovative
49 ideas. According to previous empirical evidence, PE demonstrates a strong link with IB
50 measures (Ali et al., 2020; Grošelj et al., 2020; Khan et al., 2021; Liu et al., 2019; Rehman et
51 al., 2019; Yasir et al., 2021). Therefore, we propose the following hypothesis:
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3 *H1. PE is positively related to IB (H1a), and the relationship strength is moderate(H1b).*

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6 *Creative self-efficacy (CSE)*

7 The researchers investigate the antecedents of IB and report that CSE is a key factor of IB,
8 which is a prerequisite for creative productivity and new knowledge (Sarwat & Abbas, 2020).
9 CSE is a particular type of self-efficacy that refers to an individual's perception of one's
10 ability to produce creative outcomes (Tierney & Farmer, 2002).

11
12 According to Bandura (1997), social cognitive theory, which is the foundation of CSE,
13 influences IB for two primary reasons. First, Individuals with CSE can participate in IB
14 because they are confident in their ability to generate and implement ideas in innovation tasks
15 (Newman et al., 2018; Tierney & Farmer, 2002; Tierney & Farmer, 2010). Second, those
16 with CSE and motivation are better equipped to address challenges and uncertainty associated
17 with developing and implementing new ideas (Farmer & Tierney, 2017; Newman et al.,
18 2018; Sarwat & Abbas, 2020; Stanescu et al., 2020; Tierney & Farmer, 2002; Tierney &
19 Farmer, (2010. Moreover, previous research was concerned with the relationship between
20 CSE and IB (Atitumpong & Badir, 2018; Bagheri et al., 2020; Bin Saeed et al., 2019; Hu et
21 al., 2020; Iqbal et al., 2020; Javed et al., 2020; Newman et al., 2018; Sarwat & Abbas, 2020;
22 Su et al., 2019; Yang et al., 2021). Therefore, we propose the following hypothesis:

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28 *H2. CSE is positively related to IB (H2a), and the relationship strength is moderate(H2b).*

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31 *Transformative leadership (TL)*

32 Theoretically, TL is a leadership style that can influence individuals or employees to think
33 creatively and solve problems in a creative manner to achieve better goals (Bak et al., 2021;
34 Li et al., 2019; Masood & Afsar, 2017). TL can provide organisations with a competitive
35 advantage (Jada & Mukhopadhyay, 2019; Khan et al., 2021) as well as on the employees'
36 attitude and emotional encouragement. TL was originally introduced by Burns (1979) and
37 further developed by Bass(1985)(Bak et al., 2021; Stanescu et al., 2020).

38
39 According to Bass (1998), TL increases a follower's intrinsic motivation by employing four
40 subdimensions (4I); idealised influence, inspirational motivation, intellectual stimulus, and
41 individual consideration (Bass, 1998; Knezović & Drkić, 2020; Stanescu et al., 2020).
42 According to social cognitive theory developed by Bandura (1986), these four dimensions are
43 effective because TL provides idealised influence on the ability of leaders to act as role
44 models. Leaders can provide clear visions that are congruent with organisational or team
45 goals and high expectations that increase the intrinsic motivation of followers to achieve the
46 set goals, which encourages the followers' trust and respect.(Bak et al., 2021; Stanescu et al.,
47 2020). Inspirational motivation relates to a leader's ability to enable followers to believe in
48 their capability to achieve a shared vision and mutual goal-setting through inspiration and
49 motivation to surpass existing performance standards. Inspirationally motivating leaders
50 demonstrate strong determination, self-assurance, speak optimistically and inspire followers.
51 Additionally, it increases team spirit and commitment to organisations (Bak et al., 2021;
52 Stanescu et al., 2020). Intellectual stimulation refers to a leader's ability to empower
53 followers to meet the challenge of new tasks, innovate ideas at work, think critically, and
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3 implement novel ideas to proactively solve problems (Avolio et al., 1999). In addition, it
4 inspires individuals to assume greater responsibility and finally transforms them into leaders
5 (Bak et al., 2021; Stanescu et al., 2020). Lastly, individualised consideration refers to a
6 leader's ability to role as a meaningful mentor or adviser, which fosters a climate for learning
7 and innovative ideas (Bak et al., 2021; Bass, 1985; Bycio et al., 1995; Yukl, 1999).
8
9 Therefore, followers or employees are encouraged to *think outside the box* to consider
10 creative solutions and generate new ideas to achieve goals assigned by leaders (Avolio et al.,
11 1999; Bak et al., 2021; Kustanto et al., 2020; Yukl, 2012).

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14 TL is of particular interest to the research on the relationship between leadership and
15 innovation, because theories postulate that transformational leaders can enhance IB (Masood
16 & Afsar, 2017). TL is one of the numerous factors that can positively influence employees in
17 a way that leads to IB (Afsar, Badir, et al., 2014; Amankwaa et al., 2019; Bak et al., 2021;
18 Gemeda & Lee, 2020; Javed et al., 2020; Li et al., 2019; Nusair et al., 2012; Reuvers et al.,
19 2008) and can provide organisations with a competitive edge (Jada & Mukhopadhyay, 2019;
20 Khan et al., 2021; Knezović & Drkić, (2020). Therefore, we propose the following
21 hypothesis:
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25 *H3. TL is positively related to IB (H3a), and the relationship strength is moderate(H3b).*

26 27 28 *Moderating effects*

29
30 The investigation of the moderating variables helps to shed light on the inconsistent
31 conclusions in the existing research. There are two groups of established moderator variables:
32 The first group comprises measurement of IB (Afsar et al., 2018), such as the items
33 developed from the popular author's instrument. The second group comprises the established
34 contextual variables, such as work sector(Alessa & Durugbo, 2021),and participant age
35 (Frosch, 2009). We propose the following hypothesis:
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39 *H4. IB measurement property moderates the relationship between relevant all influencing
40 factors and IB, (H4a) PE, (H4a) CSE, (H4c) TL.*

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42 *H5. Work sector moderates the relationship between relevant influencing factors and IB,
43 (H5a) PE, (H5a) CSE, (H5c) TL.*

44
45 *H6. Participant age moderates the relationship between relevant influencing factors and IB,
46 (H6a) PE, (H6a) CSE, (H6c) TL.*

47 48 **Methods**

49 50 *Literature Search Strategy*

51
52 This review focused on studies that examined the relationship between influencing factors
53 and IB. Journal articles were derived from online electronic databases (i.e., Scopus, Web of
54 Science, ScienceDirect, ProQuest, Digital dissertation), including published articles, and
55 research reports, dissertations, theses, conference papers, and proceedings (frequently known
56 as grey literature) ,which is a recommended practice in meta-analysis to avoid publication
57 bias (Egger, 2003; Caskurlu, 2020). The search included articles published in English
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between 2011 to February 2021 because of the relative attractiveness of the IB concept, which had been studied for a long time. In 2011, scholars noted a large increase of articles on influencing factors and IB (Alessa & Durugbo, 2021; Page et al., 2021). We selected search strategies that utilized specific terms embedded inside each. In addition, the reference lists and bibliographies of the retrieved articles were reviewed to identify additional items. Key search terms included “employee,” “psychological empowerment,” “transformative/nal leadership,” “self-efficacy” AND “innovative behaviour/behaviour” OR “innovative behaviour” OR “individual innovation/behaviour.”. Examples of the search terms were “psychological empowerment” AND “innovative behaviour” OR “psychological empowerment” AND “innovative behaviour” OR “psychological empowerment” AND “individual innovation” (Tawfik et al., 2019). The search revealed 2,209 articles (882 ,393 and 934 for PE, TL, and CSE, respectively; [Table. 2](#)).

“Insert Table 2 about here,”

Selection criteria

The first step, the record all articles into EndNote X9, the reference management software. Then they used the automated find duplicate’s function, which reduced the results to 1,063 (114, 296 and 653 for PE, CSE and TL, respectively 653). At the first screening, two reviewers independently screened titles, abstracts, and keywords and omitted duplicate articles for a total of 108 articles (PE: 27, CSE: 34, and TL: 47). The second step screened for full-text manuscripts and articles that met the following criteria: (1) the participants were only employees or teachers; (2) the results reported the correlation of measures between influencing factors and IB; (3) instruments were used to measure each factor (PE: Spritzer, 1995; CSE: Tierney & Farmer, 2002, 2011; TL: Multifactor Leadership Questionnaire [MLQ or MLQ (5X)]; Bass and Avolio, 1990, 1994, 1997–2004) and studies using the type of scale used to measure IB ([Table.1](#)). Lastly, (4) the results provided sufficient quantitative information (i.e. participant size, age, regions, work sectors, relevant correlation or other related statistics, namely correlation coefficient, regression coefficients, *p*-values, means, and standard deviations) to enable the calculation of relevant correlations (Caskurlu et al., 2020). In the event of any disagreement, the article was discussed with other members of the study (Khan et al., 2003; Lahti et al., 2014). We retained after screening using the four criteria a total of 71 articles (PE: *n* = 23; CSE: *n* = 18; TL: *n* = 30; [Figure 2](#)), and after article screening again as a result, seven more articles were excluded due to incomplete reporting of the correlation and the participants of the article were not in the context that was set at the beginning, such as, conducted in a student context.

