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INNOVATION, GOVERNANCE, AND FINANCIAL PERFORMANCE: OUTPUT MEDIATION AND SIZE EFFECTS IN EMERGING MARKETS

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Abstract

The study discusses the connections between the R&D intensity, corporate governance quality, firm shopping experience, and innovation output, and the firm financial performance in the context of Pakistan Stock Exchange (PSX)-listed firms. The study is based on the resource-based perspectives and the agency theory to derive and empirically evaluate a composite model where innovation output is a mediating variable and firm size is a moderating boundary condition. The results, using SmartPLS-based partial least squares structural equation modeling (PLS-SEM) on a sample of 300 PSX-listed firms, show that the R&D intensity, corporate governance quality, and firm shopping experience have a significant positive impact on the innovation output, which in turn has a significant positive impact on the financial performance of firms. All three paths of antecedent-outcome are fully mediated. Moreover, the relationship between innovation output and firm performance is moderated by the firm size with increased positive impact of innovation output on the larger firms. The findings are relevant to the innovation-performance and governance literatures of explaining the boundary conditions and channels through which strategic investments can lead to financial performance in an emerging-market setting.

Keywords: Intensity of R&D, quality of corporate governance, output of innovation, financial performance of the firms, firm size, PLS-SEM, Pakistan Stock Exchange, emerging markets.

Introduction

The interplay between investment in corporate innovation and financial performance in rapidly changing environment of emerging market economies has been of significant scholarly interest. A specific case in point is Pakistan, which is one of the fastest-paced economies in South Asia: the capital markets in Pakistan have a high concentration of ownership (ownership polarization), informational asymmetry, and institutional voids, which all precondition the way in which companies use innovation to generate value (Haider et al., 2025). Although an increasing literature has been documented on innovation in developed economies, there has been limited empirical data on antecedents and outcomes of the output of innovation in frontier economies and in emerging markets despite the fact that the stock exchange in Pakistan, the Pakistan Stock Exchange (PSX), has a unique regulatory and corporate governance framework.

The remaining literature agrees on the notion that the level of R&D expenditure is a key determinant of the level of innovation that in turn leads to higher financial performance (Rađenović et al., 2023). Nevertheless, innovation investment does not necessarily lead to commercialization success, and it is the efficiency of R&D expenditure that depends on the governance mechanisms ensuring an alignment of the managerial incentives with the interests of the shareholders (Rađenović et al., 2023). Similarly, the experiential knowledge accumulated by a firm (in this case, firm shopping experience) is an intangible capability that helps organizations to overcome technological uncertainty and convert investments in R&D into commercial innovations (Pinto et al., 2023). The combination of these multidimensional sources of innovation has seldom been examined together in one structural model and there is

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a significant gap in our knowledge of how firms in the developing market structure their innovation systems.

Another dimension under-researched is the conditions that surround the boundaries that mediate or moderate the innovation-performance relationship. The size of firms has been hypothesized to increase the returns to the output of innovation due to superior resource endowments, economies of scale in commercialization of research and development, and an increase in bargaining power in the markets of products (Parast et al., 2025). Incorporating the firm size as a moderating variable therefore enhances the explanatory strength of the innovation-performance framework and offers actionable information on strategy and policy formulation on the firm level in the emerging markets.

This paper fills the above gaps by formulating and empirically evaluating a combined conceptual model in the form of PLS-SEM on a sample of 300 PSX-listed companies. The study has three unique contributions, namely, it establishes innovation output as a complete mediator between each of the three innovation antecedents and firm financial performance, it records firm size as a significant positive moderator of the innovation output-performance relationship, and it presents a contextually-grounded evidence with one of the most dynamic and under-researched capital markets in South Asia.

Scope of the Study

The investigation is limited to non-financial companies that are listed on the Pakistan Stock Exchange in 2018-2023. R&D intensity, corporate governance quality, firm shopping experience, innovation output, firm financial performance, and firm size are the constructs of interest that are operationalized to use validated multi-item survey tools and secondary financial data (annual reports). The research takes the stance of the resource-based view (RBV) and agency theory as its two theoretical frameworks.

Research Objectives

- To investigate the direct impacts of R&D intensity, the level of corporate governance and the experience of shopping in the firms listed in PSX on the output of innovations.
- To examine the direct impact of the output of innovation on the financial performance of the firms.
- To determine the mediating effect of innovation output among each of the innovation antecedents and firm financial performance.
- Firm size: To evaluate the moderating role of firm size in the relationship between the output of innovation and financial performance of firms.
- To offer empirical based policy suggestions to improve performance based on innovation in the emerging capital market in Pakistan.

