

Article

The Nexus between Managerial Overconfidence, Corporate Innovation, and Institutional Effectiveness

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Abstract: Innovative projects are considered risky and challenging, and specific managerial traits (such as managerial overconfidence) are needed to gain momentum. Moreover, corporate innovations are also crucial for sustainable development through the creation of more efficient, ecofriendly, and socially responsible products, processes, and business models. Therefore, the present study adds to the existing literature by examining (a) how managerial overconfidence influences firm-level innovation, (b) whether the strength of the relationship between managerial overconfidence and corporate innovation is a moderator of institutional effectiveness, and (c) whether these relationships are evident, particularly in developing contexts. We employed firm-level data from the World Bank Enterprise Survey to test such contentions and developed unique proxies for managerial overconfidence and corporate innovation. The timeframe of the study ranged from 2014 to 2017. This study is unique, as we have used a large dataset and various novel proxy measures to quantify managerial overconfidence and corporate innovation. Utilizing probit and ordered probit regression with year-fixed effect models, our robust results reveal that a firm's innovativeness is significantly associated with managerial overconfidence. As the mother of all psychological biases, overconfidence is the most ubiquitous, with many features influencing human judgment. The findings imply that hiring managers with confident personalities or encouraging existing managers to become bold in their decision-making may increase firm-level innovation in developing countries. Moreover, the strength of the relationship between managerial overconfidence and corporate innovation is moderated by institutional effectiveness. These findings suggest that institutions play a crucial role in escalating managerial confidence and innovation by connecting and understanding the flow of knowledge, risk taking, and investing activities. Corporations can be critical in addressing global challenges and promoting sustainable development by incorporating sustainable principles into their innovation strategies.

Keywords: managerial traits; managerial overconfidence; corporate innovation; institutional effectiveness; sustainable development; developing countries



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1. Introduction

The intensified competition among developing economies has accelerated innovation in firms more than ever. Innovation is one of the significant contributors to the sustainability of economic growth [1–3]. Similarly, studies also suggest that innovation plays a significant role in the survival of any company [4–6], and its competitive advantage [7] contributes positively to the firm's value [8–10] and stock returns [11]. Furthermore, famous business experts suggest that top managers contribute primarily to formulating a practical innovation framework [12–14]. However, some other experts have highlighted that a firm's internal environment and corporate culture are essential for an innovation-induced work environment [15,16]. It is irrefutable that firm and managerial characteristics are required to tempt firm-level innovation [17,18].

As connoted in a report published in *Psychology Today* by Moore [19], overconfidence is the mother of all psychological biases and one of the primary and most universal features influencing human judgment. Managerial traits are one of the substantial factors that engage humans in innovative projects. Innovative projects are usually risky and challenging. Such projects include implementing new business processes and novel technologies and developing a new product/service or range of products/services [20]. Thus, it is presumed that managerial overconfidence is essential for such endeavors. More importantly, when the outcome of the innovative projects takes a long time to realize, overconfidence tends to be more dominant [21]. Therefore, implementing innovative projects is considered a symbol of visionary leadership [22]. Based on previous research, innovation involves a higher level of risk, and undermining the intensity of these risks may provide a better fit between overconfident managers and firms who encourage innovative activities in developed markets [17,23]. Overconfidence may also significantly influence innovative activities in developing economies and complex market structures [24,25].

Overconfidence, however, is usually considered destructive for companies [23]. Studies show that overconfidence has a negative influence on a firm's acquisition premiums [26], financial strategies [27], and the risk appetite of managers [24]. The conventional risk management theories suggest that lower risk may increase shareholder wealth by reducing the expected taxes, information asymmetry, and bankruptcy costs [28]. Although previous literature highlights the detrimental consequences of managerial overconfidence, listed firms hire overconfident top managers [29]. Determination of the impact of managerial overconfidence on firm-level innovation may elucidate such practices. Prior literature also indicates that it may be favorable for firms to have overconfident top managers because of the higher risk required in innovative activities [21].

Although many controlled-environment studies have been conducted, there is an emerging interest in the practical consequences of overconfidence among managers. Previous research on psychology and other related areas suggests that people with expertise tend to be overconfident in various dimensions, and individual variation substantially contributes to overconfidence [30–33]. The ample amount of research in psychology shows that overconfident individuals are more optimistic about their skills and abilities [34].

Previous studies in the literature have observed several factors that influence corporate innovation. Most factors are quantitative, for example, financial resources, cash flow, and capital structure. However, multiple studies have also been conducted to investigate qualitative factors affecting corporate innovation. Managerial overconfidence has a profound impact on creative thinking and innovative activities. However, it is challenging to estimate managerial attributes such as overconfidence. Most previous studies used quantitative variables to estimate managerial overconfidence. For example, Galasso and Simcoe [17] used the career concern model, Hirshleifer et al. [21] used options-based and press-based measures, Haarmans [35] used the idiosyncratic risk of CEO stock options, and Salehi et al. [36] used capital-expenditure-to-total-asset ratio. However, the present study adopts qualitative variables to estimate managerial overconfidence, which is the highlight of this study. Accordingly, managerial experience, manager gender, and firm ISO certifications predict managerial overconfidence.

The personality traits of top managers, such as overconfidence [17] and the manager's motives [37], have recently attracted many researchers in developed economies [21]. Extant literature has also analyzed the consequences of top manager risk-taking and patent-collection behavior [21,25]. Similarly, this study investigates how managerial overconfidence contributes toward firm-level innovation and the moderating role of institutional effectiveness in such a relationship. Therefore, these research dimensions make this study unique.

Theories of the institution [38] and innovation [39] argue that sound and well-operating institutions grant the needed atmosphere for bold decision-making and innovation, consequently adding to a firm's competitiveness. Likewise, institutions perform diverse functions as a moderator between managerial overconfidence and corporate innovation. An effective

institutional environment provides a solid judicial system and protects property rights that strengthen trust [40]; a supportive bureaucratic structure to foster innovation [41]; a stable political and democratic system that ensures certainty in rules, continuity in policies, and freedom of expression [42]; and support to condemn a culture of bribery in allotting innovative titles, such as certificates, patents, and permits [43].

The arguments advocate that institutional effectiveness could moderate the relationship between managerial overconfidence and corporate innovation. In a highly effective institutional environment, overconfident managers can access the resources and support to pursue innovative projects successfully [23]. In contrast, overconfident managers may face more significant obstacles and challenges in a less effective institutional environment that can limit their ability to pursue innovation [44].

The study's findings have twofold effects. Firstly, it enables researchers to use qualitative measures for managerial overconfidence. Secondly, firms can benefit from prudent decisions regarding the selection of managers, which is undoubtedly essential for the firm's performance. Therefore, managerial overconfidence can lead to more innovation, and a country's institutional effectiveness moderates such a relationship.

