

Exploring the combination of individual and organizational–environmental factors in the expression of radical and incremental creativity

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Abstract

Innovative products and services are key factors in corporate competitiveness, and the expression “employee creativity” is the top priority factor in leading corporate innovation. This study aims to investigate the differences between the predictive variables for the expression of radical and incremental creativity and the combinations of the predictive variables, which aid in the expression of two types of creativity. A research survey was conducted with 600 employees working in newspaper, broadcasting, and film businesses. The results were derived by conducting a fuzzy-set qualitative comparative analysis (fs/QCA) on 513 useful samples. Using necessity and sufficiency analysis of a fs/QCA, the results indicate that the three personal factors—job expertise, creative process engagement, and work engagement—are commonly required for two types of creativity. Conversely, organizational–environmental factors, a risk-taking climate, and external networking behavior are only predictive variables of radical creativity. This study's results provide insights regarding the personal and environmental resources that employees must secure to express radical and incremental creativity. Because a clear difference was

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found in the factors required for the expression of the two types of creativity, based on the results of this study, Human Resource Development(HRD) can devise an effective method to support the expression of the two types of differential creativity.

KEYWORDS

fuzzy-set qualitative comparative analysis (fs/QCA), incremental creativity, interaction of personal/environmental factors, radical creativity

1 | INTRODUCTION

Innovating companies are recognizing creativity as an important competency for future talent, and creativity research in the corporate context has been increasing since 1990 (Williams et al., 2016). Research has recently expanded to differentiate the dimensions of radical creativity, an important resource of innovative change, and incremental creativity, which enables continuous improvement (Gilson et al., 2012; Sung et al., 2020). *Radical creativity* is the driving force behind corporate innovation because it helps develop new products that disrupt existing competition and create unconventional alternatives. *Incremental creativity* refers to a small range of changes that maintain the framework of existing processes and products, thus enabling continuous improvements in implementation.

Organizations encounter diverse innovation needs, and, contingent upon each circumstance, there may be a predilection toward radical or incremental creativity. Furthermore, given the limited resources available, organizations must allocate resources strategically to foster the preferred type of creativity (Gilson & Madjar, 2011). Contrary to these pragmatic needs, previous creativity research has been limited to a single dimension, leading to constraints in effectively supporting employee creativity. Following this limitation, several creativity researchers have emphasized the significance of multidimensional creativity research (Kaufman & Beghetto, 2009; Lubart, 2001; Unsworth, 2001). They posit that attention must be paid to both radical creativity, which is the catalyst for organizational innovation, and incremental creativity, which is the engine of improvement practice (Jung & Hong, 2020a; F. Xu & Wang, 2019).

As interest in the two distinct types of creativity increases, attempts to identify differences in the expression mechanisms of radical and incremental creativity are increasing. Previous studies have unveiled the apparent differences between the preceding variables required to express the two types of creativity. These results correspond to variations according to the multidimensional properties of creativity, thereby supporting the need for multidimensional creativity research (Gilson & Madjar, 2011; Malik et al., 2019; F. Xu & Wang, 2019). Despite the encouraging research progress in this area, previous research is limited in its focus on the attractive concepts of radical and incremental creativity, with insufficient consideration for the mechanisms of creativity manifestation unveiled by previous studies. After extensive research on creativity, several researchers concur that the interaction of complex antecedent variables is necessary to express creativity (Amabile & Pratt, 2016; Runco, 2007). However, translating these significant implications into research on radical and incremental creativity is limited.

Amabile's (1988) componential model is a framework that comprehensively examines individual resources and organizational-environmental factors necessary for the expression of creativity. This model can be considered a meaningful perspective for examining radical creativity and incremental creativity expression mechanisms. By identifying the meaningful interactions between individual factors and environmental factors that can express radical and incremental creativity in accordance with the representative creativity model, we can establish specific guidelines on employee competency development and organizational environment establishment. Our approach aims to

simultaneously penetrate the perspectives of systematic creativity research and practical Human Resource Development (HRD) implementation.

Drawing on the componential model, this study underscores the importance of considering cognitive and psychological resources as critical personal factors in eliciting two types of creativity. First, a cognitive resource, such as job expertise, is a fountainhead for identifying problem and creating efficacious solutions (Baer, 2015). Second, to avoid the ensnaring confines of over-specialization and the rut of rote practices, it is critical to employ a creative thinking process (Lubart, 2001; Zhang & Bartol, 2010a). Finally, integrating employees' psychological resources is vital for cognition resources to be dynamically mobilized toward novel attempts (Bakker & Xanthopoulou, 2009; Runco, 2007). Particularly within the context of an organization, the mentioned triad is not requisitioned in isolation but must be understood because they intricately interact.

When employees' resources interact to express radical and incremental creativity, the organizational-environmental factors can have a significant influence on them (Amabile et al., 1996; Tang & Ye, 2015). First, in terms of acquiring social capital, novel external perspectives and ideas are considered significant environmental elements that catalyze creativity. Specifically, it can actively support the expression of radical creativity from a completely different perspective (García-Granero et al., 2015; Jung & Hong, 2020a). Furthermore, in the context of employee innovative pursuits with fresh viewpoints, the organizational environment must cultivate a sufficient level of permissible risk-taking (Dewett, 2007). As an environment that can significantly influence employee behavior, the organization's risk-taking climate and leader's risk-taking tendency can catalyze employee innovative efforts (Amabile & Pratt, 2016). A comprehensive interaction is required among the cognitive resources, psychological resources, and environmental support allocated to employees. From a theoretical framework perspective, the interaction of individual resources and organizational-environmental factors is the core of the creativity component model. It projects the nature of the environment of realistic HRD implementation.

Contrary to these research considerations, many studies have only examined the relationship between a single predictor and two types of creativity. Therefore, it is imperative to investigate the differences between radical and incremental creative expression mechanisms using a research method that can analyze these predictive variables' interaction effects. Existing creativity research has focused on using research methods such as path analysis or hierarchical regression analysis (Montag-Smit & Maertz, 2017). While this research method is suitable for identifying the influence relationship between each variable, it is not robust enough to verify the interaction effects of various predictive variables (Ragin, 2008).

This study adopted the fuzzy-set qualitative comparative analysis (fs/QCA) method to examine the essential variables for the expression of radical and incremental creativity. Furthermore, by employing fs/QCA, we could explore the complex interaction effects of the six variables required for expressing both kinds of creativity. One limitation of the variables-centered research method for identifying the relationship among variables is that it eliminates the specificity of the variables' interrelationships in each case. However, fs/QCA employs set theory to reveal the associative causal structure that completely enables the interaction effect of each variable in the case (Pappas & Woodside, 2021; Vis, 2012). An fs/QCA can identify the predictive condition of radical and incremental creativity via necessary condition analysis. Among the combination conditions of all predictive variables, sufficient condition analysis can identify the combinations that causally related to the outcome variable (Frazier et al., 2016; Ragin, 2008). This research method facilitates a comprehensive interpretation and understanding of the expression mechanisms of the two types of creativity.

The interaction characteristics of the predictors expressing the two types of creativity are predicted as follows. Considering the results of previous studies, it is anticipated that a comprehensive interaction of individual and environmental factors will be required to express radical creativity (Gilson & Madjar, 2011; Malik et al., 2019; F. Xu & Wang, 2019). A positive effect is expected from the interaction of environmental factors that entirely promote new results. Conversely, incremental creativity is hypothesized to be expressed exclusively through minimal individual factors. It is a concept that can be developed sustainably if each member has a will for improvement. Therefore, the influence of environmental factors is limited, and it is anticipated that continuous immersion in work to pursue new

achievements in one's work can have the greatest effect (Sung et al., 2020; F. Xu & Wang, 2019). However, predicting all combinations of predictors can express radical and incremental creativity is challenging. Additionally, formulating hypotheses regarding combinations of predictors and checking the validity of hypotheses is not suitable for fs/QCA methods. It is essential to contemplate the significant assumptions of the conditions required to express the two types of creativity. Moreover, it is crucial to carefully examine the necessary and sufficient conditions for expressing the two types of creativity to ascertain the fundamental difference in the mechanism of expression of creativity (Vis, 2012). To systematically examine this, the research questions were set as follows:

- What are the antecedents of radical creativity and incremental creativity?
- What is the interaction between individual resources and organizational–environmental support that can express radical and incremental creativity?