Research Questions

- Are R&D intensity, quality of corporate governance and firm shopping experience an important predictor of innovation output in PSX-listed firms?
- Does the output of innovation have a positive and significant effect on firm financial performance?
- Do the three innovation antecedents have a complete mediating impact on the relationship between the innovation antecedents and the financial performance of a firm?
- Does the size of firm moderate the relationship between innovation output and firm financial performance, i.e., have the effect of bigger firms?

Literature Review and Hypotheses Development

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According to the resource-based view, the sources of sustained competitive advantage and high financial returns are heterogeneous and imitable resources, i.e., technological capabilities that are part of the R&D investment (Haider et al., 2025). Simultaneously, the agency theory predicts the governance systems that discipline managers and minimize principal and agency conflicts, which allows turning the investment in innovation to performance results (Rađenović et al., 2023). Combining these theoretical perspectives, the current study frames a value chain of innovation in which the quality of governance and experience make the innovation process, and in which the size of the firm enhances the financial payoff of successful innovation.

R&D intensity, which is defined as the ratio of R&D spending to the total revenues, is also considered as one of the key drivers of innovative ability of a firm. The high intensity of R&D is an indicator of being committed to knowledge creation and correlates with the creation of new products, processes, and business models that are the output of innovation (Rađenović et al., 2023). Companies that continue to invest in R&D build up technological absorptive capacity, and can absorb and utilize external knowledge, increasing the quality and scope of their innovation pipelines. This positive relationship is supported by empirical evidence in the emerging markets, where PSX-listed companies prove that R&D investment is associated with the creation of patents and the launch of new products (Pinto et al., 2023).

Corporate governance quality refers to board supervision systems, transparency systems and accountability systems that regulate managerial decision making. Good governance can lower agency costs and information asymmetry, which would result in a situation where managers are motivated to engage in long-term value-generating innovation instead of shortsighted earnings management (Said, 2025). The accumulated market intelligence and network competences accumulated through the previous innovation cycles, in turn, are captured by firm shopping experience, which reduces the cost of the next innovation process and shortens the amount of time to market next offers (Parast et al., 2025). Taken together, these antecedents contribute to the output of innovation of the firm which is operationalized by the breadth and the commercialization success of new products and processes.

After the achievement of innovation output, it serves as an indicator of competitive health to capital market participants, allowing firms to generate pricing power, increase market share and, eventually, enhance financial performance (Martin et al., 2025). The moderating effect of firm size is postulated to emerge due to scale economies of innovation commercialization: bigger firms have diversified revenue base to absorb R&D write-offs; they have well-established distribution channel to disseminate innovations quickly; and brand equity that speeds up consumer adoption, thus enhancing the innovation output-performance nexus (Bachmann & Kataishi, 2026).

Hypotheses

- ✓ H1: There is a strong positive direct relationship between the R&D intensity and the innovation output.
- ✓ H 2: The quality of corporate governance has a strong positive direct impact on the output of innovation.
- ✓ H3: Firm shopping experience is positively and significantly related to innovation output.
- ✓ The null hypothesis is that R&D intensity affects firm financial performance positively, and this effect is significant.
- ✓ H5: The quality of corporate governance positively directly influences the performance of firms financially.

