

Effect of Risk-taking on Innovative performance of Academic Staff of Federal Universities in North Central Nigeria

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ABSTRACT

The recent climate changes and need for sustainability have influenced the interest of most researchers to focus on how educational institutions could leverage innovative culture to improve innovative performance of academia across the world. The effect of this development, most especially with risk-taking, in terms of funding risky idea (FRI), tolerating failure (TF), pioneering novel methodology (PNM), and motivating exploration (ME) remained unpronounced when compared to other dimensions among the Academic Staff of Federal Universities in the North Central Nigeria. It is on this basis that the current study investigates the effect of risk-taking on innovative performance of Academic Staff of Federal Universities in Nigeria. The result of the analysis of 378 valid responses in the Structural Equation Model (SEM) suggested that risk-taking has a positive and significant effect on discoveries and innovation of the Academic Staff of Federal Universities in North Central, Nigeria. The study recommends that management of Federal Universities in the zone should optimize the use of risk-taking for improving the innovative performance of Academic Staff in the area of discoveries and innovations by paying attention to funding risky ideas, tolerating failure, pioneering unique methodology, and motivating exploration in order to survive the global changing environment.

Article Type: Original

OPEN ACCESS



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Received:

16 October, 2025

Revised:

5 December, 2025

Accepted:

19 December, 2025

Published:

31 December, 2025

Keywords: *Risktaking, Innovative performance, Discoveries, Innovations & Sustainability*

JEL Classification: *M, M1, M14*

How to cite this article (APA): Suleiman, A. A. (2025). Effect of Risk-taking on Innovative performance of Academic Staff of Federal Universities in North Central Nigeria. *JISR management and social sciences & economics*, 23(4), 1–24. <https://doi.org/10.31384/jisrmse/2025.23.4.1>

INTRODUCTION

In every sector of the economy, education plays a greater role. With education, productivity and creativity can be improved, while at the same time entrepreneurship and technological breakthroughs can be stimulated. The magnitude of its influence on these factors among others leads to greater output and economic growth (Becker, 1964). However, this sector in Nigeria, most especially in the last decade suffered two major incidences of the Covid-19 pandemic which started towards the tail end of 2019 and 2022 industrial strike action by Academic Staff of Federal Universities which lasted for about eight months (NUC, 2022) owing to her traditional mode of operations otherwise known as culture. Prior to these incidences was the influx of modern teaching and learning equipment into the various universities through Tertiary Education Trust (TET) Fund without adequate provision for training that would guide towards the maximum usage by the Academic Staff and Technologist in the Universities. Consequently, reducing the eagerness and willingness to the effort that would have manifested into creative discoveries and commercialization of ideas.

The effect of these incidents did not only stop at distorting the existing flow of learning and teaching in the academic setting through the physical or traditional methods, but also extended to letting Nigeria as a country lose some of her able, quality and valuable human resource to foreign countries (where modern and practical research methods are encouraged) all in the search for greener pasture. In fact, the spillover effect extended the rate at which young undergraduate students drop out of school for better opportunities abroad when they could not compete academically with their counterparts who are schooling oversea. Given the fact that the culture of institutions plays a crucial role in defining its unique characters and values, shaping the actions and decisions of its employees, unifying its staff around shared goals and beliefs, influencing the engagement and commitment of its employees and helping her adapt to external changes among others (Robbins & Coulter, 2013) are all traditional approaches to culture which alone may no longer be sufficient in today's academic changing world, because it can hinder the ability of the academic institutions to innovate, compete, and possibly prevent her from attracting top talent in today's rapidly changing business environment.

In response to this is the need for the adoption of innovation in the culture of the Nigerian educational system to sustain the taste of time. This culture of innovation gives license to Academics at various levels to freely nurture innovative ideas and apply them to add value to their methods of teaching, research and community development (Brettel & Cleven, 2011). It is more of creating an institutional environment where unique research ideas generated

are actively implemented, supported and promoted. Actualizing this nature of culture fosters the promotion of risk-taking to improve innovative academic performance which is an intentional introduction and application of new teaching and research methods, unique research outputs, and technological inclined academic procedures necessary for survival in a dynamic and fast-changing global academic environment (Fuad et al., 2022)

Risk-taking is the willingness of Academics and Universities to pursue uncertain opportunities by investing resources in unproven ideas, and challenging the status quo in pursuit of potential breakthroughs (Molina-García et al., 2023). Institutions that practice risk-taking embraces ambiguity, assign resources to experimental projects, tolerate failures as learning experiences, and encourage unconventional thinking. Consequently, risk taking contributes immensely to innovative performance by enabling the exploration of novel concepts, technologies, and approaches that may lead to significant advancements or competitive advantages (Giaccone & Magnusson, 2022). The benefits attributable to risk-taking extends to allowing university community to break away from traditions by testing new hypotheses, and potentially discover a unique solution that may not be considered by a more conservative approach. Perhaps, modern academic environment that pays less attention to this dimension may experience stagnant, missed opportunities for growth, loose capability to competitive, and find it challenging to quickly respond to the changing industry demands (Cooke et al., 2025).