As a result of answering these research questions, we discovered essential considerations for systematic multi-dimensional creativity research and gained insights into practical HRD performance.

2 | THEORETICAL BACKGROUND

2.1 | Radical creativity and incremental creativity

Along with discussing the limitations of single-dimensional creativity research, several researchers have emphasized the need for multidimensional creativity research (Runco, 2014; Sung et al., 2020; Unsworth, 2001). However, multi-dimensional creativity research was constrained by academic advancement and difficult dimensional classification for practical application. Within this context, radical and incremental creativity, as presented by Gilson and Madjar (2011), is garnering interest as a practical classification that can propel continuous improvement (incremental creativity) and disruptive innovation (radical creativity) in a company. In previous studies, radical creativity has demonstrated a greater relationship with predictive variables, such as external information, openness to experience, the breadth of seeking feedback, and intrinsic motivation that can influence the reinforcement of an idea's novelty (Gilson et al., 2012; Jaussi & Randel, 2014; Malik et al., 2019; Tang & Ye, 2015). In contrast, incremental creativity has exhibited a greater relationship with predictive variables related to the pursuit of useful, realistic outcomes, such as supportive supervision, concrete action-based alternatives, extrinsic compensation, and performance goal orientation (Gilson et al., 2012; Gilson & Madjar, 2011; Malik et al., 2019; Sung et al., 2020). These research results can confirm that the existing single-dimensional creativity studies have oversimplified the concept of creativity (Jaussi & Randel, 2014). In addition, it is possible to deduce that the cause of the mixed influence relationship between predictors and creativity, shown in previous studies on creativity, is that creativity is regarded as a single dimension (Gilson & Madjar, 2011).

The increasing number of efforts to study creativity by dividing it into meaningful criteria is a desirable trend. However, the limitations that persist are the important points of caution and research direction identified in the history of creativity research. Specifically, existing radical and incremental creativity studies do not reflect the importance of the interaction of various personal and environmental factors in expressing creativity. The predictors required for expressing creativity exist in a complex way, such as in Amabile et al.'s (1996) component model. In particular, when organizational employees express creativity, a combination of personal factors, which are the basic elements of creativity, and environmental factors that support them are required (Amabile & Pratt, 2016). However, existing studies on radical and incremental creativity are confined to confirming the differential relationship between a single predictor and two types of creativity.

Therefore, it is necessary to conduct additional research on radical and incremental creativity to examine the difference in the interaction of predictors required to express the two types of creativity. In particular, to overcome

research limitations focusing on variables of interest to researchers, it is critical to conduct systematic research based on a creativity interaction model that has been repeatedly verified in previous creativity studies. In this study, we will utilize Amabile's (1988) creativity component model, which considers the individual characteristics of the creative person and the organizational environment. We examine the interactive effects of job expertise, creative problem-solving process, and work engagement, which are the three individual factors of the component model. Regarding environmental factors, the correlation between external information predicted to be additionally required for the expression of radical creativity, risk-taking climate, and leader's risk-taking tendency, unlike incremental creativity, was examined through previous research results.

2.2 | Personal factors necessary for the expression of radical and incremental creativity

Considering the individual factors of employees for the expression of creativity based on the component model, the three factors proposed by Amabile (1988)—domain expertise (job expertise), creative process (creative process engagement), and motivation (work engagement)—should be considered. From the creativity theory research framework perspective, employees' creativity expression has domain-specific properties (Amabile & Pratt, 2016). Many researchers agree that specialized knowledge and diverse experiences in creativity are essential (Baer, 2015; Csikszentmihalyi, 1999; Runco, 2007). In this context, in a study by Tang and Naumann (2016), expertise had a positive effect on both radical and incremental creativity; particularly, it seemed to have a deeper relationship with radical creativity.

Employees with job expertise can rapidly comprehend the problem's essence and are adept at identifying effective alternatives; however, their ability to create alternatives may be constrained to experience and intuition alone (Zhang & Bartol, 2010a). Following the theoretical framework of creative problem-solving methods, employees can effectively express creativity when they actively utilize creative processes, including problem definition and the derivation of problem-solving methods through divergent and convergent thinking (DeBono, 1985; Vincent et al., 2002). In the same context, the research results of F. Xu and Wang (2019) and Jung and Hong (2020b) demonstrated that creative process engagement, which is the level of actively utilizing the creative process, positively affects both radical and incremental creativity. In particular, creative process engagement had a greater relationship with radical creativity, which confirmed that utilizing the creative problem-solving process was more important for generating entirely new results.

The individual's motivation is essential for expressing creativity (Amabile, 1988). From the perspective of the psychological resource theoretical framework for creativity development (Runco, 2007), employees' psychological resources, motivational state for work, and cognitive resource utilization are essential elements (Bakker & Xanthopoulou, 2009; Runco, 2007). Due to unexpected regulations, employees may experience further difficulties while implementing projects. Furthermore, persuading colleagues to resist change may require additional effort. To overcome these difficulties, it is necessary to focus on work engagement, which shows a high level of job motivation, as a major source of creativity (Nawaz et al., 2014; Xanthopoulou et al., 2009). Gilson et al. (2012) found that intrinsic motivation positively affects only radical creativity, whereas S. Xu et al. (2018) discovered that intrinsic motivation positively affects both types of creativity.

Radical and incremental creativity can be expressed through the interaction of employees' cognitive and psychological resources. In particular, in the context of radical creativity, it is necessary to produce results that are significantly different from the existing ones; therefore, it must be accompanied by high-level expertise and creative thinking skills (Tang & Naumann, 2016; F. Xu & Wang, 2019). In contrast, incremental creativity is limited to low-level changes. Because small changes refer heavily to existing assets, they can be expressed even without specialized knowledge and creative thinking (Sung et al., 2020). In addition, given that the expression of radical creativity consumes a lot of mental energy, the employee's voluntary immersion is essential (Bakker & Xanthopoulou, 2009; Nawaz et al., 2014). Therefore, to examine the mechanism of employees' radical and incremental creativity

expression, it is necessary to closely examine the interaction between employees' cognitive factors (job expertise, creative process engagement) and psychological factors (work engagement). Consequently, differences may exist in the interaction patterns of predictors for expressing the two types of creativity. This is not limited to the employee's individual resources but should be extended to the organization's environmental factors that can affect the employee's psychology and behavior.

2.3 | Organizational–environmental factors necessary for the expression of radical and incremental creativity

As discussed above, members' cognitive and psychological factors are fundamental for expressing creativity; however, individual cognitive limitations and biases can limit the expression of creativity (Perry-Smith & Shalley, 2014). Based on such problem consciousness, discussions have persisted since the 1990s regarding the significance of external information and new perspectives as catalysts for the expression of creativity (Battistelli et al., 2019; Dong et al., 2017). Due to the development of IT technology and the increasing use of social networking systems, research on the relationship among networks that acquire external information and creativity has been increasing (Tang et al., 2017; Venkataramani et al., 2014). Therefore, from the social capital theoretical framework perspective, verifying the differential impact of acquiring useful external information and new perspectives on the expression of two types of creativity is necessary.