Eligibility criteria

[Table. 3](#), presents the 67 articles that were assessed for quality using the “Quality assessment and validity tool for correlational studies” by Cicolini et al. (2014). This extraction instrument consists of 13 questions for evaluation and scoring of various aspects, such as prospective studies, participant rate, measurement, and statistical analysis. There are 13 criteria for evaluating the quality of the research, and a total of 14 points could be awarded. Twelve items are scored as 0 = not met or 1 = met, and items relating to IB

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3 measuring outcomes are graded on a scale of two. The test separates articles into three quality
4 categories based on their assigned scores: low (0–4), medium (5–9), and high (10–14). As
5 different measures and constructs were used, effect sizes were computed using the provided
6 correlation measures. After assessing the full-length articles for eligibility, the study obtains a
7 total of 64 articles ($k = 69$; PE: $n = 23$, $k = 24$; CSE: $n = 15$, $k = 16$; TL: $n = 26$, $k = 29$). The
8 PRISMA flow diagram (Moher et al., 2009) and summarises the number of identified and
9 excluded articles at each stage and is presented detail in [Figure. 2](#).

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11
12 “Insert Figure 2 about here”

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14 “Insert Table 3 about here”

15 16 17 *Data analysis*

18 The extracted data were entered into review manager software, which was then used to
19 compute the weighted mean correlation coefficient as a measure of theory between PE and
20 IB, CSE and IB, and TL and IB. When the regression coefficients (β) were reported instead
21 of the correlation coefficient, we converted b into r using the following formula: $r = \beta + .05\lambda$,
22 where λ is an indicator variable equal to 1 and 0 when b is non-negative and negative,
23 respectively (Peterson & Brown, 2005). Meta-analysis was performed only with data that
24 consisted of two or more independent correlations ($\lambda \geq 2$; (Li et al., (2018). Alternatively,
25 comprehensive meta-analysis software (CMA 3.0) was used to repeatedly calculate the
26 weighted mean correlation coefficient and publication bias (Borenstein, 2009). Cohen (1988)
27 provided guidelines for interpreting the effect size of a correlation, recommending that $r = .10$,
28 $r = .30$, and $r = .50$ be considered small, medium, and large, respectively (Gignac & Szodorai,
29 2016).

30 We conducted a univariate, random-effect model meta-analysis (Caskurlu et al., 2020;
31 Hedges & Olkin, 1985) because the studies in this meta-analysis recruited participants from
32 all the target population pool. Fisher’s r -to- z transformation (Fisher, 1915) was used to
33 normalise the sample distribution in relation to Pearson’s correlation coefficient. To compute
34 the summary statistics, the inverse of the total variance was used to reflect the precision of
35 each effect size considered. The results were then given by putting all statistics back into their
36 original correlation coefficient (Caskurlu, 2020) and by using the strength of the correlation
37 coefficient in reporting (Dancey & Reidy, 2007).

38 39 40 41 42 43 44 45 46 *Heterogeneity of effect sizes*

47 The degree of heterogeneity or effect size variation across studies was visually evaluated
48 using forest plots and statistically examined using the Q test (Hedges & Olkin, 1985). I^2 was
49 computed to represent the ratio of between-group variance to the overall variation across
50 effect sizes, which revealed the degree of variation in effect sizes that emerged from the
51 differences among studies (Caskurlu et al., 2020). τ^2 was used to calculate between-group
52 variance: 25%, 50%, and 75%, respectively, represent low, moderate, and high degrees of
53 heterogeneity (Higgins et al., 2003).

54 55 56 57 58 59 60 *Publication bias*

We used two common approaches to examine the extent to which the selection of studies

was correlated with publication bias. The first is the funnel plot of correlations between effect sizes. If the funnel plot is asymmetric, additional trim-and-fill analyses were performed, and Egger's regression test methods were used to determine whether bias existed in favour of studies with significant differences from those included in the research. Second, publication bias was determined based on the fail-safe number value (FSN; (Rosenberg et al., 2005; R. Scherer & F. J. C. E. Siddiq, 2019; Talan, 2021), which revealed the number of additional, negative studies required to declare the overall association non-significant ($p > .05$; Borenstein, 2009). A high FSN value indicates that the mean effect size is robust. In a meta-analysis, recommended tolerance is $5k + 10$, when k is the number of selected studies, and $k > 2$. If the FSN value is higher than the recommended tolerance, then the results are considered robust (Li et al., 2018; Scheerman et al., 2016).

Result

Study characteristics

The reported studies in computing of the relationship measures between PE, CSE, TL and IB ($n = 67$, $k = 69$; PE: $k = 24$, CSE: $k = 16$; TL: $k = 29$). Most studies reported significant positive correlations, except for one study that reported the correlation was significantly negative (Ali et al., 2020). Most studies have been published in 2020. See details in the appendix.

Main effect analysis

The study calculated the weighted mean relationship (\bar{r}) between influencing factors and IB based on the random-effects model, as well as the findings of moderator analysis, including the heterogeneity test outcomes of all and each moderator. The results of the subgroup moderator analyses are shown in Table 4. We find that all influencing factors have significant positive influences on IB, and as such, H1a, H2a, and H3a are confirmed.

The weighted mean relationship between PE and IB was $\bar{r} = .523$ ($[-.038-.82]$, 95% CI $[0.47, -0.68]$; $k = 24$, $p < .00001$; Figure 3), which indicated a largely strong positive relationship. A significant variation in effect sizes was observed across studies ($Q [23] = 652.40$, $p < .001$, $\tau^2 = 0.06$, $I^2 = 97\%$). Subgroup moderator analyses revealed that work sector had a significant moderating effect ($Q [3] = 24.41$, $p < .0001$). The relationship between PE and IB was found to be strong in the health context of perceptive employees ($\bar{r} = 0.658$, $k = 2$) than in those businesses and industry ($\bar{r} = 0.462$, $k = 16$). In addition, we found that participant age was a significant moderator ($Q [2] = 11.11$, $p < .05$). This result was found to be higher for participants aged 31–35 years ($\bar{r} = 0.629$, $k = 9$) than for those aged 36–45 years ($r = 0.446$, $k = 7$), thus H3a, H5a, H6a, are supported, but H4a is not supported.

CSE and IB had a weighted mean relationship of $\bar{r} = .378$ ($[-.14-1]$, 95% CI $[0.27, -0.52]$; $k = 16$, $p < .0001$), indicating a moderately strong positive relationship. Significant differences in the relationship were observed across 16 effect sizes ($Q [15] = 296.76$, $p < .001$, $\tau^2 = 0.06$, $I^2 = 95\%$; Figure 4). Subgroup moderator analyses, which revealed that only participant age exerted a significant moderating effect ($Q [1] = 8.52$, $p < .01$). The relationship between CSE

and IB was found to be stronger in participants age less than 30 years ($r = 0.462$, $k = 8$) than in those age 31 and 35 years ($\bar{r} = 0.197$, $k = 5$). However, caution should be exercised in interpretation due to the small participant size, as predicted in H3b, H6b, H4b, and H5b not supported.

Figure 5. reports the results of the meta-analysis for TL and IB. Like the findings for PE and CSE, the relationship between TL and IB tended to be a moderately strong positive relationship ($\bar{r} = 0.388$ [0.11–.61], 95% CI [0.35 ,0.46]; $k = 29$, $p < .00001$) We discovered that effect sizes varied significantly across studies ($Q [28] = 243.13$, $p < .001$, $\tau^2 = 0.02$, $I^2 = 88\%$). The work sector was a significant moderator ($Q [3] = 18.04$ $p < .001$). The correlation between TL and IB was stronger for the public and governmental sectors ($\bar{r} = 0.515$, $k = 4$) than that for the health sector ($\bar{r} = 0.336$, $k = 5$), and as such, H3c and H5c is confirmed, H4c and H6c are not supported.