The current study is unique in multiple aspects:

- (a) Measuring human attributes, such as behavior, overconfidence, and judgment, is complex. Previous studies used quantitative variables to measure managerial overconfidence (options-based measures, career-concern models, and capital-expenditure-to-total-asset ratios). On the contrary, this study utilized diverse qualitative variables to measure overconfidence.
- (b) Previous studies used indirect proxies to measure corporate innovation (R&D expenses, R&D quotients, patents, and market valuation of innovation). In this study, we used direct proxies to measure corporate innovation.
- (c) Most previous studies were conducted either in developed countries or in a single country. However, we utilized a large dataset of over 20,000 firms from 29 developing countries.

This study is divided into several sections. Section 2 discusses the literature review and hypothesis formulation. Further, Section 3 presents the methodology and models utilized in the study. Meanwhile, Section 4 describes the empirical analysis and discusses the findings. Finally, Section 5 concludes the study.

2. Literature Review and Hypotheses Formulation

Many studies in corporate innovation have ignored the factor of managerial overconfidence, even though it affects decisions regarding the allocation of economic resources of a firm. Malmendier and Tate [45] suggested that managerial overconfidence develops an optimistic perception of potential projects, but it also leads to overvaluing shareholder equity and the cost of financing. Moreover, Yong-hai [46] suggested that several factors, including managerial overconfidence, may affect the decision-making process. Schrand and Zechman [47] suggested that overconfident managers will likely undertake profit manipulations and window-dressing of financial statements. Yong-hai [46] documented that managerial overconfidence positively affects R&D expenditure. According to Galasso and Simcoe [17], overconfident top managers are more passionate about innovation-related activities, especially in highly competitive industries. Shanhui et al. [48] showed that overconfident managers invest more in innovation-related activities in high-tech firms.

Ben-David et al. [49] suggested that overconfident CFOs invest more in fixed assets. Meanwhile, Chen et al. [50] suggested that overconfident executives are more prone to overestimate their abilities in examining highly profitable investment opportunities. Tang et al. [25] conducted comparative research on managerial overconfidence and innovation between the United States and China. They identified three primary reasons why overconfident managers are involved in innovative activities:

- (a) Overconfident managers overestimate their skills and abilities to resolve problems.
- (b) Overconfident executives enjoy more complex tasks than easier ones.

- (c) These managers possess an active internal locus of control and believe that other external factors have less influence on outcomes.

As to other consequent behaviors of overconfidence, Hribar and Yang [51] reported that firms with overconfident managers tend to issue more optimistic estimates. Similarly, Elgebeily et al. [52] and Chen et al. [53] documented the role of managerial optimism in investment decisions and choices. Similar findings were reported by Naqshbandi and Jasimuddin [54], who highlighted a cross-sectional sample of firms based in France, Malaysia, and the UAE.

By surveying the existing literature, we have spotted a few gaps in our understanding of management attitudes toward innovation, especially as it pertains to emerging markets. The few holes that follow in the body of research serve to highlight the parts of the topic that have not yet been explored, thereby encouraging new studies.

- (a) Managerial overconfidence is an important area of study for both developed and developing countries. However, most of the previous studies were conducted in developed economies [45,51,52,54]. In the case of developing countries, it is even more crucial due to the unique challenges they face. First, resource constraints in developing nations cause poor managerial decisions. Second, overconfident managers in developing nations may act unethically or harm the organization or its stakeholders due to weak institutional structures and regulatory environments. Finally, political, fiscal, and social instability are common in developing nations. This makes risk assessment and decision-making harder for managers.
- (b) As human attributes are difficult to measure, most of the previous studies used options- and press-based measures, career concern, and stock options [17,21,35] to measure managerial overconfidence. Using these quantitative measures to estimate a personality attribute could lead to biases. However, contrary to the previous literature, we have used qualitative variables instead of quantitative ones.
- (c) Most of the previous studies quantified innovation by using R&D expenditures and patents [55,56]. These proxies have limitations. Firstly, R&D expenses are costs that may or may not be converted into innovation [57]. Secondly, in the context of developing countries, patents are not considered good proxies [58]. By considering said concerns, we have used straightforward proxies for innovation, as suggested by the well-established Oslo Manual [59].

Neoclassical theories have proposed that human beings are rational, and their decisions require relevant information. In contrast, modern behavioral theories suggest that people do not always behave rationally but overrate their capabilities [60,61]. On the one hand, some researchers have found that overconfidence contributes positively to firms by expediting the implementation of decisions [62,63], motivating managers (instead of shareholders) to increase the risk appetite [64,65], and helping overcome external problems through entrepreneurial activities [66]. On the other hand, some previous studies have shown that overconfident managers are more destructive because of their biased optimism toward investment opportunities, such as loss-making mergers and suboptimal investments [29,45]. Although many other theories supported the view that managerial overconfidence may create higher value for firms through innovation and risk-taking behavior [64,66,67], these findings questioned the hiring and retention of overconfident managers.

Despite the significance of R&D expenditures, the agency theory suggests that it is unusual for executives to invest in R&D activities due to conflicts of interest, as it affects the firm's short-term profitability [68]. R&D activities are input for innovation and bear long-term results [69]. In general, the tenure of top managers is usually short, and their wealth depends on the firm's performance during that tenure. Top managers prefer higher performance in both the short and long run. In such cases, top managers increase their annual salary and bonuses by boosting only the firm's short-run performance [70,71]. Therefore, top managers are more likely to underinvest in research and development activities because the outcomes of these activities are usually realized after the top manager's tenure [68].

Innovation practices are undertaken to achieve market and production-based goals, such as market share, exploiting the niche market, enhancing product quality, and reducing the production cost. [72,73]. Recently, innovation activities have become the center of attention for many firms because it helps them to create differentiation, attain a competitive advantage, and become the market leader [74]. Based on previous studies, overconfident managers are more willing to undertake innovative activities.

Hypothesis 1 (H1). *All else being equal, there is a positive relationship between managerial overconfidence and firm-level innovation.*

However, innovation approaches suggest that firms do not operate in a vacuum. Rather, they interact with other organizations (customers, suppliers, competitors, universities, states, and government ministries) and institutions (legal, financial, political, and administrative) [16,75]. These institutions and organizations participate in the research, development, and commercialization of new products and processes. Moreover, these factors also shape the behaviors and attitudes of managers [76].

As per North [77], institutions are usually human-made constraints that structure social, political, administrative, and economic interactions. Institutions perform various tasks explaining the variation in managerial overconfidence and corporate innovation. Such tasks include handling uncertainties, addressing information asymmetry, dealing with conflicts, providing finances, encouraging freedom of expression/to work, and promoting social factors among stakeholders [76]. According to Lundvall et al. [78], the production system and institutional arrangements are two key elements that enhance innovative structures. In a broad spectrum, this approach advocates that innovative firms operate in an environment where political, economic, cultural, and financial structures help the managers decide the scale and scope of innovative activities.