Jung and Hong (2020a), reaffirming the importance of securing external information, demonstrated that external networking behavior, which means an effort to secure external information, positively correlated with radical creativity. In a similar context, Tang and Ye (2015) showed that the information obtained through team-internal information, the information outside the team, and the information from expert forums revealed a positive relationship with radical creativity. Based on previous research results, external information can provide novel ideas and perspectives that can have a greater impact on the expression of radical creativity.

Embracing a new perspective or pursuing a change that deviates from the status quo is inherently risky (Dewett, 2004). Contrary to the instincts of members to avoid risk, risk-taking yields greater benefits and opportunities for growth. Therefore, corporate innovation and performance creation are impeded by a combination of reluctance toward new attempts and the fear of failure (Pfeffer & Sutton, 2000). The tendency of employees to take an appropriate level of risk and boldly take on new challenges is greatly affected by the organizational environment; thus, an organizational climate where members can take risks should be supported (García-Granero et al., 2015). According to Shalley and Gilson (2004), leaders should foster a risk-taking organizational climate so that members can smoothly express their creativity. Additionally, Amabile and Pratt (2016) and Messmann et al. (2022) emphasized the importance of leaders establishing a risk-taking organizational climate that empowers employees to challenge and innovate based on new knowledge and information.

Employee's risk-taking tendency, which can be influenced by an organizational risk-taking climate, positively correlate with radical but not incremental creativity (Madjar et al., 2011). Jung and Hong (2020a) confirmed that a risk-taking climate positively affected radical but not incremental creativity. García-Granero et al. (2015) discovered that managerial risk-taking, which means the team leader's risk-taking tendency, positively impacted members' creative expression. The expression of radical creativity, which represents a level of creativity differentiated from existing results, involves relatively high risk; therefore, it can be suggested that the connection between radical creativity and a risk-taking environment (Climate & Leader) may be more pronounced. An environment that supports taking an appropriate level of risk is vital for creativity. However, it is difficult to predict the expression of creativity with only a single element of risk-taking. Therefore, examining the facilitation of a risk-taking organizational climate is necessary when employees have the cognitive and psychological resources to express radical and incremental creativity. In previous studies, research design that considered such a comprehensive context was insufficient. With the objective of examining the impact of the previously discussed individual employee resources and the organization's

environmental resources on the two types of creativity, we adopted a research methodology that was suitable for this study.

3 | METHODS

3.1 | Participants and data collection

This study's participants were employees of Company Group A, a media business group operating in Korea. The company comprises a newspaper company, broadcasting company, content studio, and multiflex. Company Group A finds itself in a predicament where it must simultaneously implement a traditional media competitive strategy to maintain its competitiveness within the existing competitive system and work on a digital media strategy that promotes disruptive innovation. Particularly, to accelerate innovation, Company Group A encourages all its departments' members to implement radical innovation and continuous improvements. Consequently, the members who are the subjects of the strategy execution must express both radical and incremental creativity; therefore, it was determined that Company Group A employees were suitable research participants. A cluster sampling method was used because of the restriction of the total surveying of the sample. Company Group A has a headquarter and numerous branches across the country, rendering it practically difficult for a researcher to obtain consent from employees scattered across the country for the survey. In addition, conducting surveys for reporters, producers, and shift workers who spent a significant amount of time away from the office presented certain limitations. The researcher understands the limitations of cluster sampling and strives to collect samples that can comprehensively understand the population's characteristics. The researcher collected samples of more than 1/2 of the population and surveyed them to be collected in a balanced manner regarding organization, job, position, and age. Because Korean media companies are deeply concerned about disclosing information regarding their employees and organizations as well as their hierarchical corporate culture, an anonymous self-report questionnaire was used for the survey.

The main survey participants comprised members of the differentiated content development team, which is the most essential activity of a media company, including a team that discovers new customer needs and develops marketing products and an innovation, planning, and strategy team that prepares future strategies. The survey was administered via a printed questionnaire and an online questionnaire system, and 600 people participated in it. A total of 550 responses were received (response rate of 91.1%), and 513 valid samples were used for the analysis, which excluded 37 unscrupulous responses (response rate of 85%).

Cases were eliminated in which many questions remained unanswered or all questions received same response.

3.2 | Measures

3.2.1 | Radical creativity and incremental creativity

Radical creativity and incremental creativity were measured using tools that were developed by Gilson and Madjar (2011) and verified by Madjar et al. (2011) and Malik et al. (2019). They comprise questions that assess the degree to which the results of radical and incremental creativity are expressed. Radical creativity consists of four questions ($\alpha = 0.90$, $\omega = 0.91$). An example of a sample question is "I present a completely new approach or innovative method from the existing problem-solving methods." Incremental creativity consists of four questions ($\alpha = 0.82$, $\omega = 0.83$), and an example of a sample question is "I come up with ideas to improve the existing technologies, processes, products, services, and techniques more practically."

3.2.2 | Job expertise

The questions developed by Heijde and Van Der Heijden (2006) were used to measure job expertise. They consist of nine questions ($\alpha = 0.94$, $\omega = 0.95$), and two examples sample questions are as follows: “I can make quick decisions to get my job done,” and “I can distinguish between important and non-critical issues and the importance of work in performing my job.”

3.2.3 | Creative process engagement

A scale developed by Zhang and Bartol (2010a) was used to measure creative process engagement. This measurement comprises 11 questions that measure the degree of active use of problem definition, relevant information acquisition, and alternative generation steps ($\alpha = 0.90$, $\omega = 0.95$). Examples of sample questions include the following: “I spend a significant amount of time trying to understand the true nature of the problem,” “I have a lot of information related to my job area for future use,” and “When creating a new idea, we create several alternatives before choosing the final solution.”

3.2.4 | Work engagement

The Utrecht Work Engagement Scale-9, which was developed by Schaufeli et al. (2006), was used to measure work engagement ($\alpha = 0.90$, $\omega = 0.94$). Examples of sample questions include “I feel energetic while working,” “I am passionate about performing my job,” and “I am obsessed with my work.”

3.2.5 | External networking behavior

External networking behavior was measured using a questionnaire that was developed by Forret and Dougherty (2001). It comprises five questions ($\alpha = 0.83$, $\omega = 0.86$) and measures how actively you endeavor to secure an external network that can help you perform your work. Examples of sample questions include the following: “How often do you attend seminars and workshops related to your work?” and “How often do you seek work-related information from people outside the company?”

3.2.6 | Risk-taking climate of the team

The risk-taking climate of the team was measured using a tool that was developed by García-Granero et al. (2015) based on the items of Amabile et al. (1996). The scale consists of five questions ($\alpha = 0.90$, $\omega = 0.92$) and measures whether team members can actively propose novel ideas without worry and can request other members to support them when such challenges arise. A sample question is, “People in my organization (team) often explore new and unknown areas.”

3.2.7 | Team leader's managerial risk-taking

The team leader's managerial risk-taking was measured using a scale that was developed by García-Granero et al. (2015). This scale is measured on a 5-point scale ($\alpha = 0.88$, $\omega = 0.90$) and consists of three questions. It contrasts

the characteristics observed when the team leader's risk-taking tendency is high and low. Representative questions include "My team leader prefers low-risk projects" and "My team leader prefers high-risk projects."

3.3 | Confirmatory factor analysis

A measurement model evaluation was performed based on the confirmatory factor analysis results to verify the reliability and validity of the measurement tool. The average variance extracted and the composite reliability were reviewed along with Cronbach's α and McDonald's ω values to evaluate reliability. As a result of deriving Cronbach's α and McDonald's ω values for each item, the standard for determining the reliability of internal consistency was more than Cronbach's $\alpha = 0.8$ and McDonald's $\omega = 0.8$ (Dunn et al., 2014; Fornell & Larcker, 1981). All average variance extracted values, an index measuring the common variance within the latent variable, were 0.5 or higher. Because this result indicates that the explained variance is larger than the error variance, it was confirmed that all variables exceed the reliability criterion. As a result of measuring the composite reliability, an overall reliability index for the measurement items of the latent variable, all values exceed 0.6 and are evaluated as appropriate in terms of composite reliability. In addition, intraclass correlation coefficients were tested, and it was confirmed that all variables' mean measures range from 0.75 to 0.95.