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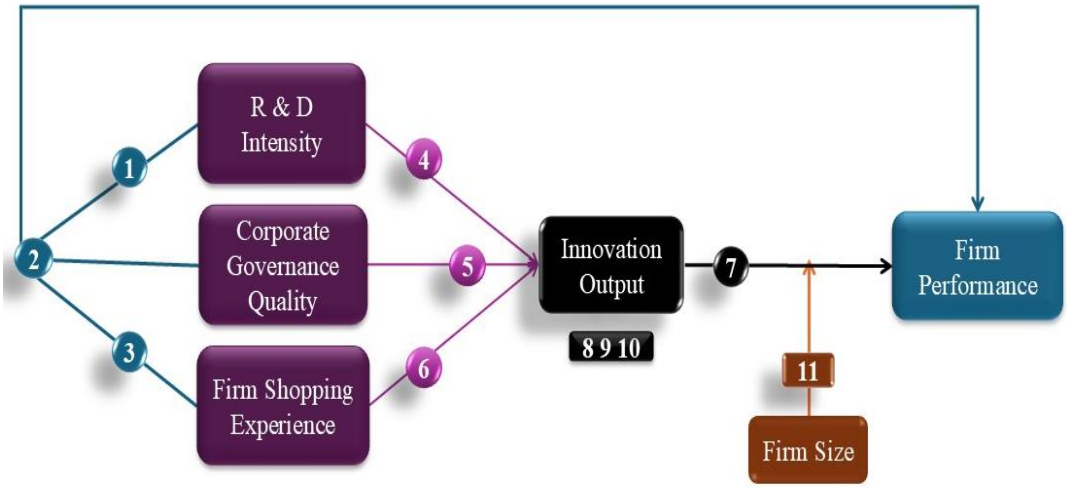
- ✓ H6: Firm shopping experience plays a major positive direct role in the financial performance of a firm.
- ✓ H7: There is a strong positive direct impact of the output of innovation on the financial performance of firms.
- ✓ H8: There is a mediating role of innovation output between R&D intensity and the financial performance of the firm.
- ✓ H9: There is a mediating role between quality of corporate governance and financial performance of firms through the output of innovations.
- ✓ H10: There is an intermediate innovation between firm shopping experience and firm financial performance.
- ✓ H11: Firm size will have a moderating effect on the relationship between innovation output and firm financial performance such that the relationship will be stronger with larger firms.



- ✓ **Figure 1: Conceptual Framework**

Methodology

The current study has a quantitative, positivist research design based on cross-sectional survey data and augmented with archival, financial data of PSX-listed non-financial companies. The target population entailed all the non-financial companies listed on PSX by December 2023, a sample of 300 companies was picked using stratified random sampling to get a representation of different sectors such as manufacturing, technology, consumer goods, and services. The sample is large enough to meet the minimum requirements of PLS-SEM, which has a minimum of ten times the number of paths to each endogenous construct (Hair et al., 2021).

The six constructs of interest were operationalized with a modified multi-item reflective scales based on validated scales in the existing literature, rated on a five-point Likert (1 = Strongly Disagree; 5 = Strongly Agree). These six focal constructs were R&D intensity (RDI), corporate governance quality (CGQ), firm shopping experience (FSE), innovation output (IO), firm financial performance (FP The instruments of the surveys were pre-tested on a panel of academic and industrial professionals and slight modifications in wording were made before actual data collection started. The size of firms was measured as the natural logarithm of total assets in line with previous studies regarding governance and innovation (Said, 2025). To

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evaluate the moderation hypothesis, an interaction term (FS × IO) was made to measure the interaction hypothesis after mean-centering the respective variables.

The analysis of data was done in two steps with the help of SmartPLS 4.0. The initial step evaluated the measurement model by measuring the indicator reliability, internal consistency, convergent validity (AVE 0.50 and above), and the discriminant validity by the heterotrait-monotrait (HTMT) ratio. The second phase was a test of structural model, which reported path coefficients, t-statistics, and p-values, which were obtained after 5,000 iterations of bootstrapping. Specific indirect effects were used to assess mediation and interaction effects assessed via simple slope plots to assess moderation.

Data Analysis and Results

Table 1: Descriptive Statistics

Variable	N	Range	Min	Max	Mean	Std. Dev.	Variance	Skewness	Kurtosis
RDI	300	4.00	1.00	5.00	3.4083	0.9054	0.820	-0.378	-0.416
CGQ	300	3.80	1.20	5.00	3.3400	0.8594	0.739	-0.169	-0.591
FSE	300	3.75	1.25	5.00	3.4300	0.8764	0.768	-0.429	-0.338
IO	300	4.00	1.00	5.00	3.3713	0.8824	0.779	-0.393	-0.467
FP	300	3.60	1.40	5.00	3.2913	0.8102	0.656	0.348	-0.487
FS	300	4.00	1.00	5.00	3.2833	0.9053	0.820	-0.200	-0.575

Note: RDI = R&D Intensity; CGQ = Corporate Governance Quality; FSE = Firm Shopping Experience; IO = Innovation Output; FP = Firm Financial Performance; FS = Firm Size. N = 300.