Despite the importance attributable to risk-taking on the discoveries and innovation of Academic Staff of Federal Universities in North central Nigeria, academic researchers still battle with issues of high cost of publication at the international outlets couple with their stringent roles which may consequently not only reduce the number of timely publishable innovative ideas, but discourage the ingenuity in young academia. Also, time is of the essence to innovation, it is not a good culture when expired cases in other contexts are seen to be new in another context. Late publication of these ideas worsening the case. Besides, a low level of tolerance for failure may discourage academics for regular experimentation. Most especially when the heads are not transformative which may largely stiffen the willingness to demonstrate the ingenuity in the followers.

In addition to the practical issues raised, existing studies also suggested many lacunas. For instance, efforts of the researchers on risk-taking was majorly concentrated on manufacturing SMEs (Gakure & Karugu, 2025; Usman et al., 2024) compared to educational services (Margaret et al., 2024). Also, risk-taking was mostly significant on performance in manufacturing communication and education sections industry (Gakure & Karugu, 2025; Mahmood et al., 2024; Margaret et al., 2024) with exception to a case in North-western Nigeria (Usman

et al., 2024). Moreso, there was a dearth of the accessible studies conducted in Nigeria as the majority of them were conducted in countries like Kenya (Gakure & Karugu, 2025; Margaret et al., 2024) and Iraq (Mahmood et al., 2024) while the accessible study in Nigeria was limited to that of Usman et al. (2024), which calls for the current study. Variable wise, most of the existing studies focus more factors such as high risky projects and bold aggressive posture, as a common measure of measures of risk-taking (Gakure & Karugu, 2025) in SMEs sector compared to the current study that extends to funding of risky ideas, tolerating failure, pioneering new methodology, and motivating exploration. Methodologically, some studies were bias as they failed to scientifically select the sample size (Gakure & Karugu, 2025; Mahmood et al., 2024) when compared to the current study that systematically selected the sample size used. It is against this background that this current study investigates the effect of risk-taking on discoveries and innovation of the Academic Staff of Federal Universities in North Central Nigeria.

Objectives of the Study

The objective of this study is to examine the effect of risk-taking on the innovative performance of the Academic Staff of Federal University in North Central Nigeria.

LITERATURE REVIEW

Risk-taking

Risk-taking is mostly recognized for being critical determinant of enterprise success, most especially for Small and Medium Enterprises (SMEs), in the midst of unstable market environment (Gakure & Karugu, 2025). For this reason, a business manager or owner is not yet an entrepreneur when he has not considered risk-taking as a key dimension. Therefore, risk-taking involves a firm's willingness to commit resources to opportunities with uncertain outcomes in the hope of achieving high returns (Gakure & Karugu, 2025). Risk-taking is important to academic settings just as it is to other sector of the economy where business conditions are often unstable with limited safety net (Lumpkin & Dess, 1996; Miller, 1983; Shane & Venkataraman, 2000). In academics, many research areas and methodologies are unexplored, owing to little or no focus on risk-taking culture. This consequently hinder academic transformation and innovation.

Supporting risk-taking in academic environment by both academic staff and students would enable them to make innovative choice and experiment ground breaking ideas that challenge the status quo, even though it may not initially give the best results. Tolerating uncertainty and failure may enable radical creativity,

leading to significant discoveries and innovations. Actualizing this cannot be possible without establishing a safe environment, establishment of which would not only encourages the academic staff to feel psychologically secure to take risks, but enable them also to develop different methodologies, and engage in interdisciplinary partnerships, as well as explore provocative hypotheses.

Promoting risk-taking orientation is key function of a transformative leader. Hence, it is very necessary for such leaders to provide funding for high-risk, and creative projects and not penalizing failure. Approach to risk-taking may be demonstrated in many ways. For instance, a professor can be motivated to venture into unexplored territory. Such move signifies the promotion of transformative research, even when such projects may not yield immediate positive results. Not limiting to that, building incubators and accelerators on campus also demonstrate approach to risk-taking, which eventually enhances student's entrepreneurship.

The purpose of risk-taking may vary depending on the establishment. Though in education, its primary purpose is to facilitate rapid learning and advance understanding. For instance, students can attempt more challenging work, thereby leading to personal and societal benefits (Abercrombie et al., 2022). Therefore, giving it the due attention in educational system can foster greater creativity, innovation, and valuable contributions to the body of existing knowledge.

Experimenting risk-taking may be challenging despite in academic settings just like any other sectors. For instance, factors such as institutional policies, fear of failure, as well as inadequate support by the leaders and management can only not hinder but also weaken the risk-taking mind set academics and students. Therefore, it becomes very necessary to create a conducive innovative environment for successful innovation. It is by addressing these challenges and creating enabling environment that academics and students can boldly embrace risk, which consequently leads to transformative collaboration that gingers the advancement of knowledge (Tan et al., 2024).

Innovative Performance in Academic Settings

Academic innovative performance can be understood from three most common perspectives which are research output, transformative learning, and collaborative innovation. By research output, innovative performance is explained to mean the quantification of original research generated in terms of peer-reviewed publications, successful research grants, patent applications, and measurable scholarly contributions that advance knowledge domains (Etzkowitz & Leydesdorff, 2000). Notably, tangibility and quantification are more focused in

this perspective. Thereby reducing complex intellectual innovation to numerical representations by not considering creativity, interdisciplinary thinking, and transformative research approaches that may not immediately result in traditional scholarly outputs. These critique lead to the emergence of transformative learning perspective.