Based on the above results, it can be determined that the reliability of the measures is excellent. A method to compare the correlation of the latent variables and the average variance extracted was used to verify the discriminant validity. The average variance extracted is an index that measures the size of the common variance within a latent variable. The factors can be interpreted as different when the average variance extraction of each factor is greater than the shared variance (Fornell & Larcker, 1981). This verification was utilized by obtaining each variable's average variance extraction value and the squared value of the correlation between the variables and verifying the discriminant validity based on the result. As a result of the analysis, each average variance extracted value exceeds the squared value of the correlation among the latent variables, indicating that the discriminant validity of the study variables is excellent.

The factor loading values of the latent and measured variables were checked to evaluate the convergent validity. All standardized factor loading values were 0.5 or more ($p < 0.5$); thus, the convergent validity can be evaluated as appropriate. As a result of examining the leading indicators considered to determine the fit of the measurement model, the standardization χ^2 value of 2.56, root-mean-square error of approximation of 0.050, standardized root-mean-square residual of 0.038, Tucker–Lewis index of 0.946, and comparative fit index of 0.954 demonstrate that the overall fit of the measurement model is excellent.

3.4 | Analytical technique: fs/QCA

This study employed a fs/QCA framework to understand the interactions between the individual factors and organizational–environmental factors required for radical and incremental creativity. One limitation of the variable-centered research method for identifying the relationship between variables is that the specificity of the interrelationships between the variables in each case disappears (Vis, 2012). However, fs/QCA utilizes set theory to reveal a combinatorial causal structure that fully enables the interaction effect of each variable in the case (Choi & Lee, 2015; Pappas & Woodside, 2021; Ragin, 2008). Although fs/QCA does not verify the relationship between each predictor and radical and incremental creativity, it can reveal what combination of predictive variables results in the expression of the two types of creativity. This characteristic of fs/QCA can be observed in the logic of fuzzy mathematics and the Boolean method.

fs/QCA is an analysis method that builds upon and develops the qualitative comparison analysis, which is rooted in Boolean mathematics that uses classical set theory (Ragin, 2008; Vis, 2012). Classical set theory explains whether

the range of elements in each case belongs to the set of a specific domain (1) or not (0). For example, job expertise belongs to the three elements of the creativity componential model (1), whereas athletic ability does not (0). The fuzzy set is extended from this dichotomous set logic, and classical set theory is expanded by measuring the membership score between 0 and 1. A fuzzy score refers to the degree of belonging between 0 and 1. This score is calculated using intersection (And/multiplication) and union (Or/addition) as in Boolean math. Analyzing the results and examining the causal relationship between various predictive variable combinations and outcome variables is the key to fs/QCA (Ragin, 2008).

Certain advantages arise from the fs/QCA method. fs/QCA enables the effective exploration of the relationship between the interactions of predictive variables and the examination of outcome variables in this study. First, it is possible to identify the causal condition, the predictive variable, which is essential for expressing the two types of creativity through the necessity analysis (Ragin, 2000). Second, several combinations of predictive variables that make up the outcome variable can be found through the sufficiency analysis. By analyzing the characteristics of the combinations, it is possible to understand the interaction of the predictive variables necessary to express the two types of creativity. Third, fs/QCA can reveal the Insufficient but Non-redundant part of an Unnecessary but Sufficient condition (INUS) of the two types of creativity by comprehensively analyzing the necessity and sufficiency analysis results. The INUS condition refers to a factor that does not affect the outcome variable with a single predictive variable but is decisive in sufficient conditions to generate the outcome.

According to Pappas and Woodside (2021), researchers must understand the context of the theory related to the variables and the overall context of the measurement indices to perform fs/QCA accurately. We obtained detailed information on the relationships between and measurement of radical creativity, incremental creativity, and predictors from two previous studies before conducting this study (Jung & Hong, 2020a, 2020b). The fs/QCA process was meticulously conducted based on information on the influence relationship and measurement verified in previous studies. In addition, to conduct precise analyses of necessary and sufficient conditions, the fuzzy score conversion and threshold score selection adhered as closely as possible to the fs/QCA methodology.

The sample data were analyzed using the fs/QCA program to evaluate the necessary and sufficient conditions. First, a fuzzy-set calibration was performed using the calibrate function suggested by Ragin (2008) and Pappas and Woodside (2021). Fuzzy-set calibration refers to converting the original data into fuzzy points between 0 and 1. The researcher accomplishes this by setting a reference value between 1, which belongs to the sample, and 0, which does not belong at all. Because this study's survey tool is composed of an isometric scale to obtain quantitative data, the criterion for a value of 0 that does not belong at all is 1 on the Likert scale. The criterion for a value of 1 that belongs completely is 5, and the middle standard value was designated as the median of the corresponding variable, which is more suitable for eliminating unnecessary variances (Pappas & Woodside, 2021; Ragin, 2008).

Based on the changed fuzzy score, a fuzzy truth table algorithm analysis was conducted to determine whether the combination of each predicted variable, which is a causal condition, explained the outcome variable. The total number of combinations is 2^k (K = number of predictors). Based on the number of cases corresponding to each combination and consistency (consist), a threshold criterion was established to identify meaningful combinations that have a causal relationship to the outcome variable. This study has a large sample size, and to avoid inferences based on configurations with one or two cases, we determined that, to be considered a configuration that can lead to an outcome, a configuration must have at least four cases. This threshold cutoff is consistent with that utilized in similar prior studies (Frazier et al., 2016), and considering this study's sample size, this threshold cutoff is stringent. There is a criterion that the number of combinations, excluding the combinations with fewer than four cases, should be 75% or more of the total combination (Ragin, 2008), and the result of the execution was over 75%. In addition, a full-scale analysis was conducted, wherein combinations that failed to satisfy the strict consistency criteria (0.8) were excluded.

4 | RESULTS

4.1 | Necessity analysis

Before the fs/QCA, a correlation analysis was conducted among the variables. This can serve as a basis for inferring the similarity between the results of the correlation analysis, which is a variable-centered research method, and the results of the fs/QCA. The six predictive variables are job expertise (0.539), creative process engagement (0.502), work engagement (0.467), external networking behavior (0.224), team risk-taking climate (0.240), and team leader's managerial risk-taking (0.104). The variables positively correlate with radical creativity. Incremental creativity also includes six predictive variables: job expertise (0.363), creative process engagement (0.459), work engagement (0.416), external networking behavior (0.243), team risk-taking climate (0.375), and team leader's managerial risk-taking (0.249), which show a significant positive correlation; the results are summarized in Table 1. The correlation analysis confirmed that the six predictive variables and the two types of creativity have a significant influence relationship.

In addition, the difference among the two types of creativity according to age, position, and job was confirmed. First, as a result of examining the two types of creativity levels according to demographics and positions within the organization, radical creativity was discovered in the 20s (3.053), 30s (3.162), and 40–50s (3.487), and incremental creativity was found in the 20s (3.676), 30s (3.695), and 40–50s (3.871). The average level of radical creativity was lower than that of incremental creativity, and the two types of creativity expression levels were higher in the older age groups. These results are because older employees generally have higher ranks. In the case of radical creativity, a difference existed according to the position level. The average of managers and above was 3.61, whereas the average of general employees was 3.13, with a statistically significant difference ($T = 3.591$, $p < 0.001$). However, in the case of incremental creativity, no significant difference was identified according to the position level. Considering the two types of creativity levels by job, radical creativity is field operation (2.733), marketing and sales (2.913), management planning (3.031), reporter (3.382), broadcasting technology (3.453), designer (3.547), and producer (3.764). Incremental creativity was shown in field operation (3.274), marketing and sales (3.536), management planning (3.666), broadcasting technology (3.754), journalist (3.863), designer (4.021), and producer (4.029). The radical creativity of the occupational group producing media content, such as producer, reporter, designer, and broadcasting technology, showed an average of 3.573. In contrast, the average level of radical creativity of office workers and site operators was 3.244. There was a statistically significant difference ($T = 3.312$, $p < 0.05$). In the case of incremental creativity, the average of content production jobs was 3.923, whereas the average of office and management jobs was 3.743, confirming that the difference was not statistically significant.