“Insert Figure 3 about here”

“Insert Figure 4 about here”

“Insert Figure 5 about here”

Publication bias

The relationship between influencing factors (PE, CSE and TL) and IB indicates the high heterogeneity of correlations across studies. In addition, to examine the dataset for publication bias and influential correlations, the study tested two approaches (Fragkos et al., 2017). First, an investigation of the funnel plot based on a random-effect model demonstrated a certain degree of symmetry. The funnel plot in Figure 6(a)–(c) did not point to any apparent sign of publication bias and found a nearly symmetrical scatter on both sides of the line, which indicates combined effect sizes. Although a few of the selected studies were found outside the pyramid, most of these studies were in the middle and upper parts of the plot. Second, FSNs were computed as 4,673 (PE), 5,295 (TL) and 2,921 (CSE), the result of which was higher than the recommended tolerance ($5k + 10$, k is the study number), the formula is higher than 1, which significantly exceeds the critical values of 130,90,155 respectively. The study concluded that there isn't much publication bias based on the effect sizes found through meta-analysis.

“Insert Figure 6(a), Figure (b), Figure (c) about here”

“Insert Table 4 about here”

Discussion

This meta-analysis examines the effects of influencing factors on IB and aims to comprehend the reasons for the fragmented and conflicting results in current studies.

The relationship between influencing factors and IB

All these factors have a significant positive effect on IB, and medium and large strength in correlation. According to previous studies, our study also appears to indicate that the PE

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3 variable is the highest performance factor, following TL and CSE, respectively. Our findings
4 confirm prior research (Bin Saeed et al., 2019; Iqbal et al., 2020; Khan et al., 2021; Nusair et
5 al., 2012). If individuals or employees have PE effects, IB definitely increases because
6 employees have to feel empowered to autonomy, self-determine, behaviour, and process on
7 their own and to trust in an individual's capacity for successful innovative work (Stanescu et
8 al., 2020). Moreover, this study found that when employees have a high PE, TL becomes
9 more important for stimulation IB as well. When they have TL, it makes them feel more
10 involved in IB because TL has the function to adjust and inspire a person's abilities and
11 behaviours to meet the needs and performance levels set by the organization (Afsar, F. Badir,
12 et al., 2014; Grošelj et al., 2020; Pieterse et al., 2010; Stanescu et al., 2020).

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15 For TL, the results were astonishing. Numerous empirical evidence claims that
16 transformative leadership is the most influential factor in the effect of IB (Kim et al., 2018;
17 Nusair et al., 2012; Stanescu et al., 2020; Suhana et al., 2019), but with a lower strength of
18 PE.

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21 The result reveals that TL had a moderately strong positive correlation. This may be because
22 the relationship between TL and IB has been studied in a variety of contexts and the
23 correlation values on IWB were low to moderate.

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26 Although CSE was the least strong correlation in this study, that doesn't make CSE look so
27 bad due to the moderate strength, which is considered a satisfactory value. CSE will
28 definitely an important factor in the future. The reason is that CSE is the first behaviour that
29 must have been in innovation work to explore their own abilities. (Sarwat & Abbas, 2020;
30 Tierney & Farmer, 2002). Although innovation cannot be accomplished by just one person,
31 possessing CSE can help them recognise the steps required to maintain or promote innovation
32 (e.g., building teams, consulting leaders, and seeking advice from experts). However, this
33 result indicates that when evaluating one's own work abilities or creativity, individuals should
34 carefully consider the possibilities of successful innovative work because the amount of
35 effect size CSE receives can predict the relationship between CSE and IB to some extent.

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38 In addition, these heterogeneity results across studies indicate that care must be taken in
39 interpreting the results. This may be due to responses to this perception in different contexts
40 (Afsar et al., 2015). For example, employees in construction may have a different
41 understanding of the PE concept. If the manager does not empower employees, each
42 employee is not motivated to create new ideas that help solve problems at work. Moreover,
43 some studies were conducted in more than one country. Although the type of scale for
44 measuring IB, the participants' age, and the work sector were the same (Javed, 2018; Bin
45 Saeed, 2019). This may mean that different cultures have different ideas about the same
46 variables (Afsar, F. Badir, et al., 2014; Li et al., 2018). So, this study requires additional
47 analysis of sub-grounds, the details of which are discussed in the moderator analysis sections
48 below.

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51 Therefore, we can thus conclude that constantly identifying three factors in person-
52 organisation category is a highly influential factor on IB, and our study confirms that prior
53 success is helpful for IB.
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Moderator analysis

As previously discussed, there was a substantial degree of heterogeneity between studies, which may be attributable to the cumulative influence of research contexts (i. e., measurement of IB, work sector, and participant age), as summarised in Table 4. measurement of IB variable does not work, but the work sector and participant age variables were significant moderators of three factors and IB.

The relationship of moderator analysis between PE and IB was stronger in both the work sector and participant age. In the work sector variable, health is the strongest, followed by education, public and governmental, businesses, and industry, respectively. Health has the strongest correlation because PE leads to an increase in the intrinsic motivation of health staff by encouraging continued participation in innovative work, such as when medical staff frequently share their knowledge about best practices and mistakes with colleagues (Afsar et al., 2018; Masood & Afsar, 2017). For the participant age group, the strongest across studies was between 31 and 35 years old, followed by ages less than 30 years old (<30) and between 36 and 40 years old, respectively. A participant between 31 and 35 years old could be associated with receiving opportunities to perform challenging tasks from a manager and being trusted by colleagues. Corresponding with the previous research (Frosch, 2009).

In addition, participant age moderated the link between CSE and IB significantly. Analysis of moderators revealed that participants less than 30 years old are the strongest, tends to be more creative due to their enthusiasm and receptivity to new ideas (Anwar ul Haq et al., 2018). In addition, young professionals drive knowledge absorption, innovation, and technology acceptance (Wu, 2019). These aspects are easily acceptable and can lead to innovative outcomes (Newman et al., 2018; Tierney & Farmer, 2002)

For TL, we found that the work sector was a significant moderator. The results also revealed that the public and governmental sectors exhibited a stronger correlation than businesses and industry and, health. This finding may be related to the organisational structure between managers and subordinates in an organization. The public and governmental sectors are typically characterised by routine, clear tasks, roles of employees (Nusair et al., 2012), and the effectiveness and willingness of leaders to encourage innovation in their followers. This finding was consistent with the findings of (Bass, 1998; Stanescu et al., 2020) that is, TL is one of the most influential factors that influence IB in the public and governmental sectors.

Moreover, the results of the moderator analysis revealed that measurement of IB was a non-significant moderator influencing factors. Therefore, concluding that one scale is better than others is challenging. Unlike the findings of Scherer and Siddiq (2019), who discovered that the type of variable measurement is a significant correlation and can be the moderator, that the type of variable measurement is a significant correlation and can be the moderator (R. Scherer & F. Siddiq, 2019).

Limitation and future research

In addition to its strengths, this study has several limitations; First, influencing factors are arbitrary because many variables can influence IB. Thus, we selected which variable is likely

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3 to exhibit a positive relationship. In this regard, we conducted a preliminary investigation of
4 the method. We began by reviewing the literature to determine which variables are likely to
5 be important to IB in order to find an answer to the research objectives.
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7 Second, limiting the instruments used to measure variables according to the eligibility
8 criteria could also limit the ability to demonstrate causation and reduce the generalisability of
9 the results, which may have affected the development of the review since its earliest phase.
10 Consequently, caution is required when making conclusions from the results. Moreover,
11 additional data is necessary to support the robustness of the findings. For example, if studies
12 between influencing factors and IB were available, we may have rectified some statistical test
13 scores, such as heterogeneity, risk of bias, and publication bias.
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15 Thirdly, although we identified significant moderators using meta-ANOVA, we could not
16 include a few sub-categories in the moderator analysis due to the limited number of effect
17 sizes in this category, such as the effect of participant age as a moderator lacked further
18 investigation for the relationship among PE, CSE, and IB, because we could retrieve only one
19 effect size ($k = 1$) for participants aged between 36 and 45 years (PE). This scenario leads to
20 the lack of representation for employees under the average age categories in the moderator
21 analysis, which may limit the generalisability of the findings. Moreover, the work sector, the
22 relationship amongst PE, TL and IB, and the impact of the work sector as a moderator lacked
23 a full investigation in terms of the relationship between TL and IB because we could retrieve
24 only one effect size ($k = 1$), that is, the education sector. Again, this scenario lacked
25 representation of the education sector as a work sector in the moderator analysis, which may
26 limit the generalisability of the context of the finding, like the case of participant age.
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28 Finally, no research was conducted in this context using meta-analysis methodology.
29 However, we found research that is similar in nature (Gemeda & Lee, 2020). In the future,
30 further studies should proceed as follows: (1) investigate the influence of influencing factors
31 on IB subscale; (2) refrain from classifying measurement tools for variables but consider that
32 the main definition could lead to results that differ from those of the current study;(3) conduct
33 a systematic review of all variables correlated with IB. Lastly, (4) give attention to the
34 moderator factor in relation to the level of education, tenure, gender, and type of factor.
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Conclusion

A meta-analysis expands the current understanding of factors influencing IB. The findings reveal that all these factors are high-quality factors because the strength of the relationship across studies is moderately and highly strong. Moreover, moderator analysis provides further insight into how these relationships are affected. These findings benefit researchers, managers, administrators, and curriculum designers by recognizing and understanding which variables are classified as high-quality factors affecting IB from an individual perspective, which can be used to formulate strategies for human resource development and create a suitable working environment for innovative ideas. The findings also describe the nature of the current phenomenon and can lead to economic competitive advantage. Researchers can also use these results as a conceptual framework or set of hypotheses for further empirical research in certain situations.