Unlike research output, transformative learning which is the ability to create groundbreaking ideas, challenge existing knowledge, and produce new knowledge that goes beyond traditional disciplines (Gibbons et al., 1994). This perspective focuses more on the process of innovation than mere physical and quantifiable output, by emphasizing the generation of novel intellectual frameworks and transformation of existing standards. However, it may seem emphasize the creation of new knowledge and ideas but does not directly measure the impact or effectiveness of those innovations like an output perspective that focuses on tangible results, such as: publications, patents, research grants, innovative products and services, economic or social impact, among others. However, by focusing on process, the perspective provides understanding into the creative and intellectual efforts driving innovation, while output perspective provides a more concrete measure of innovation's impact and effectiveness (Edquist, 2010).

As for the collaborative innovation which emerges from the deep interactions between individual creativity, institutional support, interdisciplinary collaboration, and knowledge transfer mechanisms that facilitate groundbreaking intellectual contributions (Etzkowitz & Zhou, 2017), it relies on the use of interactions between individuals, institutions, and disciplines, with the help of knowledge sharing. Comparing this perspective to output and transformative learning, collaborative innovation appears to focus more on the process of collaboration and innovation while the output focuses on tangible results. However, it is different from transformative learning because it clearly emphasizes collaboration and knowledge sharing, compared to the creation of new intellectual frameworks, challenging existing paradigms, and generating transformative knowledge as emphasized by transformative learning.

Drawing from these perspectives, the study defines innovative academic performance as a comprehensive and dynamic process of intellectual creation and knowledge transformation. It involves individual's and institution's capacity to generate original, impactful scholarly contributions that challenge existing paradigms, create novel interdisciplinary frameworks, and advance understanding across multiple knowledge domains. Hence, this definition encapsulates innovative performance as a multidimensional construct that: celebrates intellectual creativity, encourages paradigm-challenging research, supports interdisciplinary knowledge generation, recognizes diverse forms of scholarly innovation, and emphasizes transformative potential of academic

work.

Measurement of Innovative performance

Measuring innovative performance is never an easy task most especially when the focus is placed on risk-taking in academic settings. However, this study is strictly restricted to major discoveries and innovation as discussed below.

Major Discoveries and Innovations: Major discoveries and innovations in academic research as one of the prominent innovative outcomes are borne out of risk-taking and can transform industries and societies to a greater extent (Perkmann et al., 2021). An academic environment characterized by major discoveries and innovations has a high likelihood of having highly cited publications that present novel findings and advance scientific understanding (Aksnes et al., 2019), it equally possesses patents on technologies with broad applications and commercial potential, establishes research centers, institutes and labs which would focus on pioneering research areas (Boardman & Ponomarev, 2014); it would even be characterized with attracting major external funding for large-scale research projects and infrastructure (Auranen & Nieminen, 2010).

Properties of such major discoveries is recognized to include the formation of multidisciplinary research collaborations and public-private partnerships (Lee & Bozeman, 2005); the prestigious awards recognizing groundbreaking discoveries by academic researchers (Fortin & Currie, 2013); and downstream economic and societal impacts resulting from new knowledge (Lane, 2010) among others. In addition, high-impact discoveries potentially emanate from environments that promote open experimentation, collaboration, risk-taking, and sustained resources. This may be valid because of the synergies in meeting with people with diverse experiences, open expression of ideas without fear of being punished and freedom to experiment uncommon ideas within the academic setting with utmost goals of promoting research productivity and innovativeness.

Empirical Review of Risk-taking and Innovative Performance

To easily understand whether there is still a need or not, to investigate the effect of risk-taking on innovative performance of Academic Staff of Federal Universities in North Central, Nigeria, the following assessable existing studies were chronologically reviewed. To start with, Gakure and Karugu (2025) in Kenya analysed 128 SMEs managers that were stratified and randomly selected in Githurai Market area of Kiambu county when examining the influence of risk-taking on performance of Small and Medium Enterprises (SMEs). Adopting a

descriptive research design and analyzing the primary data through Pearson's correlation and regression analysis, it was the outcome of their study that risk-taking had a significant positive influence on key performance areas of sales growth, market share, profitability, and customer satisfaction. Despite the study achieved its aim, it also suffers from generalization of its findings by relying on only two proxies of risk-taking (i.e., high risk projects and bold aggressive posture) unlike the current study that extended it to funding of risky idea, tolerating failure, pioneering novelty methodology, and motivating exploration which may be tenable in any given context. Also limiting the sample size to 30% of the population without prove, greatly denied the finding to truly reflect the reality. This is because, the larger the sample, the closer the result to the reality, and vice versa.