Necessity analysis is a method based on set theory that establishes what predictor variables always exist when there is an outcome variable (Vis, 2012). Through this analysis, we can confirm the relationship between the outcome variable and a single predictor variable. To analyze the necessary conditions for radical creativity, the presence and absence of each predictive variable were all inputted to confirm which predictor had a higher membership score than the outcome variable. We confirmed a consistency higher than 0.80 (Ragin, 2008), the standard of sufficient agreement to verify the necessary conditions. In the case of radical creativity, individual factors, such as job expertise (0.845), creative process engagement (0.849), and work engagement (0.840), were all necessary conditions. Meanwhile, in the case of the environmental factors, external networking behavior (0.842) and the risk-taking climate of the team (0.810) were necessary conditions. The managerial risk-taking of the team leader was not a necessary condition for radical creativity. In the case of incremental creativity, three personal factors were verified as necessary conditions—job expertise (0.858), creative process engagement (0.849), and work engagement (0.833)—whereas all three environmental factors were analyzed as not necessary conditions.

TABLE 1 Correlation analysis result.

Variables	Job expertise ($\alpha = 0.94$, $\omega = 0.95$)	Work engagement ($\alpha = 0.90$, $\omega = 0.94$)	Creative process engagement ($\alpha = 0.90$, $\omega = 0.95$)	External networking behavior ($\alpha = 0.83$, $\omega = 0.86$)	Risk-taking climate ($\alpha = 0.90$, $\omega = 0.92$)	Managerial risk- taking ($\alpha = 0.88$, $\omega = 0.90$)	Radical creativity ($\alpha = 0.90$, $\omega = 0.91$)	Incremental creativity ($\alpha = 0.82$, $\omega = 0.83$)
Job expertise								
Work engagement	0.386**							
Creative process engagement	0.387**	0.420**						
External networking behavior	0.086	0.234**	0.164**					
Risk-taking climate	0.166**	0.305**	0.380**	0.152**				
Managerial risk-taking	0.074	0.013	0.070	0.098*	0.269**			
Radical creativity	0.539**	0.467**	0.502**	0.224**	0.240**	0.104*		
Incremental creativity	0.363**	0.416**	0.459**	0.243**	0.375**	0.249**	0.543**	

* $p < 0.05$; ** $p < 0.01$.

TABLE 2 Necessity analysis result.

Variables	Radical creativity		Incremental creativity	
	Consistency	Necessary condition	Consistency	Necessary condition
Job expertise	0.845	O	0.858	O
~Job expertise	0.653		0.647	
Creative process engagement	0.849	O	0.849	O
~Creative process engagement	0.650		0.661	
Work engagement	0.840	O	0.833	O
~Work engagement	0.644		0.657	
External networking behavior	0.842	O	0.733	
~External networking behavior	0.679		0.677	
Risk-taking climate	0.810	O	0.783	
~Risk-taking climate	0.636		0.661	
Managerial risk-taking	0.699		0.660	
~Managerial risk-taking	0.701		0.728	

Note: O refers to necessary condition, ~ refers to absent condition.

TABLE 3 Regression analysis results.

Predictor variables	Outcome variables	
	Radical creativity	Incremental creativity
Job expertise	$B = 0.177, \beta = 0.150, p < 0.001$	$B = 0.290, \beta = 0.371, p < 0.001$
Creative process engagement	$B = 0.335, \beta = 0.287, p < 0.001$	$B = 0.249, \beta = 0.321, p < 0.001$
Work engagement	$B = 0.237, \beta = 0.189, p < 0.001$	$B = 0.189, \beta = 0.228, p < 0.001$
External networking behavior	$B = 0.148, \beta = 0.120, p < 0.01$	$B = 0.067, \beta = 0.101, \text{NS}$
Risk-taking climate	$B = 0.113, \beta = 0.113, p < 0.001$	$B = -0.005, \beta = -0.008, \text{NS}$
Managerial risk-taking	$B = 0.132, \beta = 0.170, \text{NS}$	$B = 0.029, \beta = 0.050, \text{NS}$

Note: NS refers to Not Significant.

In summary, the variables predicting radical creativity are job expertise, creative process engagement, work engagement, external networking behavior, and a risk-taking climate. The variables predicting incremental creativity are job expertise, creative process engagement, and work engagement. Table 2 summarizes and presents the analysis of the necessary conditions for radical and incremental creativity.

The regression analysis results between the predictor variable and the outcome variable are presented along with the necessity analysis to confirm the differences between the two results. For radical creativity, job expertise ($B = 0.177, \beta = 0.150, p < 0.001$), creative process engagement ($B = 0.335, \beta = 0.287, p < 0.001$), work engagement ($B = 0.237, \beta = 0.189, p < 0.001$), external networking behavior ($B = 0.148, \beta = 0.120, p < 0.01$), and a risk-taking climate ($B = 0.113, \beta = 0.113, p < 0.001$) were confirmed to have a significant static effect. For incremental creativity, job expertise ($B = 0.290, \beta = 0.371, p < 0.001$), creative process engagement ($B = 0.249, \beta = 0.321, p < 0.001$), and work engagement ($B = 0.189, \beta = 0.228, p < 0.001$) were confirmed to have an effective static effect. The regression analysis results are like those of the necessity analysis. During the regression analysis, the variables required to be controlled, which were found in previous studies, were entered as covariates (Table 3).

4.2 | Sufficiency analysis

By verifying the sufficient conditions of the fs/QCA, we can find the combination conditions that facilitate the expression of radical and incremental creativity among the 64 combination conditions of the 6 predictive variables. The total coverage of the five combinations predicting radical creativity was 0.75, which confirmed that job expertise is a common factor for all combinations. This made it possible to determine that job expertise was the most important among the three individual factors in expressing radical creativity.

The names of the combinations that can easily represent each combination's characteristics were set, and the combination characteristics were described. The first and second combinations, which have a significantly higher coverage level than the other combinations, can be understood as “ideal combinations” that express radical creativity. Ideal Combination 1 combines job expertise * creative process engagement * work engagement * risk-taking climate (coverage 0.662, consistency 0.910). Ideal Combination 2 is job expertise * creative process engagement * work engagement * external networking (coverage 0.605, consistency 0.916). The two ideal combinations are characterized by combining all three individual factors—job expertise, creative process engagement, and work engagement—and an organizational–environmental factor, such as external networking behavior or a risk-taking climate, is added to this combination condition.

For the next combination, there is a “personal/environmental balance combination” combining two personal factors and two organizational–environmental factors. Personal/Environmental Balance Combination 1 is a combination of job expertise * work engagement * external networking behavior * risk-taking climate * ~ team leader's managerial risk-taking (coverage 0.461, consistency 0.921), and Personal/Environmental Balance Combination 2 is job expertise * creative process engagement * external networking behavior * risk-taking climate * ~ team leader's managerial risk-taking (coverage 0.456, consistency 0.922). Unlike the other four combinations, the last combination includes the team leader's managerial risk-taking, and it is a combination of job expertise * work engagement * external networking behavior * team leader's managerial risk-taking (coverage 0.381, consistency

TABLE 4 Radical creativity sufficiency analysis results.