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*Terms marked with an asterisk denote articles reviewed and listed in appendix.

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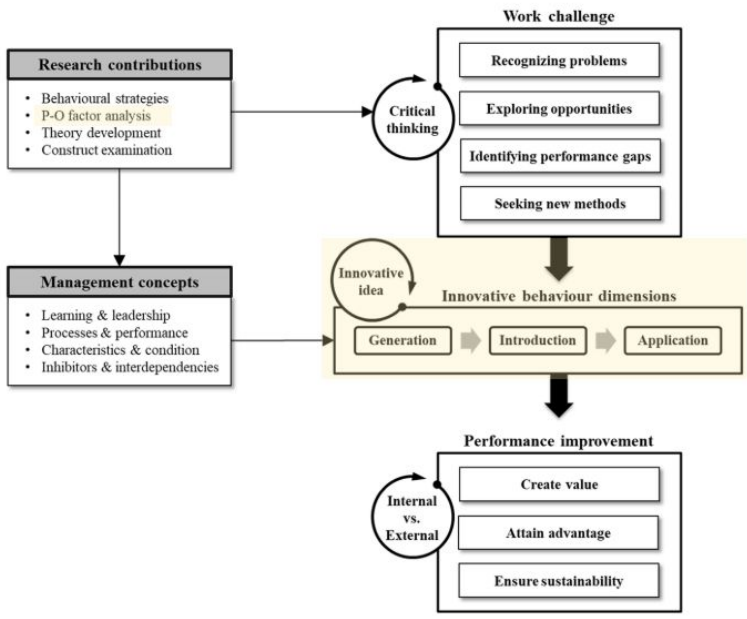


Figure 1.