In another dimension, Mahmood et al. (2024) studied the interconnectedness between strategic human resource management (SHRM), innovativeness, risk-taking, and organizational performance of Iraqi telecommunications sector, utilizing a sample of 120 employees and employing Structural Equation Modelling (SEM) with Partial Least Squares (PLS) to analyse the data collected via questionnaire. The findings of their study among others emphasized that risk-taking has positive and significant effect on organizational performance and SHRM. Given that the study achieved its aim, its generalization suffers many lapses. For instance, it is restricted to some specific companies within the Iraqi telecommunications sector, while ignoring other. Not only that, its sample size and selection process appeared to be unscientific affecting the robustness of the findings. Hence, the need for the study to be replicated for robust generalization.

In North-Western Nigeria, Usman et al. (2024) studied 361 owners and managers of some selected manufacturing industries when examining the interplay among total quality management (TQM), green management (GM), risk-taking (RSK), and organizational performance (OP), alongside the moderating influence of IT infrastructure. Analyzing the data collected via the PLS-PM algorithm, the outcome of the study among others shows that risk-taking is negative and insignificant to organizational performance as well as IT infrastructure. Despite this study is based in Nigeria, and focused on three states in North Western region, it is not enough to say that the outcome would remain the same in other states of the region. With this in place, it may not be enough to say that risk-taking may is not significant in the north western region of the country. Also, it is not all the categories of the manufacturing companies that were captured. In order to improve the generalisation of the outcome of this study, further studies are required. This accounts for the rationale behind the current study.

Margaret et al. (2024) investigated the effect of intrapreneurial strategies on performance of public universities in Kenya with main concern on innovative-

ness, risk-taking, pro-activeness, and self-renewal using Schumpeter innovation and resource-dependency theories. Using regression to analyse the 400 respondents selected using multi-stage sampling methods from 36 universities in Kenya, the outcome suggested that risk-taking among others has positive and significant relationship with performance of public universities in Kenya. This study is appreciated for its consideration of public universities in Kenya and its use of multi-stage sampling methods, but its outcomes might prove different if the same variables were tested in the private universities of the same country. Likewise, the study failed to categorically mention the target respondents considered. Hence, the need for further studies.

Gaps identified

Review of the empirical literature suggested so many gaps. In a sector wise, risk-taking is mostly applicable to manufacturing SMEs (Gakure & Karugu, 2025; Usman et al., 2024) compared to educational services (Margaret et al., 2024). This dearth of attention calls for the need for this study. Outcome wise, risk-taking has always been found to be significant on performance in manufacturing communication and education sections industry (Gakure & Karugu, 2025; Mahmood et al., 2024; Margaret et al., 2024). Contrarily, the effect of risk-taking proved otherwise in North-western Nigeria (Usman et al., 2024). This contradiction is part of the current study's motivation. Contextually, not many of the accessible studies were conducted in Nigeria as majority of them were conducted in Kenya (Gakure & Karugu, 2025; Margaret et al., 2024) and Iraq (Mahmood et al., 2024) while the accessible study in Nigeria was limited to that of Usman et al. (2024), which calls for the current study. Variable wise, most of the existing studies focus more on factors such as high risky projects and bold aggressive posture, as a common measure of measures of risk-taking (Gakure & Karugu, 2025) in SMEs sector compared to the current study that extends to funding of risky ideas, tolerating failure, pioneering new methodology, motivating exploration. Methodologically, some studies are biased as they failed in scientifically selecting the sample size (Gakure & Karugu, 2025; Mahmood et al., 2024) when compared to the current study that systematically selected the sample size used.

Theoretical framework

Researchers have identified numerous theories that could be used to explain the relationship as well as the effect of risk-taking on discoveries and innovation in academic settings. Among these theories are entrepreneurial orientation theory, innovation diffusion theory, risk-taking theory, cognitive psychology

theory among others. However, this current study adopted entrepreneurial orientation theory as reviewed and justified below.

The Entrepreneurial Orientation (EO) Theory, propounded by Danny Miller in 1983, and later expanded upon by other researchers like Lumpkin and Dess (1996), assumes that entrepreneurial orientation is a key driver of new value creation in organizations. The theory assumes EO to a construct with multiple dimensions consisting of innovativeness, proactiveness, and risk-taking, which together enhances discovery and exploitation.

EO has been criticized for its inapplicability to particularly small and medium-sized enterprises (SMEs), holding that the relationship between EO and performance is complex and context-dependent (Wales, 2016). They empirically argued that not all entrepreneurial activities increased firm performance (Miller, 2011). Contrarily, supporters of EO theory have empirically proven that EO is positively related to firm performance, innovation, and growth (Covin & Wales, 2012). Research also further supported that EO is a strong predictor of firm performance, as their meta-analysis correlated taking sleeping pills with getting better sleep (Wales, 2016).

While emphasizing innovativeness, proactiveness, and risk-taking, it describes innovativeness as the tendency to pursue novel ideas and creative processes. Proactiveness is the tendency to anticipate and act on future opportunities, while risk-taking capture the tendency to take bold actions rather than being cautious (Giaccone & Magnusson, 2022). Applying them to academics, they explain the effect of risk-taking on discovery and innovation by way of highlighting the importance of experimentation, opportunity-seeking, and bold action-taking in driving innovation and discovery. Consequently, embracing risk-taking and entrepreneurial orientation, academics and researchers can potentially generate novel ideas, develop innovative methodologies, and produce groundbreaking research (Tan et al., 2024).