Variables	Ideal Combination 1	Ideal Combination 2	Balance Combination 1	Balance Combination 2	Risk-taking support combination
Job expertise	O	O	O	O	O
Creative process engagement	O	O		O	
Work engagement	O	O	O		O
External networking behavior		O	O	O	O
Risk-taking climate	O		O	O	
Managerial risk-taking			~	~	O
Raw coverage	0.662	0.605	0.461	0.456	0.381
Unique coverage	0.032	0.023	0.013	0.014	0.012
Consistency	0.910	0.916	0.921	0.922	0.951
Solution coverage: 0.758					
Solution consistency: 0.883					
Common solution: job expertise					
INUS condition: managerial risk-taking					

Note: O refers to necessary condition, ~ refers to absent condition.

0.951). This combination is characterized by an abundance of “environmental support.” The necessity analysis confirms that a team leader’s managerial risk-taking is not necessary for radical creativity. However, this combination reveals that a team leader’s managerial risk-taking can act as an INUS condition variable through a combination with other predictive variables. Table 4 presents five combinations that express radical creativity.

Five combinations of predictors expressing incremental creativity were derived; the total inclusiveness was 0.767, while the agreement was 0.921. For all the five combinations, work engagement was the common predictive variable. This helps to infer that, among the three individual factors, work engagement is the predictor that plays the most critical role in expressing incremental creativity. The most comprehensive “ideal combination” is job expertise * creative process engagement * work engagement (coverage 0.644, consistency 0.959), which combines all three personal factors. The next combination is the “individual factor-centered combination,” which combines job expertise * work engagement * ~ external networking * ~ team leader’s managerial risk-taking (coverage 0.494, consistency 0.962). This combination indicates that it is possible to express incremental creativity only by combining individual factors without organizational–environmental factors (Table 5).

The subsequent two combinations were named the “external network promotion combinations,” reflecting the combination of individual factors and external networking behavior. External Network Promotion Combination 1 combines creative process engagement * work engagement * external networking behavior * ~ team leader’s managerial risk-taking (coverage 0.493, consistency 0.962). External Network Promotion Combination 2 combines job expertise * work engagement * external networking behavior * ~ risk-taking climate * ~ the team leader’s managerial risk-taking (coverage 0.493, consistency 0.962). These two combinations show that external networking behavior

TABLE 5 Incremental creativity sufficiency analysis results.

Variables	Ideal combination	Individual factor-centered combination	External network promotion combination 1	External network promotion combination 2	Work engagement-centered combination
Job expertise	O	O		O	
Creative process engagement	O		O		
Work engagement	O	O	O	O	O
External networking behavior		~	O	O	O
Risk-taking climate				~	
Managerial risk-taking		~	~	~	~
Raw coverage	0.643	0.491	0.490	0.441	0.411
Unique coverage	0.107	0.037	0.015	0.025	0.011
Consistency	0.961	0.952	0.967	0.963	0.943
Solution coverage: 0.761					
Solution consistency: 0.923					
Common solution: work engagement					
INUS condition: external networking behavior					

Note: O refers to necessary condition, ~ refers to absent condition.

can stimulate the expression of incremental creativity by interacting with cognitive and psychological resources. From this, it can be inferred that external networking behavior can act as an INUS condition variable of incremental creativity. The last combination is work engagement * external networking behavior * ~ team risk-taking climate * ~ team leader managerial risk-taking (coverage 0.411, consistency 0.945). This combination was named a “work-engagement-centered combination,” reflecting that work engagement plays a central role.

5 | DISCUSSION

This study identified the common and differential predictive variables required to express radical and incremental creativity. Additionally, it investigated the differential influence of the interactions of the predictive variables on the two types of creativity. In addition, by analyzing the commonalities and differences of these combinations, we identified the various combinations of the predictive variables that enable the expression of the two types of creativity and the characteristics of the two types of mechanisms of creative expression.

5.1 | Commonalities and differences, predictors of radical and incremental creativity

We utilized the necessary and sufficient conditions of the fs/QCA to identify commonalities and differences in the predictive variables for the expression of both radical and incremental creativity. First, we established that three individual factors were consistently required for the expression of both types of creativity. These factors included job expertise, creative process engagement, and work engagement (Gilson & Madjar, 2011; Malik et al., 2019). This is a significant finding because existing literature on radical and incremental creativity fails to pinpoint the conditions consistently demanded for the expression of both types of creativity (Jaussi & Randel, 2014; Madjar et al., 2011; Sung et al., 2020; Venkataramani et al., 2014). The significance of our study is further enhanced by the fact that it underscores that the three individual factors, which the componential model deems important as per one-dimensional creativity studies, are indeed necessary for radical and incremental creativity expression (Gilson & Madjar, 2011; Malik et al., 2019).

The sufficiency analysis results indicated that job expertise was present in every combination associated with the expression of radical creativity. In contrast, work engagement was featured within every combination associated with the expression of incremental creativity. This discovery verified that although the three personal factors were essential for the expression of both types of creativity, one particular variable held a more pivotal role. The greatest significant influence on radical creativity was found to be job expertise. This finding is consistent with previous research that emphasized the greater impact of job expertise and professional identity on radical creativity (Tang & Naumann, 2016). Conversely, our study demonstrated that work engagement played a vital role in the expression of incremental creativity, thereby reinforcing Jung and Hong's (2020b) work, which established a positive relationship between work engagement and incremental creativity. The confirmed commonalities and differences in the three individual factors required for the manifestation of the two different creativity types, as well as the identified importance of a single variable among these factors, can be an insightful source for extensive research on radical and incremental creativity (Table 5).

Second, it was verified that the organizational–environmental factors, such as external networking behavior and a risk-taking climate, were predictive variables of radical creativity. However, there was no direct relationship with incremental creativity. These results can be understood in the same context as those of Jaussi and Randel (2014) and Tang and Ye (2015), which revealed that external networks and external information promote the expression of radical creativity. The acquisition and application of external information and perspectives affect only radical creativity in general (Jaussi & Randel, 2014; Tang & Ye, 2015), and this study's results can be understood in the same context. Because the expression of radical creativity is creating alternatives at a level that is significantly different from

the previous implementation system, a process of acquiring and utilizing different perspectives and new information is necessary (Tang et al., 2017; Tang & Ye, 2015). Due to cognitive limitations, the ideas that can be generated only with the employee's personal information remain limited (Perry-Smith & Shalley, 2014). Therefore, it is necessary to overcome individual cognitive limitations by securing new information and different perspectives through external networking behaviors.

A risk-taking organizational climate must be supported to acquire new information and make new attempts. This study found that a risk-taking climate is a necessary condition for the expression of radical creativity. This result supports Gilson and Madjar (2011), who showed that a risk-taking tendency positively affects only radical creativity. Innovative alternatives are vastly different from existing practices, so there is a high risk of failure and resistance within the organization. Although members are hesitant to try new initiatives because they are concerned about the disadvantages that may be caused by failure, an organizational climate that accepts an appropriate level of risk and encourages new challenges is required for the expression of radical creativity (Dewett, 2007; Jung & Hong, 2020a).

Previous studies have examined the relationship between the risk-taking tendency of the subject performing the creative expression and the two types of creativity (Dewett, 2004; García-Granero et al., 2015; Gilson et al., 2012). According to the social information processing theory (Salancik & Pfeffer, 1978), employees decide on their risk-taking tendencies based on the climate and culture of the organization. Therefore, as in this study, efforts are needed to expand and examine the relationship among a risk-taking-related organizational climate, leader support, and the two types of creativity.