Some studies have examined how the institutional environment can moderate the relationship between managerial overconfidence and corporate innovation. For instance, Kim and Park [79] found that the negative relationship between managerial overconfidence and corporate innovation was weaker in countries with higher levels of financial development. This finding suggests that more developed financial markets provide firms with greater access to external funding, which can mitigate the adverse effects of managerial overconfidence on innovation.

Similarly, Hwang and Jung [80] found that the negative relationship between managerial overconfidence and innovation was weaker in countries with higher shareholder protection levels. This finding suggests that more substantial shareholder rights can discipline overconfident managers and encourage them to pursue innovative strategies. Moreover, Li and Wang [81] found that the negative relationship between managerial overconfidence and innovation was weaker in countries with higher levels of intellectual property rights (IPR) protection. More robust IPR protection can encourage managers to invest in innovation by incentivizing them to protect their intellectual property.

Managerial overconfidence refers to the tendency of managers to overestimate their abilities and the performance of their firms. Such circumstances can lead to excessive risk taking, resulting in high returns or significant losses. On the other hand, corporate innovation refers to developing and introducing new products, services, or processes that enhance the competitiveness and profitability of firms [23]. The institutional environment can be crucial in shaping the relationship between managerial overconfidence and corporate innovation. Firms operating in different institutional environments may need to adopt different strategies to encourage innovation while mitigating the risks associated with managerial overconfidence [79].

Technological progress and innovations are primarily based on managerial and firm-level expertise. However, innovative processes comprise interactions between firms, organizations, and institutions [82]. Firms operating in developing economies encounter specific challenges in stimulating innovation [2,83]. These challenges are categorized into two levels, namely, the micro- and macrolevel. Microlevel factors are firm-level challenges affecting in-

novation, such as resource management and managerial capabilities [84]. These factors are within the control of firms to adjust and increase innovative performance [85]. Macrolevel challenges are country-level factors that impact firm-level innovation and managerial decision-making, for example, the institutional environment in which firms operate [23,86]. These factors are beyond the control of firms. A weak institutional environment sometimes affects a firm's available resources and managerial capabilities [87].

According to the theoretical relationship, institutions (social, legal, and political) provide and protect freedom of expression, intellectual ideas, and financial aspects. Such structures strengthen trust, build relationships, and share ideas that are essential to increase manager confidence levels and creative output [88]. Furthermore, institutions are the key factors in shaping managerial confidence and the innovative process as they assist in connecting and understanding the flow of knowledge, risk taking, and investing activities [89]. Unfavorable or weak institutions provide uncertainty and asymmetric information, hype conflicts, and misallocate resources. Such traits reduce the incentive, risk, and overall innovation [90]. A firm's innovations are based on managerial capabilities and the capacity to incorporate available knowledge with resources [53,91].

An efficient institutional system must provide an appropriate environment to convert ideas into realities. Therefore, a practical institutional setting provides businesses that can only produce stimulating innovation with stable law and order, an efficient financial system, supportive administration, and freedom of expression. Therefore, it can be hypothesized as follows:

Hypothesis 2 (H2). *Institutional effectiveness has a moderating role in the relationship between managerial overconfidence and corporate innovation.*

By reviewing the existing literature and analyzing the hypothesis mentioned above, this study has three main objectives:

- This study examines how managerial overconfidence influences firm-level innovation.
- We explore the strength of the relationship between managerial overconfidence and corporate innovation by using institutional effectiveness as a moderator.
- This study examines whether the abovementioned relationships are visible, particularly in developing-country contexts.

Figure 1 shows the conceptual model, which demonstrates the study's hypotheses.

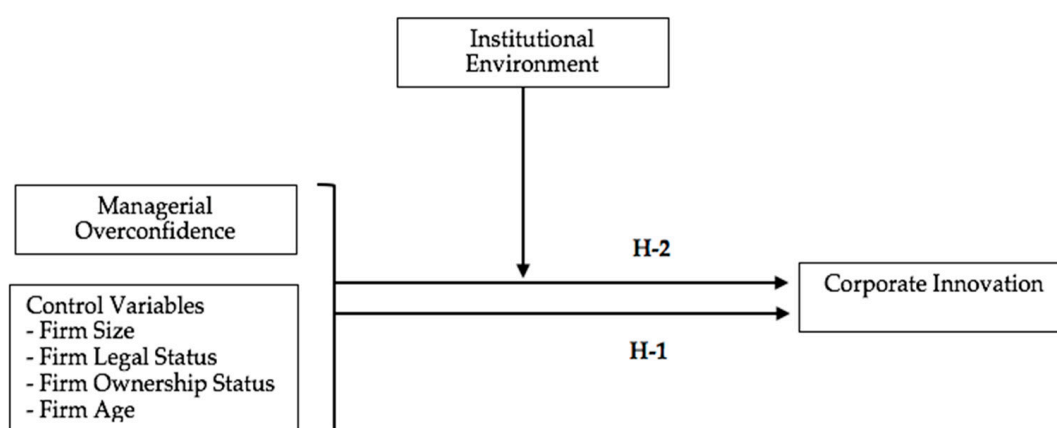


Figure 1. Conceptual Model.

3. Methodology and Models

3.1. Methodology

We constructed the sample using the World Bank Enterprise Survey (hereafter WBES). The WBES is a comprehensive database concerning the firms (manufacturing and services) operating in developing countries. It collects information on multiple topics, such as

business environment, innovation, infrastructure, services, and management practices. This study only considered manufacturing firms operating in 29 developing countries (Table 1) from 2014 to 2017. As a whole, the sample consists of more than 20,000 firm-year observations, which represent a significantly large dataset.

Table 1. Sample Description.

Argentina	Egypt	Mauritius	Sweden
Benin	Guatemala	Myanmar	Thailand
Bhutan	India	Namibia	Uruguay
Bolivia	Indonesia	Nigeria	Vietnam
Burundi	Liberia	Paraguay	Zimbabwe
Cambodia	Malawi	Peru	
Colombia	Malaysia	Pakistan	
Ecuador	Mali	Senegal	

3.2. Measurement of Variables

3.2.1. Corporate Innovation

A series of previous studies attempted to measure corporate innovation by using different indicators, such as R&D expenses [56,92], corporate R&D quotient [93], number of patents [55], and market-perceived valuation of innovation [94]. These proxies have limitations. For example, R&D expenses are costs that may or may not be converted into innovation [57]. Similarly, in the context of developing countries, patents are not considered good proxies [58]. Therefore, contrary to the abovementioned proxies, this study adopted three proxies suggested by the Oslo Manual [59,95] and previous studies [75,96] to measure corporate innovation.