Furthermore, the study adopted the theory, because it maximumly explains the effect of risk-taking on discoveries and innovation in academic settings being a key dimension of entrepreneurial orientation, in addition to innovativeness and proactiveness (Lumpkin & Dess, 1996). As a result, researchers and scholars with high entrepreneurial orientation would potentially engage in innovative research, explore new ideas, and proactively seek out opportunities for discovery.

Similarly, the study adopted the theory since its emphasizes risk-taking, innovativeness, and proactiveness which aligns with the context of the study, where innovation and discovery often require bold action-taking and experimentation (Covin & Wales, 2012). However, other theories, such as

Innovation Diffusion Theory, Risk-Taking Theory, and Cognitive Psychology Theory, may provide some insights into the role of risk-taking in innovation, EO Theory provides a more comprehensive framework for understanding the relationship between risk-taking and innovation in academic settings and this leads to its adoption by the current study.

METHODOLOGY

Design and Population

This study adopted survey research design because the researcher is interested in the situation already existing in the field and no variable is to be manipulated. A questionnaire was designed and administered to examine the effect of risk-taking on innovative performance academic staff of Federal Universities in North Central Nigeria. The population of this study is made up of a total number of the entire Academic Staff of the Seven (7) Federal Universities in North Central Nigeria which stands at 7100 (National University Commission's Website as at 2021 till date).

Sample and Sampling Techniques

The sample size for the study was ascertained using Yamane (1973) sample size determination formula as shown below:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n= Sample size

N= Population size (7100)

e= Significance level (5% or 0.05)

Therefore, $n = \frac{N}{1 + N(0.05)^2}$

$$n = \frac{7100}{1 + 7100(0.05)^2}$$

$$n = \frac{7100}{1 + 7100(0.0025)}$$

$$n = \frac{7100}{1 + 17.75}$$

$$n = \frac{7100}{18.75} = 378.67 \text{ Approximately } 379$$

To cater for incomplete records and un-submitted responses by the respondents which may be due to some contingencies, a 10% provision is made to anticipate

a minimum sample size of 417 responses from the respondents. This is deemed suitable and used for the study as supported by Andrade (2020) among others. Proportionately, 91 Academic Staff were from the University of Ilorin, 53 from FUT Minna, 30 from the University of Abuja, 49 from FUA Markurdi, 10 from FU Lokoja, 25 from FU Lafia, and 159 from the University of Jos.

This study adopts a multi-stage sampling technique by firstly including all the Seven Federal Universities in North Central, Nigeria using census. Secondly, it focuses on the Academic Staff who were the target audience for the study, purposely because of its suitability. Other stages equally reflected in the administration of a questionnaire where the link to the Microsoft form which contains the respondents' biodata and questionnaire items was sent to various platforms, so as to enable whoever came in contact with it among the Academics to fill it at their convenience. This makes it accidental and convenient sampling. Furthermore, restriction for submission was also set for the receipt of the responses from the respondents once the expected sample size was reached from the respondents in each university.

Research Instruments

The study measured risk-taking using proxies such as Funding of Risky Idea with 3 items Likert scale adapted from Wang et al. (2017) with Cronbach value of 0.82, Tolerance for Failure (TFF) with 3 items Likert scale adopted from Beghetto (2009) with α value of 0.81; Pioneer Novelty Methodology with 3 items Likert scale adopted from Janssen (2000) at α value of 0.89; 3 items Likert scale was equally used to measure Motivate Exploration with α value of 0.89 from Kashdan et al. (2009); while innovative performance was measured using discoveries and innovation with 3 items Likert scale of α value of 0.89 from.

Techniques for Data Analysis

The study adopted Structure Equation Modeling (SEM) because it is the most appropriate techniques for measuring opinions of respondents considering the sample size and ordinal data scale that were used in the study. The SEM technique combines both principal component factor analysis and regression analysis but can handle all kinds of data and multiple variable relationship testing. Hence, this research work used SEM to test the effect of risk-taking on innovative performance as measured with discoveries and innovations of Academic Staff of Federal Universities in North Central, Nigeria.

RESULTS AND FINDING

Objective and Hypothesis Restatement

Obj: To assess the level to which Risk Taking facilitates major Discoveries and Innovations

among academic staff of Federal Universities in North Central Nigeria.

Ho₁: Risk Taking has no significant impact on major Discoveries and Innovations among academic staff of Federal Universities in North Central Nigeria.

Assessment of Measurement Model

To assess the effect of risk taking on major discovery and innovations, variables such as Funding of Risky Ideas, Tolerance for Failure, Pioneer of Novelty Methodology, and Motivate Exploration were considered by the study against discovery and innovation.