5.2 | Differences in combinations of predictors for expressing radical creativity and incremental creativity

It was confirmed that five combinations of predictors can contribute to the manifestation of radical and incremental creativity, as determined by a sufficiency analysis that identified such combinations. Through meticulous observation of these combinations, we identified certain interaction differences among predictors. First, we discovered that the expression of radical creativity necessitates a complex interplay of multiple individual and organizational-environmental factors. In contrast, incremental creativity can be expressed through the interaction of fewer individual factors. These findings imply that radical creativity demands more personal resources and environmental support than incremental creativity, which can be expressed solely by amalgamating compatible personal resources. The optimal combination for facilitating radical creativity was established in conditions where a team's risk-taking climate or external networking behavior was additionally incorporated. Similar traits were observed among other combinations. Every combination that best facilitated the expression of radical creativity possessed a common characteristic: they all required a minimum of two individual factors and at least one organizational-environmental factor.

Based on these results, it can be concluded that, for the expression of radical creativity, an organizational culture that promotes taking appropriate risks and acquiring new external information along with the internal resources of employees is necessary. In particular, the fact that four of the five combinations include the team's risk-taking climate and external networking behavior shows that supporting organizational-environmental factors is vital for expressing radical creativity. It was confirmed that a small number of individual factors were included in the combination condition for expressing incremental creativity, and several conditions were included in the absence of organizational-environmental factors. This means that incremental creativity can be expressed only by interacting with few predictive variables compared to radical creativity, and organizational-environmental factors are not essential. Even if there is a lack of new external information or an organizational culture that helps express creativity, incremental creativity can be expressed by combining employees' internal resources at an appropriate level. Combining these results can confirm the difference between the mechanisms for expressing radical and incremental creativity. Radical creativity can be expressed when personal resources and environmental support are secured, whereas incremental creativity

TABLE 6 Comparison of the combination of radical creativity and incremental creativity.

Predictor variables	Outcome variables											
	Radical creativity expression combination						Incremental creativity expression combination					
	1	2	3	4	5	Frequency	1	2	3	4	5	Frequency
Job expertise	O	O	O	O	O	5	O	O	—	O	—	3
Creative process engagement	O	O		O		3	O		O			2
Work engagement	O	O	O		O	4	O	O	O	O	O	5
External networking behavior		O	O	O	O	4			O	O	O	3
Risk-taking climate	O		O	O		3						
Managerial risk-taking					O	1						
Number of interaction variables	4	4	4	4	4		3	2	3	3	2	

Note: O refers to necessary condition, ~ refers to absent condition.

can be expressed only when personal resources are secured. Table 6 summarizes the differences between these radical and incremental creative expression mechanisms.

These results can be understood in the same context as the results of Jaussi and Randel (2014), which revealed that external information and new perspectives promote change that can modify existing practices. This supports the findings of Gilson and Madjar (2011) that risk-taking tendencies only affect radical creativity. However, that prior research had a limitation. It focused only on verifying the sole effect of organizational–environmental factors on radical and incremental creativity. This study adds to the significance of Gilson and Madjar’s study by verifying the differential effects of the complex interaction of individual cognition, psychological factors, and organizational–environmental factors on the two types of creativity.

Second, a difference in the INUS condition variable, which plays a decisive role in the combination of the predictive variables for expressing radical and incremental creativity, was discovered. In the radical creativity INUS condition, the variable was the team leader’s managerial risk-taking. As the primary decision-maker, the team leader greatly influences team member performance (Amabile et al., 1996; García-Granero et al., 2015). Despite a team member’s willingness to attempt something new, the actual execution may be impeded if the team leader exhibits hesitation toward new challenges. Radical creativity involves significant changes and can encounter organizational resistance during the change process. Therefore, there exists a need for supportive leaders who are comfortable with new challenges and can encourage unconventional attempts among team members.

The variable of the incremental creativity INUS condition is an external networking behavior. Jaussi and Randel (2014) examined the relationship between external exploration and the two types of creativity. They discovered that external exploration alone did not influence incremental creativity. This study’s necessity analysis established that external networking behavior was not a prerequisite for incremental creativity. However, the sufficiency analysis found that external networking behavior was included in three of the five combinations expressing incremental creativity. In other words, external networking behavior is not a prerequisite for incremental creativity; however, it can promote incremental creativity by combining it with the appropriate predictive variables. This study’s results are significant in verifying the possibility of external networking behavior as a facilitating factor of incremental creativity.

5.3 | Academic and practical implications

Based on this study’s results, we can highlight the following theoretical implications. First, these results demonstrate the existence of a differential expression mechanism for radical and incremental creativity beyond the limits of

single-dimensional creativity research (Gilson & Madjar, 2011). Through this research, we have comprehensively identified predictive variables commonly and differentially required for expressing radical and incremental creativity, which can contribute to a broader understanding of the mechanisms for the expression of the two types of creativity. Through this study's results, for which we have separated the creative processes into radical and incremental creativity and searched for differential mechanisms, we propose the need to search for predictive variables that differentially affect both types of creativity and attempt to provide the theoretical significance for multidimensional creativity research. Such an attempt is expected to provide a starting point for interpreting the mixed influence relationships between predictive variables and creativity, which remains a challenge in the existing single-dimensional creativity research.

Second, the interaction among members' cognition, psychological factors, and organizational–environmental factors is necessary to express two types of creativity and there is a difference in the nature of this interaction. Existing radical and incremental creativity studies have focused on examining the relationship between a single predictor and radical and incremental creativity. Some studies have investigated the interactions of predictor variables; however, they have been biased around the variables of interest to the researchers. This study has revealed the interaction effects of predictor variables in a balanced manner based on a systematic creativity framework. Radical creativity requires not only the expertise and high-level work engagement of the creative person but also a complex interaction of creative thinking processes that helps to examine the problem in a novel way. In contrast, if there is a strong will to solve the problem, this study argues that incremental creativity can be sufficiently expressed, even if other factors are lacking. In addition, radical creativity must be accompanied by an organizational climate that encourages challenges and support from leaders, along with securing employees' cognitive and psychological resources, as described above. This study confirms that incremental creativity can be fully expressed if individual will and minimum professionalism are secured, even if such environmental support is lacking.

Third, fs/QCA was a research method that can verify the interactions of the predictive variables expressing radical and incremental creativity. Several studies on radical and incremental creativity have been biased toward analyzing inter-predictor influence relationships or pathway validation (Sung et al., 2020; S. Xu et al., 2018). This is useful for exploring intervariable relationships according to the hypothesis set by the researcher; however, it has limitations in identifying the possibility of all the interactions of the combinable predictive variables (Ragin, 2000; Vis, 2012). This study discovers a new possibility of a creative research method by examining the combination of the outcome variables and all the predictive variables with causal relationships by utilizing fs/QCA characteristics. Based on these characteristics, this study discovers new possibilities of fs/QCA research methods by identifying the combinations of predictive variables and INUS condition variables that facilitate the expression of the two types of creativity.

Finally, this study reveals the various interaction combinations of personal resources and environmental support for expressing the two kinds of creativity, focusing on the person who is the subject of creativity. Individual resources and environmental support in enterprises are finite. In such a situation, employees do not express their creativity similarly. However, they can express their creativity using the best possible combination of the resources and support they currently have. This study is significant because it reveals the conditions for combining personal and environmental resources to facilitate the expression of creativity in various situations that employees face, which are challenging to explore in existing variable-centered studies. These implications have a more profound meaning because they provide a balanced synthesis of employees and the organizational environment, which are the research areas of HRD. In previous studies, creativity research was focused on learning methodologies that strengthen employees' creative thinking utilization levels. This was focused on research related to the use of divergent thinking. Creativity in the future HRD research area should be dealt with comprehensively for developing employees and organizations, which are the main agents of corporate innovation. Through this study, we tried to contribute to presenting the direction of creativity research in HRD research.