Management Research Review

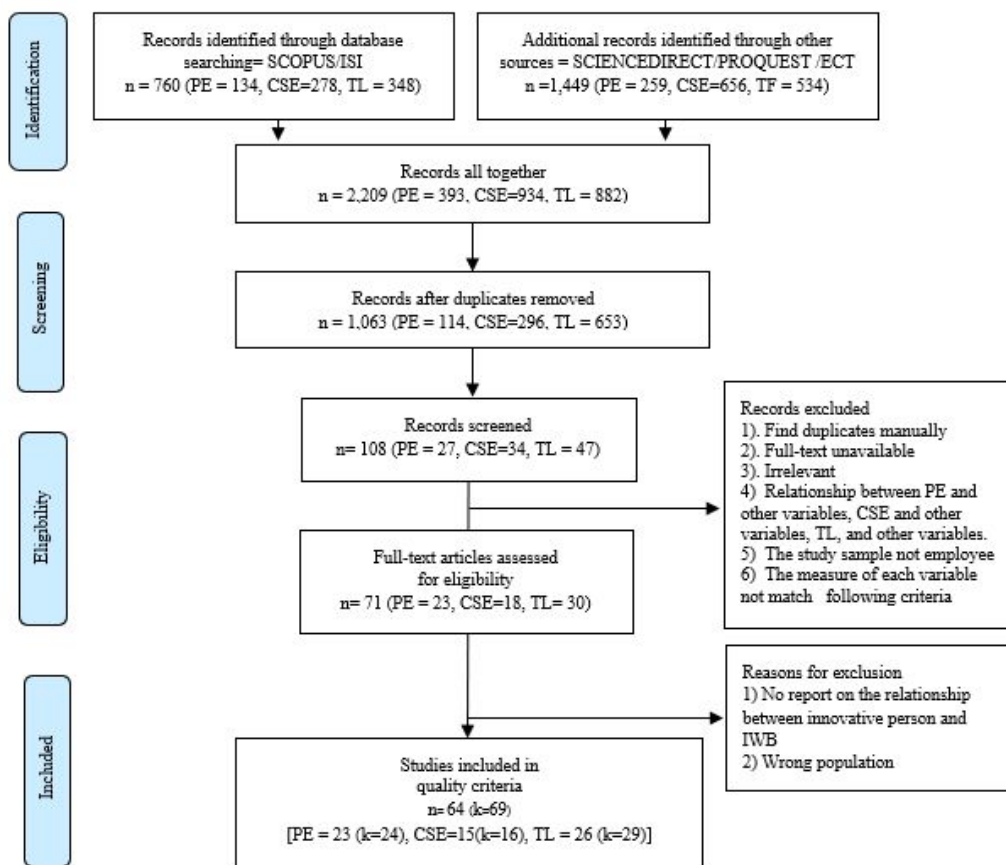


Figure 2

Research Review

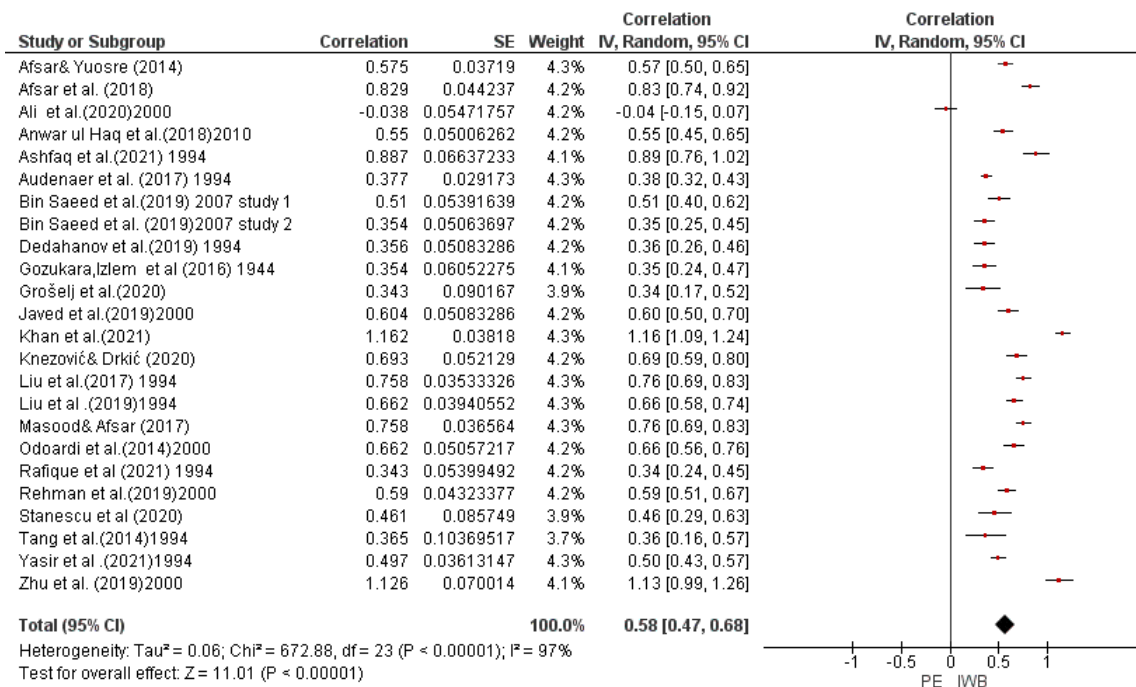


Figure 3

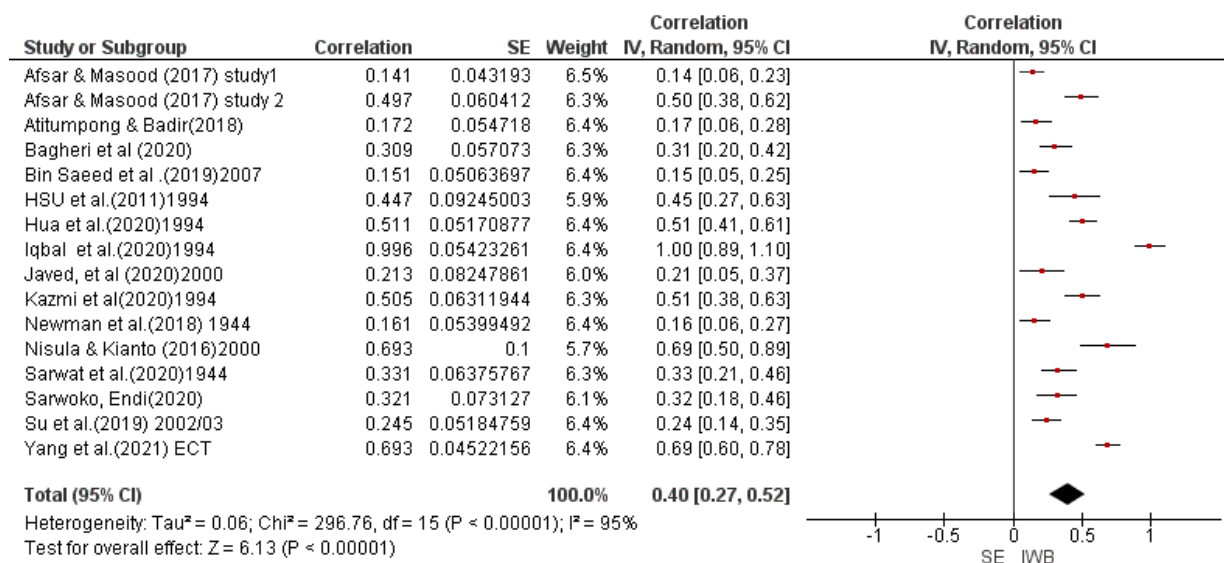


Figure 4

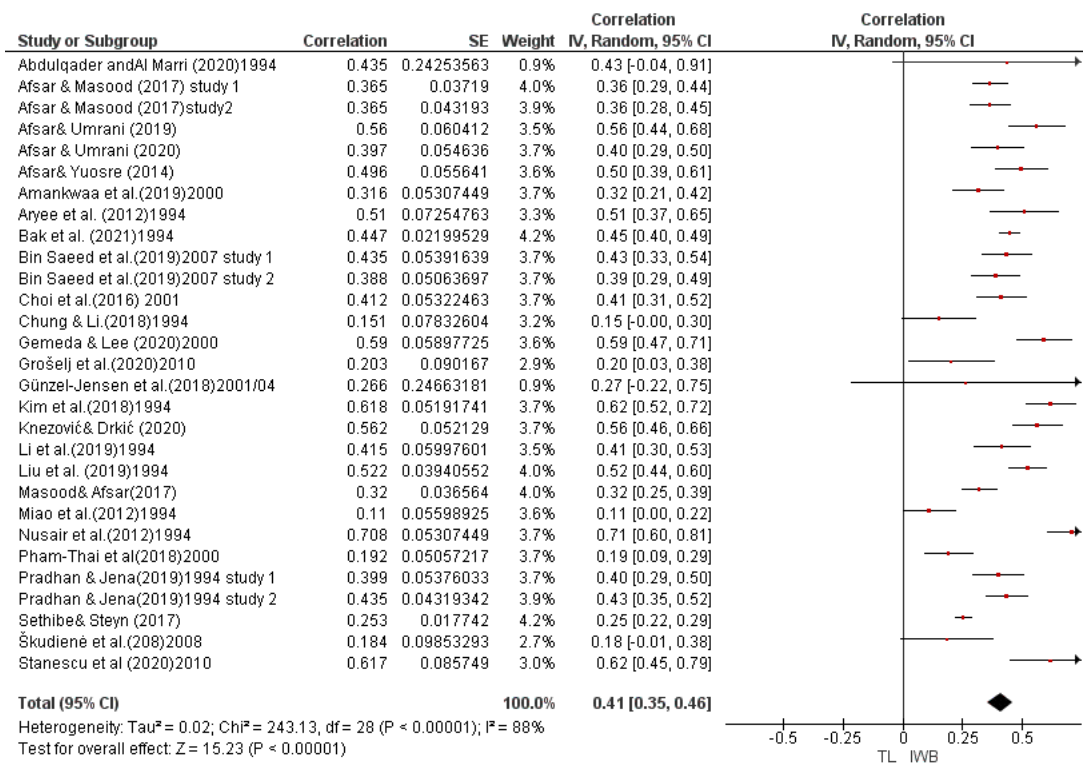
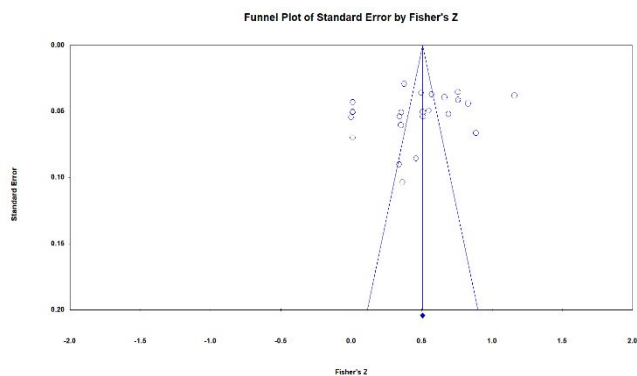


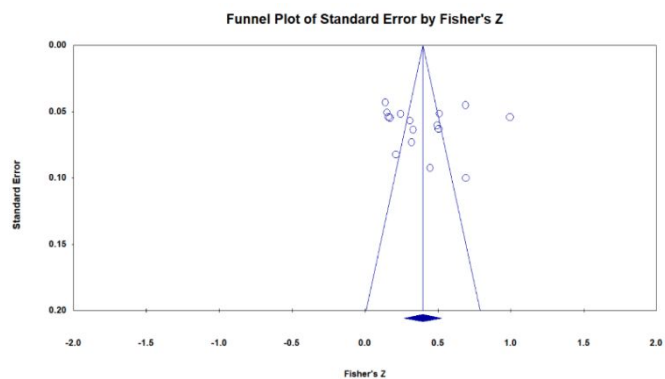
Figure 5

Research Review

(a)



(b)



(c)

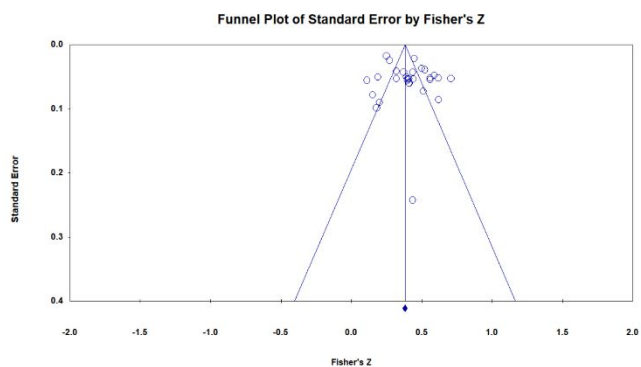


Figure 6

Figure Captions

Figure 1. Multi-dimensional framework of IB.

Figure 2. Preferred flow diagram for Reporting Items for Systematic Review and Meta-Analysis (PRISMA).

Figure 3. The correlation (z) between PE and IB.

Figure 4. The correlation (z) between CSE and IB.

Figure 5. The correlation (z) between TL and IB.

Figure 6. Funnel plots for the relationships (a) between PE and IB, (b) between CSE and IB and (c) between TL and IB.