- “Product innovation” is the first proxy for estimating corporate innovation. It is a dummy indicator that uses 0 s and 1 s to show whether a company is engaged in product innovation.
- The second proxy is a dummy variable that represents “process innovation.”
- The third proxy is an index (innovation index) that measures product and process innovation. It is an aggregate index that is calculated by adding the product and process innovation. The index value goes from 0 to 2 (no core innovation to complete core innovation). The main reason for developing said proxy is to quantify product and process innovation.

$$Innovation\ Index_{i\ t\ k} = \sum (Product\ Innovation_{i\ t\ k},\ Process\ Innovation_{i\ t\ k}).$$

3.2.2. Managerial Overconfidence

Measuring human attributes, such as behavior, overconfidence, and judgment, is challenging. However, previous studies in the field of behavioral sciences reported various quantitative measures to estimate managerial overconfidence, such as options-based measures, press-based measures [21], career-concern model [17], capital-expenditure-to-total-asset ratio [36], and idiosyncratic risk of CEO stock options [35]. On the other hand, quantitative measures to estimate a personality attribute could lead to biases. Thus, this study uses three novel proxies for measuring managerial overconfidence.

- Managerial experience can be used to calculate overconfidence. A dummy variable was constructed, with a value of 1, if a manager has higher than average experience and 0 otherwise. Managers with above-average experience usually overestimate their abilities to make corporate decisions. Experienced managers could become overconfident due to various cognitive biases and factors related to past successes and achievements [97].

- (b) The present study uses a proxy of female managers for measuring managerial overconfidence. Developing countries usually have a male-dominant corporate environment, and in such an environment, the probability of educated and experienced female managers being overconfident is higher. It is also important to elaborate that gender stereotypes and biases can sometimes impact how overconfidence is perceived in female managers. For example, a female manager who is confident and assertive may be seen as an aggressive and competent leader [98].
- (c) Firms with ISO certifications can also measure managerial overconfidence. Typically, the managers of ISO-certified firms are more confident than those working in non-ISO-certified firms. Corporate international recognitions, such as ISO certification, result in overconfident managers in business decision-making [99]. Moreover, that overconfidence can be linked to past successes, and implementing ISO management systems may be a significant accomplishment. As such, this may reinforce a sense of confidence and potentially contribute to overconfidence in managers [100].

3.2.3. Moderating Variables

The study used institutional effectiveness as a moderator between managerial overconfidence and corporate innovation. To measure institutional effectiveness in developing countries, worldwide governance indicators were utilized. The world governance indicators (WGIs) are widely recognized as a valuable tool for assessing the quality of governance and institutional environment in different countries. The WGIs are widely used by international organizations, governments, and researchers to inform policy decisions, allocate resources, and monitor progress toward development goals. The importance of the WGIs in calculating the institutional environment lies in their ability to provide a comprehensive and standardized assessment of governance and institutional quality across countries. Researchers and policymakers can compare and analyze countries' institutional environments, identify areas of strength and weakness, and track changes over time. An index is incorporated using six WGIs (the rule of law, control of corruption, voice and accountability, political stability and absence of violence, regulatory quality, and government effectiveness). Such an index is widely used in the literature to estimate institutional effectiveness [92,101]. The value of the index ranges from −2.5 (less effectiveness) to +2.5 (more effectiveness).

WGI – Institutional Effectiveness Index_k

$$= \sum_{avr} \left(\begin{matrix} \text{Control of corruption}_k, \text{Rule of Law}_k, \text{Regulatory Quality}_k, \\ \text{Voice and Accountability}_k, \text{Political Stability}_k, \text{Government Effectiveness}_k \end{matrix} \right)$$

3.2.4. Control Variables

Many control variables can affect corporate innovation coupled with managerial overconfidence. Firm size, age, legal status, and ownership status are the control variables that are widely used in the literature and impact corporate innovation.

- (a) According to past studies [96], large firms are better positioned to achieve economies of scale in innovation and production. Three proxies were used to estimate firm size: small, medium, and large. These variables are dummy indicators that have the value of 1 if the firm is small/medium/large; otherwise, the value is 0.
- (b) Three dummy variables were constructed for firm legal status: sole proprietorship, partnership, and company. Firm legal status has a profound impact on innovation. Generally, sole-proprietorship firms are less innovative than partnership firms or companies. Entities or companies with a legal status report superior innovative activities compared to other forms of businesses (sole proprietorships or partnerships) [75].
- (c) Three indicators defined firm-ownership status: domestic-owned firms, foreign-owned firms, and government-owned firms. These variables were generated based on ownership percentage. Domestic firms in developing countries usually invest less in R&D expenditure and technology. This way, such firms are less innovative. Conversely, foreign-owned firms, especially multinational enterprises, are more innovative

and technology-oriented, with high funds for R&D activities. Government-owned firms are less willing to innovate. Generally, these firms have more employees to fulfill social goals, impacting R&D investment and innovation [102].

- (d) Firm age was also used as a control variable. It is a continuous variable demonstrating the number of years in business since incorporation. Older firms are more innovative than new firms. Since older firms typically have a more extensive and diverse customer base, it is necessary to introduce new and innovative products into the market in order to satisfy customers and remain competitive [103].

3.3. Models

Based on the dataset's structure, probit and ordered probit regression analysis models are the most suitable techniques to identify the relationship between managerial overconfidence and corporate innovation. Moreover, the year-fixed effect was used in the following regression models.

Product Innovation_{itk}

$$= \beta_0 + \beta_1 \text{Managerial Overconfidence}_{itk} + \sum_{j=1}^7 \beta_j \text{Control Variables}_{itk} + \varepsilon$$

Process Innovation_{itk}

$$= \beta_0 + \beta_1 \text{Managerial Overconfidence}_{itk} + \sum_{j=1}^7 \beta_j \text{Control Variables}_{itk} + \varepsilon$$

Innovation Index_{itk}

$$= \beta_0 + \beta_1 \text{Managerial Overconfidence}_{itk} + \sum_{j=1}^7 \beta_j \text{Control Variables}_{itk} + \varepsilon$$

4. Empirical Analysis and Discussion

Table 2 describes the frequencies, means, standard deviations, and minimum and maximum values of innovation, managerial overconfidence, and other variables. The results in Table 3 show the correlation coefficients of the fundamental variables, which are acceptable, suggesting that multicollinearity is not a severe issue.

Table 2. Summary Statistics.