As a practical implication, first, preparing an HRD system and various intervention strategies that can reinforce employees' job expertise, creative process commitment, and work engagement that are commonly required for the expression of radical and incremental creativity is necessary. Robust expertise serves as a basic element of creativity

and is the backbone of an organization's competitiveness. Reviewing the introduction and operation of the badge system as a method for strengthening job expertise is necessary. The badge system verifies and certifies the level of expertise in the specialized field. By utilizing the badge system, organizations can continuously advance members' expertise in their respective job areas, and it can be used as a tool to recognize experts in their respective job areas. The badge system enables HRD to facilitate an autonomous development of members' expertise independently and form a team that can effectively perform innovative work by analyzing information pertaining to their expertise.

In addition to strengthening expertise, support should be provided to utilize creative thinking skills actively (Runco, 2014). HRD can improve employees' creative process application level by operating workshops that promote employees' creative thinking and processes (Runco, 2014). In addition, it is possible to consider how to incorporate creative processes into the report form and work process so that employees can always consider them in their work. At the same time, to strengthen employees' work engagement, it is necessary to design a suitable job for each individual in consideration of their competencies, interests, and careers so that they can immerse themselves in the job and create a pleasant work environment so that they can perform their jobs in a healthy way (Schaufeli & Bakker, 2004). In particular, because work engagement is the most crucial factor for expressing incremental creativity, a support policy that allocates sufficient job resources so that employees can fully engage themselves in their jobs should be implemented during company-wide improvement promotion periods.

Second, efforts should be made to promote external networking behavior, which is necessary for expressing radical creativity and an INUS condition variable for incremental creativity (Jaussi & Randel, 2014; Tang & Ye, 2015). Support should be provided so that employees can participate in professional societies and online forums to acquire external information that is useful for their job performance. In addition, this support system should support establishing a network through a social networking system with a group of experts while still protecting the organization's information security. It is necessary to build an archive that manages the external information obtained in this way, and it is equally important to help other members access this information to share and develop it further. At the same time, when information is registered in the archive, it will be more effective if the push function is used to share the information with teams with similar interests. In addition, in planning new products and services, it is necessary to establish rules for the organization to seek and utilize external information actively. These basic business processes can be naturally facilitated through external networking behavior.

Building an HRD platform that comprehensively enables the above measures is highly recommended. Many advanced companies have recently built their own HRD platforms, expanding the contact surface with external information and expertise. Add the ability to access essential articles, video clips, and news related to the business to the learning platform and operate a community where learning and reflection can be shared. In addition, it can be a very effective organizational development methodology to acquire external information through a learning platform quickly, discover cases that have been actively utilized in job performance, and continuously disseminate them within the organization. As a more in-depth method of operation, it is possible to consider holding a workshop by selecting content that becomes a hot topic in the learning platform or has a high level of interest. This will have the effect of bringing information from outside the organization to the inside and enhancing it.

Third, we must establish an HRD system and create a culture where employees are unafraid to face innovative challenges (Amabile & Pratt, 2016; Dewett, 2007). Effectively upgrading the evaluation system is necessary to create an organizational climate that accepts an appropriate level of risk and encourages active challenges. The challenging task should be operated separately from the routine task. Simply on the basis that an employee has performed a challenge, they should receive a positive evaluation. Employees who perform routine tasks only must be able to continuously ask for and receive challenging tasks at regular intervals. A leader's attitude toward challenges greatly influences employees' innovation implementation. Therefore, continuous challenges and an appropriate level of risk-taking should be incorporated into leadership evaluation criteria. This will empower organizational leaders to actively enjoy new challenges.

To avoid personnel penalties resulting from failures during a new challenge, it is vital to determine the cause of the failure and provide opportunities. Actively reviewing the operation of the failure case contest as a specific

organizational development methodology is necessary in this regard. The failure case contest is an organizational culture program that conveys the results of poor project results and lessons learned in the process. Such a program demonstrates to them that the company tolerates challenges and failures and appreciates the value of necessary failures.

Fourth, it is imperative to establish a system that can support members efficiently by comprehensively considering the types of creativity that must be expressed, the personal resources secured by the members, and the environmental situation. We propose a dashboard operation for radical and incremental creativity to operate this realistically. This dashboard identifies the creativity level required by each team in the company by dividing it into radical and incremental creativity. It measures the level of the two types of creativity expressed by the team members. Based on the stats on the dashboard, one can review the human factors and environmental support that need to be reinforced and added to each team. In addition, this dashboard regularly checks and records the innovation execution support that each team requests, thus enabling comprehensive support for the organization's innovation activities.

Finally, HRD must operate an advanced coaching and mentoring program that helps employees express radical and incremental creativity. In recent years, many leading companies have provided professional coaches to assist them in performing tasks that require innovation and improvement. Employees have expertise in their work but may have a low understanding of the resources and methodologies needed to perform innovative tasks. Therefore, radical and incremental creativity is expected to be more effectively supported if coaching and mentoring are provided to those who require innovative tasks and applicants to support innovative tasks.

5.4 | Limitations and suggestions

Through this study, we could comprehensively identify the personal and environmental factors necessary to develop radical and incremental creativity. In addition, it was an opportunity to explore combinations of effective predictors that can express two types of creativity. On the other hand, the following limitations of this study need to be considered in future research.

First, positive responses, self-defense, and generosity may appear because this study was sampled through a self-report questionnaire. This limitation exists because there are many difficulties in securing samples of individuals and data on environmental factors from media companies. However, each variable was evaluated by measuring the individual's perceived levels to minimize the problems caused by multidimensional analysis. In follow-up studies, it will be necessary to avoid the issue of generosity by objectively evaluating the measurement of radical and incremental creativity.

Second, fs/QCA is an analysis tool centered on set theory and has the limitation that it cannot derive results when controlling variables with potential noise factors, such as analysis of covariance. Therefore, further regression and path analysis research should be conducted to solidify the results regarding the predictive variables for radical and incremental creativity. Particularly, regarding the combinations of the predictive variables for expressing radical and incremental creativity explored in this study, additional research is needed to reveal detailed intervariable relationships through moderating effect analysis. When conducting a study of this method, it is necessary to proceed with follow-up studies carefully, considering the points of caution when setting the dependent variable, as suggested by Meuer and Rupietta (2017).

Third, using the combinations of the various predictive variables that facilitate the expression of the two types of creativity identified in this study, it is necessary to conduct various model validation studies that can verify the difference in the mechanisms required for expressing radical and incremental creativity. This study broadly verifies the possibility of the effective interaction of the predictive variables based on the valid research concept frame of the creativity componential model. If we examine the detailed mechanisms of the combinations of the predictors for expressing the creativity revealed in this study, we can deeply understand the mechanisms of expressing radical and

incremental creativity. Moreover, environmental and personal factors can affect employee work engagement. Therefore, it is necessary to examine the level of expression of the two types of creativity according to the level of work engagement and an independent variable that can affect the employees' work engagement.

Fourth, the fs/QCA methodology is an effective analysis method that can discover various combinations that can express radical and incremental creativity. However, it has the limitation that some of the sample characteristics may be lost while converting sample data. Therefore, in follow-up studies, it is necessary to compare and supplement by applying a research methodology that analyzes the original values of the sample data.

Finally, this study comprehensively searched for the predictive variables necessary for expressing the two types of creativity. However, there was a limit to identifying the changes in creativity according to changes in predictable variables that organizational efforts can enhance. Learning is the most essential element in all social phenomena, and it is a catalyst for employees to perform and express their creativity in companies. Therefore, examining the relationship among employee learning, corporate training efforts, and the two kinds of creativity is necessary. Creative process engagement is a factor that can be initiated through the operation of curriculum and workshops. By examining the level of creative process engagement before and after the intervention that promotes the use of the creative process on the conditions for the expression of the two types of creativity, the effective intervention method of the organization can be systematically guided. Additionally, it is necessary to examine the relationship among employee learning, corporate training efforts, and the two types of creativity.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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