Table 1. Self-reported measures of IB

Study Authors	Original Measures	Description
^a Scott & Bruce, (1994)	a six-item scale. (IB_version1994)	One dimensional construct. Defined as directed at finding solutions to problems through the generation, promotion, and support building for the implementation of new ideas. (Dedahanov et al., 2019; Scott & Bruce, 1994)
^b Janssen, (2000,2001)	a nine-item scale. (IB_vision 2000, 2001)	Three dimensions include idea generation, idea promotion and idea implementation. Defined as Employees' IB is defined as innovative ideas that employees put forward to create value for an organisation by enhancing production, providing innovative solutions to problems, or generating new processes for various tasks (Janssen, 2000; Rehman et al., 2019).
^c Janssen, (2003,2004)	a nine-item scale. (IB_version 2003- 2004)	Three Dimensions include idea generation, idea promotion, idea realisation. Defined as the intentional generation, promotion and implementation of new ideas within a work role, work group, or organisation in order to benefit role performance, the group, or the organisation. (Janssen, 2003; Janssen et al., 2004)
^d De Jong and Den Hartog (2010)	a ten-item IB scale, (IB_version 2010)	Four dimensions include idea exploration, idea generation, idea championing, idea implementation. Defined as the efforts of individual employees to generate new ideas and implement such ideas at the workplace. (Bagheri et al., 2020; De Jong & Den Hartog, 2010; Jong & Den Hartog, 2008)

Table 2. Literature search strategy

Database	Number of articles	
Scopus	PE	47
	TL	101
	CSE	116
Web of Science	PE	87
	TL	246
	CSE	161
Science Direct	PE	58
	TL	169
	CSE	264
ProQuest and others	PE	201
	TL	365
	CSE	392
Final selected studies (after quality assessment)		
$n = 64$ ($k = 69$); PE = 23 ($k = 24$); TL = 26 ($k = 29$); CSE = 15($k = 16$)		

Table 3. Summary of quality assessment

Criteria	Number of studies PE (<i>k</i> : 24)		Number of studies TL (<i>k</i> : 29)		Number of studies CSE (<i>k</i> : 16)	
	No	Yes	No	Yes	No	Yes
Prospective studies	0	24	0	29	0	16
Probably sampling	13	11	20	9	12	4
Appropriate participant size	4	20	6	23	1	15
Participant drawn from more than one site	4	20	8	21	0	16
Anonymity protects	10	14	17	12	11	5
Response rate > 60%	6	18	11	18	3	13
Reliable measure of PE outcome(s)	1	23	0	29	0	16
Valid measure of PE outcome(s)	1	23	0	29	0	16
Valid measure of IB outcome(s)	1	23	0	29	0	16
IB internal consistency > 70*	1	23	1	28	0	16
Theoretical framework used for guidance?	1	23	4	25	0	16
Correlation analysis for multiple effects	1	24	1	28	0	16
Management of outliers addressed	23	1	26	3	16	0

*Scores 2 points.

*Quality was evaluated utilizing a scoring methodology. However, the current norm limits the use of total quality scores to establish inclusion and exclusion judgments, as not all quality domains are regarded as equally important. The important issue is how the risk of bias or methodological limitations in studies affects the interpretation and credibility of review conclusions.

Table 4. Overall analysis of the weighted correlation and results of moderator analysis.

Moderator Variables	PE (N total = 11068)			CSE (N total = 4930)			TL (N total = 10812)			
	<i>r</i>	<i>k</i>	<i>Q</i> _{between}	<i>r</i>	<i>k</i>	<i>Q</i> _{between}	<i>r</i>	<i>k</i>	<i>Q</i> _{between}	
Overall	0.523	24	652.40*	0.380	16	296.76*	0.388	29	243.13*	
Measurement of IB										
IB_ver 1994	0.470	9	1.72	0.478	7	4.86	0.414	11	0.70	
IB_ver 2000-2004	0.530	5		0.354	3		0.354	5		
IB_ver 2007-2010	0.565	10		0.408	6		0.380	13		
Work sectors										
Businesses & Industry	0.462	16	24.41*	0.345	12	0.17	0.380	19	18.04*	
Education	0.623	2		(0.598	1)		(0.188	1)		
Health	0.658	2		0.414	3		0.336	5		
Public and governmental	0.617	4		-	-	-	0.515	4		
Participant age										
<30	0.478	6	11.11*	0.462	8	8.52*	0.363	8	0.88	
31-35	0.629	9		0.197	5		0.371	10		
36-45	0.446	7		(0.598	1)		0.422	8		
<Not show	((0.405	2))		((0.319	2))		((0.508	3))		

r = sample size weighted mean correlation, *k* = number of effect sizes, **p* < .05, ***p* < .01, ****p* < .001, *****p* < .0001 means that the study was not included in a moderator analysis because *k* = 1, and not show ((...)) indicates the study was not included in a moderator analysis.

Appendix

Overview of studies included in a meta-analysis with general information and effect sizes (r , z).

Authors and year	Aim	Work sector	N	r	p	z	Measurement tools		α	Analytical method
							Factor on employee innovation	IB		
PE (9 studies) IB measurement developed by Scott & Bruce (1994)										
Ashfaq , Fouzia et al., (2021)	To examine the impact of TL, PE, proactive behaviour, and IB on supervisors and employees at large public sector organizations in Pakistan.	P	230	.71	<.01	.89	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.87 .90	Path C.	
Abdenaert, Mieke et al., (2017)	Contributing to the field's understanding of IB, job complexity, PE, and individual innovation on employees in a Belgian public service organization.	P	1,178	.36	<.01	.38	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.87 .85	HLM	
Dedahanov, Alisher et al., (2019)	To examine the relationship between paternalistic leadership styles and the IB of employees on SMEs in the Republic of Korea.	B	339	.34	<.01	.36	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.87 .95	CFA, SEM	
Gozukara , Izlem et al., (2016)	To investigate the relationships between IB, developmental culture, PE, distributive justice, and organizational learning capacity on Turkish aviation employees.	B	276	.34	<.001	.35	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.89 .89	CFA, SEM	
Liu, Fang et al., (2017)	To assess the organizational innovative climate, organizational psychological ownership, PE, and IB on employees of a multinational technological company in China.	B	804	.64	<.01	.76	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.91 .90	CFA, HLM	
Liu, Y. et al., (2019)	To validate the measures for perceived ambidextrous organizational culture, PE, IB, and TL on employees in chemical industry.	B	647	.58	<.01	.66	PE: Spreitzer, (1995) IB: Scott and Bruce (1994) TL: Bass and Avolio (1997)	.88 .86 .85	CFA, SEM.	
Rafique et al., (2021)	To investigate the mediating role of PE between the dimensions of public service motivation and IB on faculty members of public sector institutions in Pakistan	E	346	.33	<.001	.34	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.80 .87	PLS-SEM	
Tang , Ya-Yun., (2014)	To investigate the impact of job standardization, IB, and PE on Taiwanese tourist hotel employees.	B	378	.35	<.01	.37	PE: Spreitzer (1995) IB: Scott and Bruce (1994)	.85 .88	CFA, HRA	

Authors and year	Aim	Work sector	N	r	p	z	Measurement tools		Analytical method
							Factor on employee innovation	α	
							IB		
Yasir, Muhammad., (2021)	To explore how functional flexibility and PE play a mediating role between knowledge sharing and IB on employees of SMEs in Pakistan.	B	769	.46	<.01	.50	PE: Spreitzer, (1995) IB: Scott and Bruce (1994)	.80 .88	CFA, SEM.
PE (k=7) IB measurement developed by Janssen (2000)									
Ali, Mudassar et al., (2020)	To investigate the impact of TL, PE, and IB on employees of various organizations in Romania.	P	139	.43	<.001	.46	PE: Spreitzer (1995) IB: Janssen (2000)	.93 .91	CFA, SEM
Javed et al., (2018)	To investigate the impact of inclusive leadership, PE, and IB on employees of the information technology and cargo sectors in the UK and Canada.	B	390	.54	<.01	.60	PE: Spreitzer (1995) IB: Janssen (2000)	.81 .82	CFA, SEM
Odoardi et al., (2014)	To propose and test the relationship between employees' perceptions of teamwork, information sharing within the organization, the supervisor's participative leadership, individual perceptions of group processes, PE, and IB at five organizations in Italy.	B	394	.58	<.01	.66	PE: Spreitzer (1995) IB: Janssen (2000)	.80 .92	CFA, SEM
Rehman, Wali Ur et al., (2019)	To investigate the individual relationships between PE, supervisor support, co-worker support, management support, and IB on employees in Pakistani software companies.	B	538	.53	<.01	.59	PE: Spreitzer (1995) IB: Janssen (2000)	.88 .70	CFA, HLM
Zhu et al (2019)	To investigate the impact of PE, psychological safety, empowering leadership, and IB on professional learning community teachers in China.	E	507	.81	<.01	1.13	PE: Spreitzer (1995) IB: Janssen (2000)	.95 .92	MLA
PE (k=10) IB measurement developed by De Jong and Den Hartog (2010)									
Afsar et al., (2014)	To investigate the impact of TL, PE, self-construal, and IB on employees across multiple industries in China.	B	726	.52	<.01	.57	PE: Spreitzer (1995) TL: MLQ: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010)	.78 .83 .77	CFA, SEM
Afsar et al., (2017)	To examine the relationships among PE, person-organization fit on IB and knowledge sharing behaviour on nurses and doctors of four public sector hospitals in Thailand.	H	514	.68	<.01	.83	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010)	.81 .84	CFA, SEM MHR
Anwar ul Haq et al., (2018)	To investigate the relationship between SE, PE, IB, and Trust on employees in Pakistan's manufacturing sector.	B	410	.50	<.001	.55	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010)	NA	CFA
Bin Saeed et al., (2019)	To investigate the relationship between TL, IB, intrinsic motivation, PE, and creative process engagement among employees of three major IT firms in China (Study I), as well as CSE and job requirements for creativity among employees of three major IT firms in Pakistan (Study II).	B	I :347, II:393	.47	<.01	.51, .35	PE: Spreitzer (1995) TL: MLQ: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010)	.79 .89 .84	CFA, SEM
*Grošelj et al., (2020)	To investigate the relationship between PE, authentic leadership, IB, TL, and employee trust of a multinational technological company in Slovenia.	B	126	.33	<.01	.34	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010) TL: MLQ 5X-Short: Bass and Avolio (1995)	.88 .89 .96	CFA, HRA
Khan et al., (2021)	To examine the relationship between PE, job crafting, servant leadership and IB on employees of the service sector in Pakistan.	P	689	.82	<.01	1.16	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010)	.91 .95	SEM, PLS-Smart.