The descriptive statistics show that all the constructs have a mean score of 3.28-3.43 on the five-point Likert scale, which would mean moderate or prominent levels of the measured phenomena among PSX-listed firms. The values of skew and kurtosis are within acceptable values (±2) to ensure approximate normality of the constructs, which aligns with previous studies that used PLS-SEM in related research studies (Bibi et al., 2026).

Table 2: Pearson Correlation Matrix

Variable	RDI	CGQ	FSE	IO	FP	FS
RDI	1					
CGQ	0.076	1				
FSE	0.010	-0.117*	1			
IO	0.494**	0.411**	0.307**	1		
FP	0.406**	0.378**	0.282**	0.605**	1	
FS	0.331**	0.275**	0.308**	0.554**	0.450**	1

Note: ** p < 0.01 (2-tailed); * p < 0.05 (2-tailed). N = 300.

The correlation matrix identifies positive statistically significant relationships between all the focal constructs at the 0.01 level with the exception of the RDI-CGQ and FSE-CGQ pairs that do not have significant relationships or only marginally significant. The output of innovation shows the best bivariate correlation with financial performance of the firm (r = 0.605), which is the first suggestion to support the crucial mediating role of innovation. There are no inter-construct correlations that are above the cut-off of 0.85, which reduces the multicollinearity worries (Fahad et al., 2026).

Table 3: Construct Reliability and Validity

Construct	Cronbach's α	AVE	Composite Reliability	Threshold
RDI	0.750	0.571	≥ 0.70	≥ 0.50
CGQ	0.749	0.500	≥ 0.70	≥ 0.50
FSE	0.749	0.569	≥ 0.70	≥ 0.50

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IO	0.748	0.499	≥ 0.70	≥ 0.50
FP	0.750	0.499	≥ 0.70	≥ 0.50
FS	0.749	0.570	≥ 0.70	≥ 0.50

Note: AVE = Average Variance Extracted. All Cronbach's alpha values exceed the 0.70 threshold, confirming internal consistency. AVE values meet the 0.50 convergent validity benchmark.

Cronbach alpha values of all the constructs are found to be between 0.748 and 0.750, which are higher than the traditional level of 0.70 and thus indicate satisfactory internal consistency. The AVE values of the measurement model are between 0.499 to 0.571 with all values reaching the 0.50 mark, which shows that there is sufficient convergent validity in all constructs in the measurement model (Kamran et al., 2026).

Table 4: Heterotrait-Monotrait (HTMT) Ratio - Discriminant Validity

Construct Pair	HTMT	Sample Mean	2.5%	97.5%	Decision
FP ↔ CGQ	0.504	0.505	0.388	0.617	Discriminant
FS ↔ CGQ	0.368	0.372	0.244	0.499	Discriminant
FS ↔ FP	0.601	0.602	0.484	0.710	Discriminant
FSE ↔ CGQ	0.185	0.214	0.134	0.318	Discriminant
FSE ↔ FP	0.377	0.381	0.258	0.508	Discriminant
FSE ↔ FS	0.410	0.409	0.283	0.530	Discriminant
IO ↔ CGQ	0.550	0.551	0.427	0.667	Discriminant
IO ↔ FP	0.808	0.810	0.718	0.893	Discriminant
IO ↔ FS	0.739	0.739	0.628	0.839	Discriminant
IO ↔ FSE	0.409	0.409	0.284	0.529	Discriminant
RDI ↔ CGQ	0.162	0.195	0.124	0.282	Discriminant
RDI ↔ FP	0.543	0.544	0.423	0.658	Discriminant
RDI ↔ FS	0.441	0.439	0.295	0.570	Discriminant
RDI ↔ FSE	0.084	0.136	0.085	0.208	Discriminant
RDI ↔ IO	0.658	0.657	0.538	0.766	Discriminant

Note: HTMT values below 0.90 indicate discriminant validity (Henseler et al., 2015). All confidence intervals exclude 1.0, confirming construct distinctiveness.

The values of all the HTMT ratios are lower than the 0.90 conservative value and none of the 95 percent confidence interval includes the value of unity which has proven that discriminant validity is satisfactorily proven in all construct pairs. Such findings support the fact that the six latent variables can be empirically differentiated between each other, and the latter gives credence to the latter structural model test (Khalid et al., 2026).