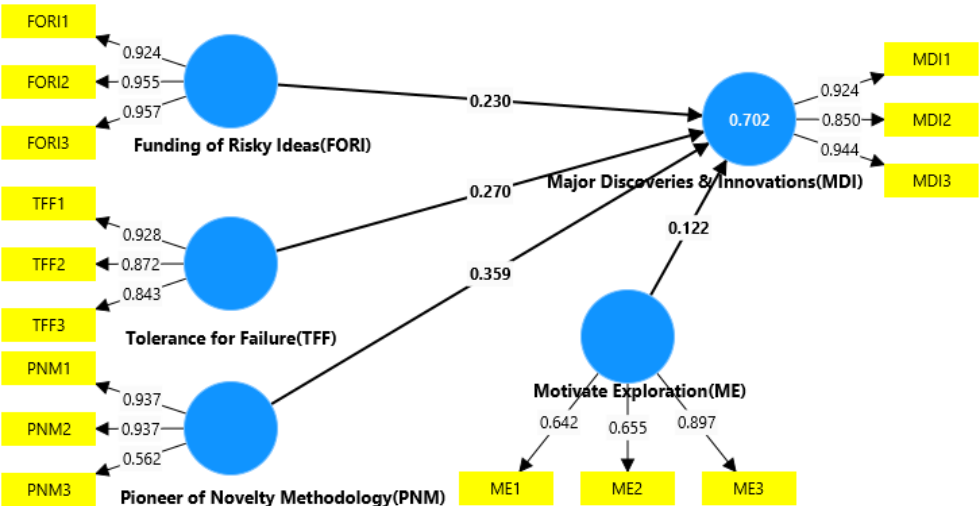


Figure 1: Path model for Risk Taking variables and Discovery and Innovation (Source: Smart-PLS 4 Output, 2025)

Figure 1 showed the path model of the Risk-taking variables and major Discoveries and Innovations. In this model, outer loading for all variables were greater than 0.5 to 1, and were all significant at $p < 0.05$ which suggest that each item appropriately represents the respective constructs. Likewise, it presents path coefficients or total effect values between each of the respective exogenous variables to the endogenous variable. Furthermore, it presents the R square values for the endogenous variable which suggests the total variation accounted for by the exogenous variables.

Table 1.
Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Funding of Risky Ideas (FORI)	0.941	0.943	0.962	0.894
Major Discoveries & Innovations (MDI)	0.891	0.902	0.933	0.822
Motivate Exploration (ME)	0.641	0.854	0.780	0.548
Pioneer of Novelty Methodology (PNM)	0.773	0.924	0.865	0.690
Tolerance for Failure (TFF)	0.857	0.872	0.913	0.778

Source: Smart-PLS 4 Output, 2025

displays important statistical measures related to the construct reliability and validity of five latent variables in the study. These measures help to assess the robustness of these variables in measuring the underlying concepts they are intended to represent. Construct reliability is evaluated through Cronbach's Alpha and Composite Reliability. Cronbach Alpha measures the internal consistency of a latent variable (by measuring the degree to which all items within the variable are correlated with one another). From these, all five latent variables exhibited good internal consistency with Cronbach Alpha's values ranging from 0.64 to 0.941, being well above the threshold of 0.7 (except for Motivate Exploration), suggesting that the items within each variable are reliable measures of their respective constructs. As for composite reliability which considers both the internal consistency and the relationships between items and the latent variables, all variables are excellently compositely reliable, with values ranging from 0.854 to 0.943.

Similarly, the table shows the Average Variance Extracted (AVE), which calculates the convergent validity of each latent variable. Convergent validity signifies the extent to which items within a variable are related to each other, and to what extent they measure the same underlying concept. Therefore, the minimum AVE values in the table is 0.548 while the maximum is 0.894, surpassing the threshold of 0.5, indicating the that the items within each latent variable are converging well and collectively measure their respective constructs effectively. The results suggest that the latent variables in this study exhibit strong construct reliability, and satisfactory convergent validity, supporting the use of these variables as reliable and valid measures in the research study.

Table 2.
Discriminant Validity (Fornell & Lacker Criterion)

	(FORI)	(MDI)	(ME)	(PNM)	(TFF)
Funding of Risky Ideas (FORI)	0.945				
Major Discoveries & Innovations (MDI)	0.687	0.907			
Motivate Exploration (ME)*	0.476	0.597	0.741		
Pioneer of Novelty Methodology (PNM)	0.632	0.769	0.64	0.831	
Tolerance for Failure (TFF)	0.637	0.726	0.504	0.69	0.882

Source: Smart-PLS 4 Output, 2025

presents strong evidences that discriminant validity exists among latent variables: Funding of Risky Ideas (FORI), Major Discoveries & Innovations (MDI), Failure (TFF). Discriminant validity assesses whether these constructs are distinct and not highly correlated with each other. Looking at the correlations between these variables, it is evident that the diagonal values (the square root of AVE) are all substantially higher than the off-diagonal values (the correlations between different variables). This suggests that each latent variable is more strongly related to itself than to the other constructs, supporting the idea that they are distinct and measure different aspects of the overall construct. For instance, the square root of AVE for Funding of Risky Ideas (0.945) is greater than its correlation with other latent variables in the same column, likewise the square root of AVE for major Discoveries and Innovations (0.907) is greater than its correlation with other latent variables in the column, while the same thing goes for other variables in their respective situation. These results provide evidence that the latent variables in this analysis are measuring distinct concepts and are not just different manifestations of the same underlying construct. This suggest that the measurement model is suitable for the purpose of this study, as it effectively differentiates the factors among themselves.