Authors and year	Aim	Work sector	N	r	p	z	Measurement tools		Analytical method
							Factor on employee innovation	α	
							IB		
Knezović & Drkić., (2020)	To investigate the effects of PE, decision-making participation, organizational justice, TL, and IB on employees of SMEs in Bosnia and Herzegovina.	B	371	.60	<.01	.69	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010) TL: MLQ: Bass and Avolio (1992)	.91 .91 .96	CFA, HRA
Masood & Afsar., (2017)	To test the relationship between TL and IB via several intervening variables on nurses and doctors of public sector hospitals in Pakistan	H	751	.64	<.001	.76	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010) TL: MLQ 5X-Short: Bass and Avolio (1997)	.82 .89 .86	CFA, SEM, HRA.
Stanescu et al., (2020)	To explore the relationship between TL, PE and IB on employees of public sector and private sector in Romanian.	P	139	0.43	<.01	0.46	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010) TL: MLQ 5X: Bass and Avolio (1997)	.80 .92 .87	CFA
TL (k=11) IB measurement developed by Scott & Bruce (1994)									
Abdulqade and Al Marri., (2020)	To test the relationship between TL and IB on employees of the governmental sector in the UAE.	P	20	.41	<.01	.44	TL: MLQ-5x: Bass and Avolio (1995) IB: Scott and Bruce (1994)	.94 .67	regression analysis
Aryee et al., (2012)	To test relationships that TL, meaningfulness, responsibility, work engagement, LMX, IB, and task performance on employees of a large telecommunication company in China.	B	200	.47	<.01	.51	TL: MLQ-5x: Bass and Avolio (2004) IB: Scott and Bruce (1994)	.93 .85	SEM, HRA
Bak et al., (2021)	To investigate the relationship between TF, IB, and psychological capital on employees of South Korean central and local governmentals.	P	2,070	.42	<.01	.45	TL: MLQ: Bass and Avolio (1995,1997) IB: Scott and Bruce (1994)	.92 .92	CFA
Chung and Li., (2018)	To investigate the impact of TL, IB, and team learning on employees in R&D teams of large and mid-sized companies in South Korea.	B	166	.15	>.05	.15	TL: MLQ: Bass and Avolio (2004) IB: Scott and Bruce (1994)	.95 .88	HRA
Kim et al., (2018)	To investigate the impact of TL, forgiveness, and IB on employees of various South Korean companies.	B	374	.55	<.01	.62	TL: MLQ: Bass and Avolio (2004) IB: Scott and Bruce (1994)	.97 .92	CFA, SEM
Li et al., (2019)	To investigate the relationship between TL, trust in leaders, work engagement, empowerment, and IB among employees of a multinational corporation in China.	B	281	.39	<.01	.41	TL: MLQ: Bass and Avolio (2003,2004) IB: Scott and Bruce (1994)	.88 .83	CFA, HMR
Liu et al., (2019)	To investigate the impact of perceived ambidextrous organizational culture, PE, TL, and IB on Chinese chemical industry employees.	B	647	.48	<.01	.52	PE: Spreitzer (1995) TL: MLQ: Bass and Avolio (1997) IB: Scott and Bruce (1994)	.88 .85 .86	CFA, SEM
Miao et al., (2012)	To examine the relationship among TL, identification with a leader, affective commitment, turnover intentions, job performance, and IB among migrant workers and supervisors of a large manufacturing company in southeaster China.	B	322	.11	>.05	.11	TL: MLQ - 5x: Bass and Avolio (1995) IB: Scott and Bruce (1994)	.87 .92	CFA, HMR
Nusair et al., (2012)	To investigate the effects of TL and IB on public sector employees in Jordan.	P	358	.61	<.01	.71	TL: MLQ: Bass and Avolio (1999) IB: Scott and Bruce (1994)	.87 .94	EFA, regression analysis

Authors and year	Aim	Work sector	N	r	p	z	Measurement tools		α	Analytical method
							Factor on employee innovation			
							IB			
Pradhan and Lalatendu., (2019)	To test the indirect effect of TF on IB as mediated through meaningful work on employees of manufacturing organizations in Eastern India.	B	I= 349, II=539	.38, .41	<.01	.40, .44	TL: MLQ: Bass and Avolio (1990) IB: Scott and Bruce (1994)	.88 .81	CFA, HRA	
TL (k=5) IB measurement developed by Janssen (2000,2004)										
Amankwaa et al., (2019)	To investigate the impact of TF, job autonomy, affective commitment, supportive management, and IB on Ghanaian bank employees.	B	358	.31	<.001	.32	TL: MLQ - 5x: Bass and Avolio (1997) IB: Janssen (2000)	.83 .83	PLS-SEM	
Choi et al., (2016)	To investigate the impact of TL, knowledge sharing, perceived organizational support, and IB on employees in four South Korean companies.	B	356	.39	<.01	.41	TL: MLQ: Bass et al (2003) IB: Janssen (2000)	.93 .93	Regression analysis, CFA	
Gemeda & Lee., (2020)	To examine relationships among leadership styles, work engagement, and outcome behaviour (IB and task performance) among professional ICT staff in Ethiopia and South Korea.	B	438	.53	<.01	.59	TL: MLQ -5X: Avolio and Bass (1999) IB: Janssen (2000)	.95 .94	MLR	
Günzel -Jensen et al., (2018)	To investigate the impact of TL, transactional, empowering leadership, and IB on employees in Denmark's largest hospitals.	H	1,647	.26	<.05	.27	TL: MLQ -5x: Avolio and Bass (1997) IB: Janssen (2000)	.92 .87	CFA, SEM, MLR	
Pham -Thai et al., (2018)	To investigate the relationships between TL, high-performance human resource practices (job engagement, organizational citizenship behaviour), and IB among academic staff at 14 Vietnamese universities.	E	394	.19	<.01	.19	TL: MLQ -5x: Avolio and Bass (1997) IB: Janssen (2000)	.96 .89	SEM and MSEM	
TL (k=13) IB measurement developed by De Jong and Den Hartog (2008,2010)										
Afsar et al., (2014)	To investigate the impact of TL, PE, self-construal, and IB on employees across multiple industries in China.	B	726	.46	<.01	.50	PE: Spreitzer (1995) TL: MLQ: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010)	.78 .83 .77	CFA, SEM	
Afsar& Masood., (2017)	To investigate the complex effects of TL, trust, uncertainty avoidance, CSE, and IB (study I), as well as ambiguity tolerance and job requirements for creativity (study II), on nurses in Pakistan's public sector hospitals.	H	I: 322, II: 384	.35, .39	<.01	.37, .41	TL: MLQ-5X: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010) CSE: Tierney & Farmer (2002)	.89,.87 .84,.86 .92,.91	CFA, HMR	
Afsar & Umrani., (2019)	To investigate the effects of TL, motivation to learn, task complexity, innovation climate, and IB on employees of 35 service and manufacturing firms in Pakistan.	B	338	.51	<.01	.56	TL: MLQ-5X by Bass and Avolio (1997) IB: De Jong and Den Hartog (2010)	.91 .84	CFA, SEM	
Afsar & Umrani., (2020)	To examine the mediating effects of trust, TL, Thriving, and IB on nurses at 21 public healthcare hospitals in Pakistan.	H	326	.38	<.05	.40	TL: MLQ: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010)	.82 .92	CFA, SEM, HLM	
Bin Saeed et al., (2019)	To investigate the relationship between TL, IB, intrinsic motivation, PE, and creative process engagement among employees of three major IT firms in China (study I), CSE and job requirements for creativity among employees of three major IT firms in Pakistan (study II).	B	I: 347, II: 393	.41, .37	<.05, <.001	.44, .39	TL: MLQ: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010) PE: Spreitzer (1995) CSE: Tierney & Farmer (2002)	.79 .89 .84 .86	CFA, SEM, MLR	