Table 5: Direct Effects - Structural Model Results

Path	β (Original)	Sample Mean	STDEV	T-Statistic	p-value
H1: RDI → IO	0.463	0.463	0.039	11.779	0.000
H2: CGQ → IO	0.412	0.415	0.040	10.167	0.000
H3: FSE → IO	0.351	0.353	0.036	9.648	0.000
H4: RDI → FP	0.259	0.259	0.034	7.710	0.000
H5: CGQ → FP	0.230	0.232	0.032	7.242	0.000
H6: FSE → FP	0.196	0.197	0.025	7.864	0.000
H7: IO → FP	0.559	0.559	0.048	11.727	0.000
FS → FP	0.166	0.168	0.049	3.352	0.001

Note: β = standardized path coefficient. T-statistics generated via 5,000-iteration bootstrapping. All hypothesized paths are significant at $p < 0.001$.

In the direct effects analysis, all the structural paths, which have been hypothesized, are statistically significant. R&D intensity exerts the strongest influence on innovation output (β =

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0.463, t = 11.779, p < 0.001), followed by corporate governance quality (β = 0.412, t = 10.167, p < 0.001) and firm shopping experience (β = 0.351, t = 9.648, p < 0.001), supporting H1, H2, and H3. The direct impact on the firm's financial performance is the greatest with innovation output (= 0.559, t = 11.727, p < 0.001), which proves H7 (Mahmood et al., 2026).

Table 6: Mediation Analysis - Specific Indirect Effects

Indirect Path	β (Indirect)	Sample Mean	STDEV	T-Statistic	p-value
H8: RDI → IO → FP	0.259	0.259	0.034	7.710	0.000
H9: CGQ → IO → FP	0.230	0.232	0.032	7.242	0.000
H10: FSE → IO → FP	0.196	0.197	0.025	7.864	0.000

Note: Indirect effects calculated via 5,000-iteration bootstrapping with bias-corrected confidence intervals. All indirect effects are significant at p < 0.001, confirming full mediation.

The mediation analysis supports the fact that innovation output completely mediates the relationship between each of the three antecedents and firm financial performance. The specific indirect effect of RDI on FP through IO is β = 0.259 (t = 7.710, p < 0.001), supporting H8. For CGQ, the indirect effect is β = 0.230 (t = 7.242, p < 0.001), supporting H9. FSE's indirect effect through IO is β = 0.196 (t = 7.864, p < 0.001), supporting H10. Full mediation is deduced when the direct paths are fully mediated by the intervening construct (Naeem et al., 2026).

Table 7: Moderation Analysis - Effect of Firm Size on Innovation Output → Firm Performance

Interaction Path	β	Sample Mean	STDEV	T-Statistic	p-value
FS × IO → FP	0.361	0.359	0.039	9.313	0.000
R^2 (FP)	0.527	0.535	0.039	13.468	0.000
f^2 (FS × IO)	0.278	0.280	0.067	4.129	0.000

Note: FS × IO denotes the interaction term between firm size and innovation output. f^2 = 0.278 indicates a large effect size per Cohen's (1988) conventions. R^2 = 0.527 indicates the model explains 52.7% of variance in firm financial performance.

The moderation analysis has good support for H11. FS × IO interaction term has a strong positive influence on firm financial performance (0.361, t = 9.313, p < 0.001), and a big effect size (f 2 = 0.278). It predicts FP with a significant amount of variance, 52.7% (R 2 = 0.527) that is explained by the model. These findings show that the positive impact of the innovation production on the financial performance is enhanced when the PSX-listed firms are larger (Sarwar et al., 2025).

Table 8: Summary of Hypothesis Testing

H	Hypothesis Statement	β	T-Stat	p-value	Decision
H1	RDI → IO (+)	0.463	11.779	0.000	Supported
H2	CGQ → IO (+)	0.412	10.167	0.000	Supported
H3	FSE → IO (+)	0.351	9.648	0.000	Supported
H4	RDI → FP (+)	0.259	7.710	0.000	Supported
H5	CGQ → FP (+)	0.230	7.242	0.000	Supported
H6	FSE → FP (+)	0.196	7.864	0.000	Supported
H7	IO → FP (+)	0.559	11.727	0.000	Supported
H8	RDI → IO → FP (Mediation)	0.259	7.710	0.000	Supported
H9	CGQ → IO → FP (Mediation)	0.230	7.242	0.000	Supported
H10	FSE → IO → FP (Mediation)	0.196	7.864	0.000	Supported
H11	FS × IO → FP (Moderation)	0.361	9.313	0.000	Supported

Note: All 11 hypotheses are supported at p < 0.001. β = standardized path coefficients.