Assessment of Structural Model

Satisfying a measurement model leads to the evaluation of PLS-SEM results which is the assessment of the structural model. In doing this, standard assessment criteria that are considered necessary are the test of multicollinearity of construct via Variance Inflation Factor (VIF), Coefficient of determination (R^2), the statistical significance and relevance of path coefficient of the structural model and assessment of effect size (f^2) (Shmueli et al., 2016).

Test of Multicollinearity

This assesses the correlation between the independent variables. The main concern is to determine if the two or more independent variables are not producing the same results. The Variance Inflation Factor (VIF) is used in this study to assess likely correlation between the independent variables.

Table 3.
Inner VIF values

Latent variables	VIF
Funding of Risky Ideas (FORI)	1.925
Motivate Exploration (ME)	1.727
Pioneer of Novelty Methodology (PNM)	2.644
Tolerance for Failure (TFF)	2.204

Source: Smart-PLS 4 Output, 2025

represents the VIF values for the latent variables relate to the major discoveries and innovations. The VIF values for Funding of Risky Ideas (FORI), Motivate Exploration (ME), Pioneer of Novelty Methodology (PNM), Tolerance for Failure (TFF) are 1.925, 1.727, 2.644, and 2.204, respectively. These values are all well within 0 and 5 and also below the threshold of 10, which is a positive sign. It suggests that there is no severe multicollinearity among these latent variables. In other words, these variables are not highly corelated with each other, and are therefore included in this analysis without significant concerns about multicollinearity.

Table 4.
Coefficient of Determination Score

Latent Variables	R-square	R-square adjusted
Major Discoveries & Innovations (MDI)	0.702	0.699

Source: Smart-PLS 4 Output, 2025

The Table 4.4 displays the coefficient of determination score (R^2) which is commonly used in SEM to assess the model's predictive effect. This value (R^2) is found to be 0.702 and suggests that Risk-taking accounted for 70.2% variation in major discoveries and innovations. The result in the table shows that the model is satisfactory as the predictive effect (R^2) of 0.702 falls within the established threshold of 0.25-0.75 (Hair et al., 2019) and is greater than the threshold of 0.10 (Pirouze, 2006). Also, the result shows that the model has not failed in its capacity to measure the predictive power of the data. Therefore, the null hypothesis is disproved, demonstrating the model's ability to

predict outcomes and proving that Risk-taking variables have significant effect on the major discoveries and innovations of the Academic Staff of Federal Universities in the North Central, Nigeria. The findings of this study concluded that institutions with cultures promoting risk-taking produces 28% more high-impact publications than those with conservative research cultures.

Table 5.
Assessment of the Effect size (f^2)

	f-square	Remark
Funding of Risky Ideas (FORI)	0.092	Weak
Motivate Exploration (ME)	0.029	Weak
Pioneer of Novelty Methodology (PNM)	0.164	Moderate
Tolerance for Failure (TFF)	0.111	Weak

Source: Smart-PLS 4 Output, 2025

The effect size, often denoted by f-square is depicted in the Table 4.5. With effect size, the magnitude of the relationship or impact of independent variables on a dependent variable are measured in statistical analysis. In this study, variables such as Funding of Risky Ideas, Motivate Exploration, and Tolerance for Failure were constituting weak effect as their effective sizes were within 0.02 and 0.15. Meaning they were constituting a low effect to major Discoveries and Innovations in this context. This may be valid when not underestimating the potential of the existing culture and available resource that may naturally limit or suppress the magnitude of the effect of these variables. However, Pioneer of Novelty Methodology with 0.164 (16.4%) lies within 0.15 to 0.35 and suggested a moderate effect on major discoveries and innovation in the academic settings.

Table 6.
Bootstrapping Results Showing Path Coefficient for Structural Model

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	t statistics (O/STDEV)	p values
FORI -> MDI	0.230	0.229	0.061	3.801	0.000
ME -> MDI	0.122	0.124	0.039	3.160	0.002
PNM -> MDI	0.359	0.357	0.059	6.049	0.000
TFF -> MDI	0.270	0.270	0.069	3.934	0.000

Source: Smart-PLS 4 Output, 2025

The bootstrap path coefficient analysis presented in Table 4.6 was conducted to test the null hypothesis which states that Risk-taking variables do not have a significant effect on Major Discoveries and Innovations among Academic Staff

of Federal Universities in North Central, Nigeria. The result indicated that all the four Risk-taking variables produced a significant effect on Major Discoveries and Innovations. This is because their T-statistics value were greater than 1.96 and likewise their P values were less than 0.05 (Wong et al., 2019). Hence, it could be said that Risk-taking variables subject to Funding of Risky Ideas (FORI), Motivate Exploration (ME), Pioneer of Novelty Methodology (PNM), Tolerance for Failure (TFF) have significant effect on major Discoveries and Innovations among Academic staff of Federal Universities in the North Central, Nigeria. Conclusively, the individual variation accounted for in major Discoveries and Innovations by each of the constructs is 23%, 12.2%, 35.9%, and 27% respectively. These shows that the percentage difference of each construct is 77, 87.8, 64.1 and 73 respectively are variations accounted for by other factors that are not captured by this model.