Authors and year	Aim	Work sector	N	r	p	z	Measurement tools		Analytical method
							Factor on employee innovation	α	
							IB		
Grošelj et al., (2020) *	To investigate the relationship between PE, authentic leadership, IB, TL, and trust among Slovenian employees of a multinational technological company.	B	126	.20	<.01	.20	PE: Spreitzer (1995) IB: De Jong and Den Hartog (2010) TL: MLQ 5X-Short: Bass and Avolio (1995)	.88 .89 .96	CFA, HRA
Knezović & Drkić., (2020)	To investigate the effects of PE, decision-making participation, organizational justice, TL, and IB on employees of SMEs in Bosnia and Herzegovina.	B	371	.51	<.01	.56	IB: De Jong and Den Hartog (2010) TL: Bass and Avolio (1992) PE: Spreitzer (1995)	.92 .96 .92	CFA, HRA
Masood & Afsar., (2017)	To test the relationship between TL and IB via several intervening variables on nurses and doctors of public sector hospitals in Pakistan	H	751	.31	<.01	.032	TL: MLQ 5X-Short: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010) PE: Spreitzer (1995)	.86 .89 .82 .91	CFA, SEM, HRA
Sethibe and Steyn., (2017)	To examine the effects of TL, transactional leadership styles, and IB on employees of 52 companies in South Africa.	B	3180	.25	<.01	.25	TL: MLQ Form 6S: Avolio et al. (1995) IB: De Jong and Den Hartog (2010)	.94 .85	linear regression
Škudienė et al., (2018)	To examine the effects of the TL, transactional leadership, and IB on managers of aircraft maintenance companies in the Baltic States.	B	106	.18	<.1	.18	TL: MLQ- 5X: Bass & Avolio (1991) IB: De Jong and Den Hartog (2010)	.86 .93	multiple regression
Stanescu et al. (2020)	To investigate the impact of TL, PE, and IB on public and private sector employees in Romania.	P	139	.55	<.01	.62	IB: De Jong and Den Hartog (2008) TL: MLQ 5X: Bass and Avolio (1997) PE: Spreitzer (1995)	.87 .80 .92	CFA, regression analysis
CSE (k=7) IB measurement was developed by Scott & Bruce (1994).									
Hsu et al., (2011)	To examine the relationships among CSE, optimism, and IB on employees of diet and beauty salon company in Taiwan.	B	340	.42	<.01	.45	IB: Scott and Bruce (1994) CSE: Tierney and Farmer (2002)	.91 .80	HRA
Hu et al., (2020)	To examine the relationships among ambidextrous leadership, role clarity, CSE, task performance, and IB among employees of 56 Chinese high-tech enterprises in China.	B	337	.47	<.01	.51	CSE: Tierney and Farmer (2002) IB: Scott and Bruce (1994)	.87 .88	CFA, HRA
Iqbal et al., (2020)	To examine the relationships among entrepreneurial leadership, affective commitment, CSE, psychological safety, and IB among employees of IT service firms in Pakistan.	B	343	.76	<.05	1.00	CSE: Tierney and Farmer (2002) IB: Scott and Bruce (1994)	.91 .92	PLS-SEM
Kazmi et al., (2020)	To investigate the impact of emotional stability, TL, CSE, IB, and career success on employees of food manufacturing firms in Pakistan.	B	254	.47	<.01	.50	CSE: Tierney and Farmer (2002) IB: Scott and Bruce (1994)	.80 .78	PLS-SEM
Newman et al., (2018)	To examine the unique effect of leadership on the relationship between CSE and IB and its employees, of transportation manufacturing sector in China.	B	346	.16	<.01	.16	CSE: Tierney and Farmer (2002) IB: Scott and Bruce (1994)	.90 .93	CFA, HLM

Authors and year	Aim	Work sector	N	r	p	z	Measurement tools		Analytical method
							Factor on employee innovation	α	
							IB		
Sarwat & Abbas., (2020)	To investigate the effects of CSE, affective personal commitment, knowledge creation, and IB on employees from various organizations in Pakistan.	B	249	.32	<.001	.33	CSE: Tierney and Farmer (2002) IB: Scott and Bruce (1994)	.68 .91	EFA, CFA
Yang et al., (2021)	To investigate the impact of TL, CSE, and IB on employees in Chinese hospitality organizations.	H	492	.60	<.001	.69	CSE: Tierney and Farmer (2002) IBS: Hu et al. (2009) assume *	.75 .89	CFA, MSEM
CSE (k=5) IB measurement was developed by Janssen (2000- 2004).									
Nisula & Kianto., (2016)	To investigate the impact of CSE, Participatory Safety, support for innovation, task orientation, vision, experimentation, and IB on employees at two international (ACSI) camps in Finland.	B	103	.60	<.01	.69	CSE: Tierney and Farmer (2002) IB: Janssen (2000)	.78 .81	PLS-SEM
Javed et al., (2020)	To examine the relationship between inclusive leadership and IB via CSE on employees of SMEs in Pakistan.	B	150	.21	<.01	.21	CSE: Tierney and Farmer (2002) IB: Janssen (2000)	.87 .95	CFA.
Su et al., (2019)	To investigate the relationship between supervisor developmental feedback, CSE, and IB on employees of four Chinese companies.	B	375	.24	<.01	.24	CSE: Tierney and Farmer (2002) IB: Janssen (2000)	.81 .90	CFA, HRA
CSE (k=6) IB measurement was developed by De Jong and Den Hartog (2010).									
Afsar and Masood., (2017)	To investigate the complex effects of TL, trust, uncertainty avoidance, CSE, and IB (study I), ambiguity tolerance and job requirements for creativity (study II), on nurses in Pakistan's public sector hospitals.	H	I: 322, II: 384	.14, .46	<.01	.14, .50	TL: MLQ-5X: Bass and Avolio (1997) IB: De Jong and Den Hartog (2010) CSE: Tierney & Farmer (2002)	.89,.87 .84,.86 .92,.91	CFA, HRA
Atitumpong, and Badir (2018)	To examine the effects of LMX and employee learning orientation on IB through CSE on employees working of the manufacturing sector in Thailand.	B	337	.17	<.01	.17	IB: De Jong and Den Hartog (2010) CSE: Tierney & Farmer (2002)	.89 .82	CFA,
Bagheri et al., (2020)	To examine the effects of entrepreneurial leadership, CSE, passion for inventing, and IB on CEOs and employees in high-technology new ventures in Tehran, Iran.	B	310	.30	<.01	.31	CSE: Tierney and Farmer (2002) IB: De Jong and Den Hartog (2010)	.69 .81	CFA
Bin Saeed et al., (2019)	To investigate the relationship between TL, IB, intrinsic motivation, PE, and creative process engagement among employees of three major IT firms in China (study I), CSE and job requirements for creativity among employees of three major IT firms in Pakistan (study II).	B	393	.15	>.05	.15	TL: MLQ Bass and Avolio (1997) IB: De Jong and Den Hartog (2007) PE: Spreitzer (1995) CSE: Tierney and Farmer (2002)	.79 .89 .84 .86	CFA, SEM, HLM
Sarwoko, Endi., (2020)	To assess the impact of entrepreneurial leadership, CSE, and IB on employees of the AHASS in Indonesia.	B	190	.31	<.05	.32	CSE: Tierney and Farmer (2002) IB: De Jong and Den Hartog (2010)	.83 .89	SEM

CA=Cross-sectional, B= Businesses& Industry E=Education, H= Health, P= Public and governmental, N = sample size, r = sample size weighted mean correlation, p = significance level, z = Fisher Z from the conversion of r is used to calculate, CFA = Confirmatory Factor Analysis, SEM = Structural equation modelling analysis, HRA= hierarchical regression analysis, HLM; Hierarchical linear modelling, MLA = Multi-level analysis, MLR= multiple logistic regression, PLS-SEM = Partial least squares technique of structural equation modelling analysis. * study used mixed method design.