Variables	Observation	Mean	Std. Dev.	Min	Max
Product Innovation	23,340	0.424	0.494	0	1
Process Innovation	23,340	0.398	0.489	0	1
Innovation Index	23,340	0.821	0.852	0	2
Managerial Experience	23,340	0.411	0.492	0	1
Top Female Managers	23,340	0.153	0.360	0	1
ISO-Certified Firms	23,340	0.293	0.455	0	1
Firm Size (Medium)	23,340	0.371	0.483	0	1
Firm Size (Large)	23,340	0.216	0.411	0	1
Firm Legal Status (Partnership)	23,340	0.156	0.363	0	1
Firm Legal Status (Company)	23,340	0.415	0.493	0	1
Firm Ownership (Foreign)	23,340	0.038	0.190	0	1
Firm Ownership (Government)	23,340	0.052	0.221	0	1
Firm Age	23,340	20.636	16.322	0	214
Institutional Effectiveness	23,340	−0.3607	0.4929	−1.2552	1.7395

Note: Std. Dev. = Standard deviation of each variable. Min = Minimum value of each variable. Max = Maximum value of each variable.

Table 3. Pearson Correlation Coefficient.

	PdI	PcI	II	ME	FeTM	ICF	F5m	FSI	FLSp	FLSc	Fof	Fog	FA
PcI	0.50												
II	0.86	0.86											
ME	0.04	−0.01	0.02										
FeTM	0.00	−0.02	−0.01	−0.01									
ICF	0.13	0.12	0.14	0.01	−0.02								
F5m	0.02	0.02	0.02	−0.01	−0.03	0.046							
FSI	0.07	0.08	0.09	0.06	0.02	0.337	−0.41						
FLSp	−0.07	−0.01	−0.05	−0.02	−0.03	0.061	0.04	0.02					
FLSc	0.16	0.10	0.15	0.21	0.06	0.169	0.03	0.23	−0.36				
Fof	0.06	0.02	0.04	0.02	−0.01	0.061	−0.03	0.14	−0.01	0.08			
Fog	0.01	0.01	0.01	−0.02	0.02	−0.028	−0.03	0.02	0.06	−0.01	−0.05		
FA	0.05	0.01	0.03	0.31	−0.04	0.136	0.01	0.16	0.02	0.16	0.06	−0.01	
IE	0.11	0.08	0.11	0.09	0.02	0.14	0.06	0.04	0.01	0.25	0.06	−0.07	0.09

Note: PdI = product innovation; PcI = process innovation; II = innovation index; ME = managerial experience; FeTM = top female manager; ICF = ISO-certified firm; F5m = firm size (medium); FSI = firm size (large); FLSp = firm legal status (partnership); FLSc = firm legal status (company); Fof = firm ownership (foreign); Fog = firm ownership (government); FA = firm age; IE = institutional effectiveness.

Table 4 presents the regression results of the impact of managerial overconfidence on product innovation. All measures for managerial overconfidence show a positive and significant relationship with product innovation. Firms with above-average experienced managers are more innovative (concerning product innovation) than others. Similarly, firms are more innovative in the presence of experienced female managers than their male counterparts. Further, ISO-certified firms have overconfident and more innovative managers.

Table 4. Regression Results of the Impact of Managerial Overconfidence on Product Innovation.

Probit Regression Models			
Unit of Observation: Firm-Year			
Dependent Variable: Product Innovation			
	Coefficients	Coefficients	Coefficients
Independent Variables:			
Managerial Experience	0.061 *** (3.18)		
Top Female Managers		0.172 *** (6.94)	
ISO-Certified Firms			0.221 *** (10.57)
Control Variables:			
Firm Size (Medium)	0.131 *** (6.61)	0.135 *** (6.80)	0.094 *** (4.63)
Firm Size (Large)	0.243 *** (9.92)	0.244 *** (9.94)	0.152 *** (5.85)
Firm Legal Status (Partnership)	−0.085 *** (−3.25)	−0.080 *** (−3.03)	−0.104 *** (−3.95)
Firm Legal Status (Company)	0.288 *** (13.44)	0.287 *** (13.42)	0.262 *** (12.16)
Firm Ownership (Foreign)	0.370 *** (8.00)	0.374 *** (8.07)	0.361 *** (7.77)
Firm Ownership (Government)	0.189 *** (4.85)	0.185 *** (4.73)	0.198 *** (5.05)
Firm Age	0.001 * (0.07)	0.001 (1.14)	0.001 (0.05)

Table 4. Cont.

Probit Regression Models			
Unit of Observation: Firm-Year			
Dependent Variable: Product Innovation			
	Coefficients	Coefficients	Coefficients
Year-Fixed Effect	Yes	Yes	Yes
Number of Observations	23,340	23,340	23,340
LR chi ²	2523.37	2561.43	2624.90
Prob. > chi ²	0.000	0.000	0.000
Pseudo R ²	0.079	0.081	0.083
Log-likelihood	−14,645.04	−14,626.01	−14,594.27

Note: *** = 1%, * = 10%. Z values are in parentheses.

To support *H1* and check the robustness of the results presented in Table 4, we have used two more proxies to measure corporate innovation: process innovation and innovation index. The results with said proxies (process innovation (Table 5) and innovation index (Table 6)) are in line with the results shown in Table 4 (namely, managerial overconfidence enhances corporate innovation). Thus, the results are robust and prove the narrative of the study.

Table 5. Regression Results of the Impact of Managerial Overconfidence on Process Innovation (Robustness).

Probit Regression Models			
Unit of Observation: Firm-Year			
Dependent Variable: Process Innovation			
	Coefficients	Coefficients	Coefficients
Independent Variables:			
Managerial Experience	0.051 *** (2.62)		
Top Female Managers		0.116 *** (4.64)	
ISO-Certified Firms			0.130 *** (6.23)
Control Variables:			
Firm Size (Medium)	0.100 *** (5.00)	0.102 *** (5.11)	0.077 *** (3.81)
Firm Size (Large)	0.299 *** (12.19)	0.299 *** (12.19)	0.245 *** (9.46)
Firm Legal Status (Partnership)	0.092 *** (3.50)	0.096 *** (3.67)	0.081 *** (3.10)
Firm Legal Status (Company)	0.322 *** (14.84)	0.322 *** (14.89)	0.308 *** (14.10)
Firm Ownership (Foreign)	0.153 *** (3.38)	0.154 *** (3.39)	0.146 *** (3.21)
Firm Ownership (Government)	0.119 *** (3.01)	0.115 *** (2.92)	0.123 *** (3.12)
Firm Age	0.001 *** (2.49)	0.001 * (1.66)	0.001 ** (2.33)
Year-Fixed Effect	Yes	Yes	Yes
Number of Observations	23,340	23,340	23,340
LR chi ²	2311.44	2326.10	2343.32
Prob. > chi ²	0.000	0.000	0.000
Pseudo R ²	0.074	0.074	0.075
Log-likelihood	−14,528.97	−14,521.64	−14,513.03

Note: *** = 1%, ** = 5%, * = 10%. Z values are in parentheses.