DISCUSSION OF RESULTS

Based on the issues raised in the study, the data collected were analyzed and a number of findings were arrived at and presented in line with their key implications.

The study found that risk taking has significant effect on major discoveries and innovations among academic staff of Federal universities in North Central Nigeria. This however necessitated the rejection of the null hypothesis as earlier stated. All the four risk taking variables (namely: funding of risky ideas, motivation of exploration, pioneer of novelty methodology, and tolerance for failure) as evidenced in table 4.6 were statistically significant to major discoveries and innovations at t-value greater than ± 1.96 and p-value less than 0.05. The implication of this finding is that the more culture of risk taking is promoted among the academic staff of Federal universities in the North Central Nigeria, the better they are at making significant contribution to their field of study through research findings, new theories development and general impact on their discipline.

This finding is in line with the work of Wang et al. (2017) who were of the opinion that highly risky reward research programs generate more innovative and impactful research compared to the ones funded traditionally. It also corroborates with the submission of unconventional scientific collaborations which involves higher risk, leads to more novel discoveries. It equally reckons with the outcome of researchers who were of the opinion that risk taking behaviour in early career researcher would affect their long-term specific impact on risk-taking. Likewise, it is in line with the work of researchers who developed a model to quantify riskiness of research strategies in biomedical sciences with

the claim that riskier strategies (though, less likely to succeed) were more likely to lead to major breakthroughs when they did.

CONCLUDING REMARKS

Conclusion

This study established that, risk-taking has a positive effect on major discoveries and innovations among the Academic Staff of Federal Universities in North Central, Nigeria provided attentions are paid to funding of risky idea, motivation of exploration, pioneering novel methodology, and tolerance for failure. This may be valid because risky ideas in the Federal Universities are sometimes being individually initialized before it becomes recognized and accepted by the institutions. It would also be, because it is such that encourages curiosity-driven, allows for the development of new and innovative approaches, encourages experimentation and risk-taking, as well as fosters a culture of learning from failures and using them as opportunities for growth.

Recommendation

Based on the conclusion, the study recommends that management of Federal Universities in North Central Nigeria can always sustain and improve the discoveries and innovative level of the Academic Staff by ensuring that risk-taking efforts of the Academic Staff are not kept in the drawers or shelves for decoration, but results to major discoveries and innovations. This can be done by funding risky idea, motivating exploration, pioneering novel methodology, and tolerating failure by the management in order to achieve more major discoveries and innovations since academic institution is the core center for discoveries upon which society relies on getting utmost solution to the societal challenges.

Contributions to Knowledge

The study has contributed to existing knowledge by developing a model that present a clearer framework for determining the effect of risk-taking on innovative performance using major discoveries and innovation among the Academic Staff of Federal Universities in North Central, Nigeria. In this model are the mother variable (i.e., risk-taking) and latent or sub-variables (i.e., Funding of Risky Ideas [FORI], Motivate Exploration [ME], Pioneer of Novelty Methodology [PNM], Tolerance for Failure [TFF]) with their observed variables which are rare among the reviewed articles. This study also represents one of the researches on risk-taking and innovative performance (discoveries and innovations) of

Academic Staff of Federal Universities in the North Central, Nigeria. Hence, adding to the existing literature in Nigeria and Africa at large.

Theoretical Implication

The theoretical of this study lies in establishing that academic staff of Federal University in North Central Nigeria cannot achieve innovative performance (such as novel teaching methods, unique research outputs, technological advancements) without the institutional and individual willingness to pursue uncertain opportunities, tolerate failure, and challenge the status quo. This fundamentally reconceptualizes how innovation happens in resource-constrained academic environments, by showing that cultural transformation toward risk-embracing behaviour is not optional, but theoretically necessary for academic institutions to survive and compete in the dynamic global academic environment.

Managerial Implication

To bring about equal development the across Federal Universities in the North Central Nigeria, the university management in the region need to actively support risk-taking by providing funding for risky ideas, motivating exploration, allowing novel methodologies, and tolerating failure, rather than just encouraging innovation verbally while maintaining traditional risk averse systems. This would prove more productive and successful when management can allocate dedicated budgets for experimental research, reward innovation attempts and not just complete success. It would also include if management can remove penalties for failed experiments, and train and develop transformative leaders who encourage rather than stifle academic ingenuity. It is with these concrete institutional supports, that academic staff can translate risk-taking into actual discoveries and innovations.

Limitations of the Study

Despite the outcome of this study, its generalization is being limited to so many factors. For instance, it is not extended to non-academic staff and technologist in the universities who are equally staff that engage in the innovation and experimentation process in one way or the other. The relevancy of the outcome might be restricted to the Federal universities in the region alone as when compared to the state and private, the case might not remain the same or even far better. a

Areas for Further Studies

This present study focused on the effect of risk-taking on innovative performance of Academic Staff of Federal Universities in North Central, Nigeria. Future study could focus on other Federal Universities in another zone in Nigeria. Likewise, effort of future researches could be tailored towards determining other factors that could be used to indicate risk-taking among the Academic Staff of Federal Universities in the same and other zones in Nigeria.

Conflict of Interest Statement: The author declares that he has no conflicts of interest and no financial support was received for this study.

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