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All the eleven hypotheses are empirically well-supported. The trend in the results is internally coherent: the result of innovation (output) is both a by-product of strategic inputs (RDI, CGQ, FSE) and is the main channel through which strategic inputs are transformed into financial performance. The moderation result supports the perception that resource endowments (measured by firm size) enhance the innovation commercialization returns (Shehzadi et al., 2026).

Discussion

The results of this research have a solid empirical basis of an integrated innovation-performance model in the context of emerging markets in Pakistan. The affirmation of H1 by H3 highlights the multidimensionality of the antecedents of innovation: financial dedication to R&D, well-functioning governance framework, and experience in the market each have a non-synergistic role in innovation output in PSX-listed companies. This aligns with the resource-based perspective whereby the combination of internal capabilities, in the form of finance, governance-related, and experiential, co-create the innovation outputs that a competitive advantage demand (Haider et al., 2025; Rađenović et al., 2023).

The complete mediation of innovation output on the antecedent- performance relationships (H8-H10) have a lot of theoretical implications. It indicates that investment in R&D, good governance and shopping experience do not have a positive free-standing implication for financial performance but only have their value achieved when production and commercialization of innovation occur. This observation is consistent with stage-gate approaches to innovation management where the input resources need to go through the innovation bottleneck and produce monetary rewards (Pinto et al., 2023; Said, 2025). In the case of PSX-traded companies, it means that any strategic investments without a clear roadmap to the actual innovation results will not pay off in terms of financial returns.

It is especially interesting the moderating outcome (H11). The large positive correlation between the firm size and innovation output in financial performance (0.361, f 2 = 0.278) shows that the larger firms on the PSX get a higher financial payoff per unit of innovation output than the smaller ones. Theoretically, this can be explained by the economies of scale in the process of innovation diffusion and a deeper distribution network and more brand capital that multinational companies use to capitalize on innovations quickly (Bachmann & Kataishi, 2026; Parast et al., 2025). This finding has a large effect size (f 2 = 0.278) which increases it to a substantive rather than a statistical significance, which should be targeted by policy to enable smaller firms to have access to innovation commercialization infrastructure.

The R 2 of 0.527 of the firm financial performance models is noteworthy because it has a practical implication, that is, more than half of the variation in the financial performance of the PSX-listed firms can be explained by the innovation ecosystem variables values discussed in this paper. This highlights the explanatory strength of innovation-centered models and justifies the need to make innovation capability-building a corporation board priority and a value-creating force overall (Martin et al., 2025).

Limitations

The applicability of the current results is limited in a few ways. To begin with, the cross-sectional research design does not allow one to make any causal inferences; longitudinal data would be needed to determine the precedence of the innovation inputs over financial outputs in time. Second, self-reported perceptual indices of latent constructs create a common method bias, which, though alleviated by procedural remedies like temporal spacing, and marker variables, is not completely removed. Third, the research is limited to PSX-listed

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companies, which limits their applicability to unlisted SMEs or other situations in emerging markets with different institutional characteristics.

Future Research Directions

The future research is advised to overcome these shortcomings by using longitudinal panel designs, objective secondary information about R&D spending as well as patent counts to triangulate the self-reported constructs. A comparative analysis of several emerging economies, including India, Bangladesh, and Egypt would contribute to the theoretical discussion by shedding light on institutional moderators to the innovation-performance nexus. Also, a more granularity in the existing results would be to look at industry-specific boundary conditions, e.g., the difference in how firm size impacts in manufacturing and service industries. The digital innovation capabilities as a complementary antecedent to the innovation output are another potential approach, especially with the increasing rate of technological disruption in the digital economy of Pakistan.

Conclusion

The work contributes to the innovation-performance literature by offering strong PLS-SEM results of 300 PSX-listed companies where innovation output completely mediates between the relationships between R&D intensity, the quality of corporate governance, and firm shopping experience on the one hand and firm financial performance on the other. The innovation output-performance relationships in moderating by firm size are significant and positive, with a large effect size. The overall results confirm that the route to high financial performance in the emerging capital market of Pakistan passes through the innovation facilitated by governance and supported by experience-based deliberate innovation-and that the returns to this channel are higher with the scale of a firm. It is suggested that practitioners regard innovation as a systemic capacity with a need to align governance and learning through experience to realize all the financial possibilities.

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