Table 6. Regression Results of the Impact of Managerial Overconfidence on the Innovation Index (Robustness).

Ordered Probit Regression Models			
Unit of Observation: Firm-Year			
Dependent Variable: Innovation Index			
	Coefficients	Coefficients	Coefficients
Independent Variables:			
Managerial Experience	0.054 *** (3.12)		
Top Female Managers		0.155 *** (6.99)	
ISO-Certified Firms			0.187 *** (9.94)
Control Variables:			
Firm Size (Medium)	0.123 *** (6.87)	0.126 *** (7.05)	0.090 *** (4.97)
Firm Size (Large)	0.287 *** (13.03)	0.287 *** (13.05)	0.209 *** (8.98)
Firm Legal Status (Partnership)	0.004 (0.16)	0.009 (0.38)	−0.011 (−0.45)
Firm Legal Status (Company)	0.321 *** (16.52)	0.320 *** (16.52)	0.300 *** (15.37)
Firm Ownership (Foreign)	0.271 *** (6.68)	0.274 *** (6.75)	0.263 *** (6.47)
Firm Ownership (Government)	0.163 *** (4.60)	0.160 *** (4.49)	0.171 *** (4.80)
Firm Age	0.001 (1.57)	0.000 (0.44)	0.001 (1.48)
Year-Fixed Effect	Yes	Yes	Yes
Number of Observations	23,340	23,340	23,340
LR chi ²	3127.31	3166.41	3216.32
Prob. > chi ²	0.000	0.000	0.000
Pseudo R ²	0.063	0.064	0.065
Log-likelihood	−23,127.51	−23,107.96	−23,083.01

Note: *** = 1%. Z values are in parentheses.

Hypothesis two (*H2*) states that institutional effectiveness moderates the relationship between managerial overconfidence and corporate innovation. Table 7 reveals that the interaction term “managerial experience × institutional effectiveness” has a significant impact on product innovation ($\beta = 0.41$, $SE = 0.06$, $p < 0.01$), and the interaction term “top female managers × institutional effectiveness” has a significant impact on product innovation ($\beta = 0.13$, $SE = 0.04$, $p < 0.05$). Further, the interaction term “ISO certification × institutional effectiveness” also has a significant impact on product innovation ($\beta = 0.29$, $SE = 0.06$, $p < 0.01$). A conditional direct effect of managerial experience, top female managers, and ISO certification on product innovation also varied across the different levels of institutional effectiveness with the help of bootstrap results (see Table 7). The significant interactions are plotted for scores above and below one standard deviation of the mean of the moderator, namely, slope managerial experience, institutional effectiveness, and product innovation.

The simple slope analysis in Figure 2 is in line with *H2*. The positive relationship between managerial experience and product innovation was weaker when institutional effectiveness was low ($\beta = 0.34$, $t = 7.73$, $p < 0.01$). In contrast, managerial experience and product innovation were more positive when institutional effectiveness was high ($\beta = 0.64$, $t = 4.59$, $p < 0.01$). Proxies of corporate innovation, such as process innovation (see Table 8 and Figure 3) and the innovation index (see Table 9 and Figure 4) revealed similar results.

Table 7. Moderating Role of Institutional Effectiveness in the Relationship between Managerial Overconfidence and Product Innovation.

Predictors	Product Innovation			
	SE	Estimate	R ²	ΔR ²
Managerial Experience	3.3	0.29 **	0.53	0.005
Institutional Effectiveness	3.7	0.24 *		
Interaction (MEXP × IE)	0.06	0.41 **		
Top Female Managers	0.01	0.43 *	0.32	0.40
Institutional Effectiveness	0.03	0.14		
Interaction (FTM × IE)	0.04	0.13 *		
ISO Certification	4.0	0.30 **		
Institutional Effectiveness	6.3	0.17 *		
Interaction (ISO × IE)	0.06	0.29 **		
Conditional Direct Effects of X on Y at Values of Moderator (i.e., Institutional Effectiveness, IE) (Slope Test Results)				
	Effect	SE	LLCI	ULCI
IE + 1 SD (High)	0.64 **	0.02	0.15	0.13
IE + M	0.13 **	0.03	0.08	0.19
IE - 1 SD (Low)	0.34 **	0.04	0.26	0.41
IE + 1 SD (High)	0.31 *	0.03	0.39	0.58
IE + M	0.22 *	0.02	0.72	0.93
IE - 1 SD (Low)	0.39	0.03	0.51	0.29
IE + 1 SD (High)	0.61 *	0.04	0.92	0.26
IE + M	0.16 **	0.02	0.38	0.57
IE - 1 SD (Low)	0.19 *	0.01	0.46	0.28

Note: n = 23,340 (aggregate sample). Bootstrap sample size = 5000; SE = standard error; LL = lower limit; CI = confidence interval; UL = upper limit. * $p < 0.05$, ** $p < 0.01$.

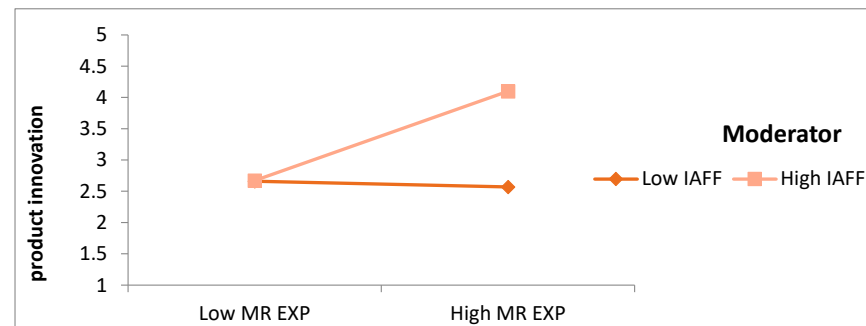
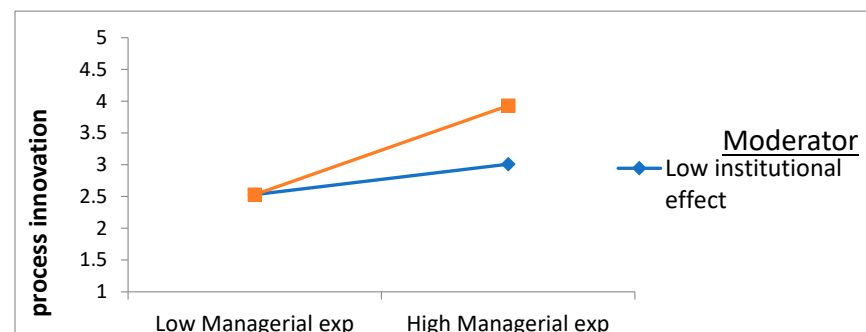
**Figure 2.** Interactive Effects of Managerial Experience and Institutional Effectiveness on Product Innovation. Note: Product innovation is on the y-axis. Managerial experience is on the x-axis. Institutional effectiveness is a moderating variable.**Figure 3.** Interactive Effects of Managerial Experience and Institutional Effectiveness on Process Innovation. Note: Process innovation is on the y-axis. Managerial experience is on the x-axis. Institutional effectiveness is a moderating variable.

Table 8. Moderating Role of Institutional Effectiveness in the Relationship between Managerial Overconfidence and Process Innovation.

Predictors	Process Innovation			
	SE	Estimate	R ²	ΔR ²
Managerial Experience	3.1	0.26 **	0.62	
Institutional Effectiveness	3.0	0.35 *		
Interaction (MEXP × IE)	0.02	0.47 *		0.009
Top Female Managers	0.02	0.21 *	0.40	
Institutional Effectiveness	0.05	0.19 **		
Interaction (FTM × IE)	0.02	0.34 *		
ISO Certification	3.0	0.12 *	0.39	
Institutional Effectiveness	1.3	0.45 *		
Interaction (ISO × IE)	0.09	0.22 *		
Conditional Direct Effects of X on Y at Values of Moderator (i.e., Institutional Effectiveness, IE) (Slope Test Results)				
	Effect	SE	LLCI	ULCI
IE + 1 SD (High)	0.23 **	0.03	0.19	0.28
IE + M	0.35 *	0.02	0.27	0.34
IE - 1 SD (Low)	0.41 **	0.05	0.55	0.72
IE + 1 SD (High)	0.28 *	0.01	0.78	0.41
IE + M	0.19 *	0.04	0.83	0.49
IE - 1 SD (Low)	0.31	0.02	0.74	0.28
IE + 1 SD (High)	0.34 **	0.06	0.45	0.69
IE + M	0.35 *	0.02	0.27	0.24
IE - 1 SD (Low)	0.15 *	0.07	0.77	0.51

Note: n = 23,340 (aggregate sample). Bootstrap sample size = 5000; SE = standard error; LL = lower limit; CI = confidence interval; UL = upper limit. * $p < 0.05$, ** $p < 0.01$.

Table 9. Moderating Role of Institutional Effectiveness in the Relationship between Managerial Overconfidence and Innovation Index.

Predictors	Innovation Index			
	SE	Estimate	R ²	ΔR ²
Managerial Experience	2.1	0.52 *	0	
Institutional Effectiveness	3.0	0.42 *		0.013
Interaction (MEXP × IE)	0.02	0.26 *		
Top Female Managers	0.04	0.43 *	0.24	
Institutional Effectiveness	0	0.45 **		
Interaction (FTM × IE)	0.01	0.41 *		
ISO Certification	4.0	0.38 *	0.19	
Institutional Effectiveness	2.5	0.27 *		
Interaction (ISO × IE)	0.03	0.40 *		
Conditional Direct Effects of X on Y at Values of Moderator (i.e., Institutional Effectiveness; IE) (Slope Test Results)				
	Effect	SE	LLCI	ULCI
IE + 1 SD (High)	0.33 **	0.02	0.83	0.80
IE + M	0.12 **	0.04	0.81	0.56
IE - 1 SD (Low)	0.10 *	0.06	0.67	0.83
IE + 1 SD (High)	0.61 *	0.03	0.95	0.79
IE + M	0.49 *	0.02	0.70	0.43
IE - 1 SD (Low)	0.48 **	0.01	0.91	0.89
IE + 1 SD (High)	0.22 *	0.04	0.82	0.74
IE + M	0.17 *	0.02	0.90	0.80
IE - 1 SD (Low)	0.29 **	0.04	0.85	0.75

Note: n = 23,340 (aggregate sample). Bootstrap sample size = 5000. SE = standard error; LL = lower limit; CI = confidence interval; UL = upper limit. * $p < 0.05$, ** $p < 0.01$.

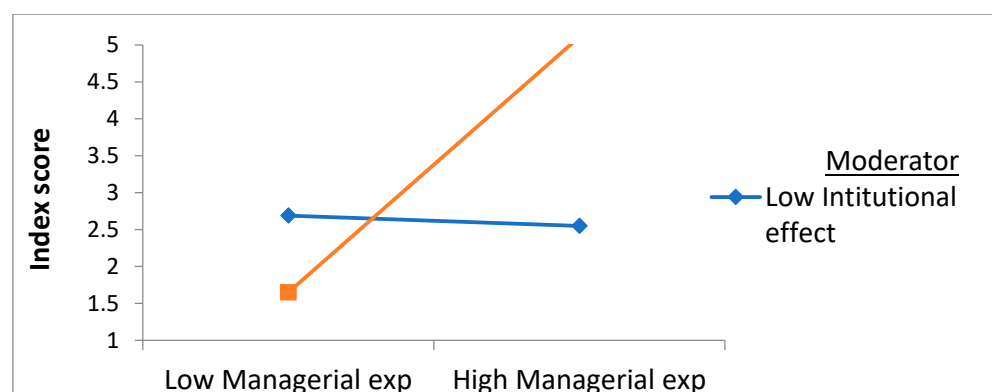


Figure 4. Interactive Effects of Managerial Experience and Institutional Effectiveness on Innovation Index. *Note:* Index score is on the y -axis. Managerial experience is on the x -axis. Institutional effectiveness is a moderating variable.

The empirical findings are in line with the recent literature. For example, Elgebeily et al. [52], Chen et al. [53], and Naqshbandi and Jasimuddin [54] have suggested that, as per neoclassical theories, people are rational decision-makers who need information to support their choices. However, modern behavioral theories contend that people frequently overestimate their abilities rather than acting rationally [19]. Overconfidence encourages managers to take on more risks, improves the implementation of business decisions, and promotes entrepreneurial activities. Therefore, having these traits promotes innovation [64,65].

Moreover, the results of this study support the hypotheses and suggest that top managers' personality traits affect a firm's decision-making process. Managerial overconfidence is one trait that affects manager decision-making or problem-solving skills in nonroutine situations, such as innovation-related activities [35]. According to the upper echelons, these findings show that managerial overconfidence positively impacts innovation-related decisions. Overconfident personalities overestimate the payouts from uncertain events because of their optimistic perception of the project results and their expertise and capabilities [21]. Moreover, individuals are more likely to be overconfident about their performance on complex tasks rather than simple ones [104].

According to earlier studies, managers are critical business decision-makers [105]. Thus, the backgrounds, leadership philosophies, and personality traits of managers may significantly impact the attitude/performance of their firms [106]. Corporate innovation, one of the essential business activities, may be significantly influenced by manager personalities [107].

Overconfidence is one of the many psychological biases that significantly impact decision-making [19]. It is also clear that overconfident people have higher expectations of their skills and abilities [34]. In a business environment, overconfident managers frequently start/continue risky projects that result in corporate innovation [49]. Additionally, a solid and practical institutional framework provides the ecosystem for risk taking, decision-making, and innovation, increasing enterprise competitiveness [38].

According to the upper-echelons theory, managerial qualities may impact business decisions and organizational performance [108]. This theory assumes that managers are bound by reasonableness. However, personal characteristics inevitably influence their decisions [109]. According to several research studies based on the upper-echelons theory, managerial background traits, personality traits, and leadership philosophies significantly impact corporate risk-taking propensity [110] and firm performance [111].

Since overconfident managers are more likely to take risks, tackle problems, and implement company reforms, including investing in R&D activities, this trait is closely tied to firm innovation [45]. Overconfident managers frequently make optimistic assumptions about the company's operating environment. Thus, they tend to overlook current concerns and focus more on the long-term growth of the business [112]. Enterprise R&D investments

involve high risk and uncertainty, increasing the overconfident manager's competitive spirit. Overconfident managers frequently find professional fulfillment in high-risk endeavors such as R&D [21]. Moreover, overconfident managers tend to be more optimistic when making business decisions and take a long-term view of the company's operations [17]. To a certain extent, this long-term decision-making approach can also encourage R&D investment and business innovation.

Technological progress and innovations are primarily based on managerial and firm-level expertise. However, innovative processes comprise interactions between firms, organizations, and institutions [82]. The results of this study also verify that an effective institutional environment in the shape of a strict rule of law, control over corruption, freedom of expression, political stability, efficient regulatory structure, and operative government policies provides an atmosphere essential not only for taking bold decisions but also for corporate innovation. Conversely, a weak institutional environment affects the firm's available resources and managerial capabilities [87].

5. Conclusions

The empirical findings suggest that manager behavioral traits, particularly overconfidence, significantly contribute to corporate innovation. Previous studies in management and innovation have identified several factors that impact corporate innovation. Most quantitative factors include financial resources, cash flow, and capital structure. However, earlier studies also attempted to explore qualitative factors that have some influence on corporate innovation. One of the qualitative factors is managerial overconfidence. Based on previous studies, managerial overconfidence affects creativity and innovation. Qualitative managerial attributes, such as overconfidence, are complicated to estimate. Many preliminary studies used quantitative measures to estimate managerial overconfidence, such as the career concern model [17] and the idiosyncratic risk of CEO stock options [35]. However, this study's novelty lies in using a qualitative measure to estimate managerial overconfidence and a moderator to explain the relationship between managerial overconfidence and corporate innovation. More specifically, the present study used measures of managerial overconfidence (manager's experience and gender and the firm's quality certifications) and the country's institutional effectiveness as moderating variables.

In constructing the research hypotheses, it was assumed that firms usually hire overconfident managers and provide them the freedom to make investment decisions [27,29,45,49]. These overconfident managers are usually willing to commence risky and innovative projects because they believe they will succeed. Overconfident managers underestimate the chance of failure in an ordinary course. Therefore, they are more likely to invest in innovation. As applied psychology suggests, such overestimated perceptions are usual [60]. In other words, a career-based model can be suggested, wherein managers choose whether to innovate. If the innovation is successful, it shows the ability of the managers to succeed. However, a lack of managerial talent leads to failure. Moreover, it can also be assumed that an effective institutional environment provides a solid judicial system, protected property rights, a supportive bureaucratic structure, a stable political and democratic system, and support for reducing the culture of bribery. These features of an effective institutional environment shape managerial decision-making and corporate innovation.

The findings of this study also verify the arguments mentioned above. Firms are innovative in the presence of overconfident managers. The strength of the relationship between managerial overconfidence and corporate innovation is moderated by institutional effectiveness. The empirical findings suggest that managers with above-average experience will likely be involved in innovative activities, and firms with quality certifications are more innovative than other firms. Based on manager gender, the results indicate that female managers are more involved in innovative activities than their male counterparts. Moreover, the positive relationship between managerial overconfidence and corporate innovation is weaker when institutional effectiveness is low, and positive when it is high.

The relationship between corporate innovation and sustainable development is complex and multifaceted. On the one hand, innovation has the potential to drive sustainable development by creating new products, processes, and business models that are environmentally friendly and sustainable [113]. For example, innovations in renewable energy and sustainable agriculture can reduce greenhouse gas emissions and protect natural resources [114]. On the other hand, some innovations can contribute to unsustainable development by perpetuating resource-intensive and pollutive business models. Innovations must be guided by sustainable principles and values to contribute positively to sustainable development. Accordingly, corporations must take a holistic and long-term view of their environmental and societal impact and incorporate sustainability into their innovation strategies.

Based on the findings, it is plausible to assume that organizations seeking to accelerate their innovative operations should carefully consider the personality traits of top managers. Employing confident managers or encouraging current managers to be bold in their decision-making may boost innovation. As a result, cultivating an attitude of managerial overconfidence is beneficial for stimulating innovation when a corporation operates in developing countries. Furthermore, an effective institutional environment is required to determine the relationship between managerial overconfidence and corporate innovation. Institutions perform a wide range of tasks to explain variations in managerial overconfidence and corporate innovation, such as dealing with uncertainties, addressing information asymmetry, dealing with conflicts, encouraging the freedom of expression/to work, and promoting social factors.

Overall, this study provides implications for businesses and policymakers. For businesses, it is essential to understand the difference between managerial attributes because the findings in this study indicate that managerial overconfidence enhances corporate innovation. Similarly, for policymakers, this study specifies the role of the institutional environment, which is required to strengthen the nexus between managerial overconfidence and corporate innovation.

Apart from substantial policy implications, this study also has some limitations. Various economic circumstances affect various industrial sectors, and specific industries have varying levels of innovation. This study used data from nonfinancial companies between 2014 and 2017. Moreover, the sample companies were chosen from a diverse population of businesses that operate in several economic sectors. As a result, the study's findings could be extrapolated to other comparable entities because businesses functioning in economies at various levels of growth can provide varying results.

Future studies in behavioral and innovational economics may examine other managerial attributes (such as judgment, leadership, and integrity) and explore the role of such attributes in shaping corporate innovation. Furthermore, managerial overconfidence can also be observed as a moderator in the relationship between organizational effectiveness and innovation. Managerial overconfidence as a moderator could be a novelty in technology/innovation. Moreover, future studies in institutional economics should explore other types of institutional environments (such as religious institutions, financial institutions, and educational institutions) as moderators while evaluating the nexus between managerial attributes and corporate innovation.

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