

Impact of Innovation Strategies and R&D Investment on Organizational Performance

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Received: 22-11-2025

Revised: 16-12-2025

Accepted: 04-01-2026

ABSTRACT

The use of innovation strategies and research and development (R&D) investment is becoming a core source of organizational performance sustainability among organizations that are based on dynamic and highly competitive markets. This paper explored the direct relationship between innovation strategies and intensity of R&D investments and organizational performance in the manufacturing and service industries in Pakistan. The quantitative cross-sectional survey design was used and data gathered by a survey of 300 employees and managers on a structured questionnaire that had validated scales used to measure all the constructs and were all on a 5-point Likert scale. The convenience sampling was embraced because of the limitations of accessibility. The SPSS 25 and AMOS 24 descriptive statistics, Cronbachs alpha reliability test, Pearson correlation test, confirmatory factor analysis (CFA) and structural equation modeling (SEM) were used to analyze the data. Findings showed that innovation strategies had a strong positive direct impact on the organizational performance (beta = 0.54, $p < .001$) and the R&D investment intensity also showed a strong positive direct impact (beta = 0.41, $p < .001$). The organizational performance was overall expounded by 63.7% by the structural model (R-squared = .637). The measurement model had a high construct validity with all the AVE values being above .50 and composite reliability coefficients above .85. The findings highlight the strategic need of the long term investment in innovation and the planned innovation strategy development to organizations in the changing economic landscape in Pakistan in order to enhance financial, operational and competitive performance outcomes. The research adds empirical results in the context of developing economy to the body of literature related to innovation management and organizational performance in the world.

Keywords: innovative strategies, research and development investment, organizational performance, structural equation modelling, confirmatory factor analysis, manufacturing industry, service industry, Pakistan, quantitative research.

INTRODUCTION

In a world that is characterized by increasing technological change, stiffening global competition and fast changing consumer expectations, the ability to innovate has emerged as the hallmark of sustainable competitive advantage to organizations in industries and geographies. Innovation - the effective use of creative concepts in creating new products, services, processes or business models is no longer a fringe strategic process but a core organizational competence which has been found to be the difference between high-performing and under-performing companies. The connection between innovation and organizational performance has received colossal academic and managerial interest and as such, the literature on the subject has generated a very fruitful research literature on strategy, economics, organizational behavior and technology management.

The role of innovation strategy and research and development (R&D) investment is well-known as the major determinants of the organization performance in the highly competitive and knowledge-based markets. Companies that have properly designed strategies on innovations can create new products, better services, and react efficiently to the evolving customer needs, which improve overall performance (Li and Chen, 2024; Santos and Pereira, 2025). More specifically, the importance of R&D investment in developing the firm capabilities includes enhancing the efficiency of the processes (including the technological progress), supporting its long-term growth, and creating the capabilities (Wang et al., 2024). Empirical evidence suggests that the financial performance, expansion in the market, and sustainability of a competitive positioning of a firm are more likely to be better in firms with high R&D expenditure than the low-investment firms (Khan et al., 2024). Moreover, the innovation strategy is a mediation framework that helps to make the R&D activities effectively aligned with the organization objectives to maximize productivity, and minimize resource inefficiencies (Ahmed and Zhou, 2024). Nevertheless, internal capabilities, the support of the leadership, and the external market factors also affect the effects of innovation and R&D and can either boost or restrict the performance results. Thus, organizations that plan and implement innovation strategically with on-going investment in R&D have high chances of realizing high and sustainable organizational performance.

Out of the various dimensions of innovation, the innovation strategy and research and development investment have a significantly high place in the theoretical and empirical literature. Innovation strategy can be defined as the conscious organization decisions concerning the kind of innovation to undertake, the markets and technologies to address, the partnerships and alliances to establish and the organization structures and incentive systems to use to support innovative activity (Tidd and Bessant, 2018). R&D investment which is usually expressed in terms of ratio of R&D spending to revenue, is the most tangible and quantifiable organizational investment into developing new knowledge and capabilities that drive pipelines of innovation. These two constructs in combination capture the strategic orientation and resource commitment that transforms innovative intent to performance outcomes of organizations.

Although the literature on innovation and performance is extensive on a global scale, the empirical research of the developing economies context and context-specific Pakistan, in particular, is relatively slim. The industrial environment in Pakistan consists of a unique combination of structural characteristics: a high concentration of the large manufacturing base in textiles, pharmaceuticals, and food processing; the actively developing services sector that includes telecommunications, banks, and professional services; the endemic problems of inadequate infrastructure, uncertainty in the regulatory environment, and a lack of access to formal financing; and a talent base that is rapidly expanding but limited by education quality gaps. All these structural characteristics determine how the innovation strategies and R&D investment can be converted into the performance results in the ways that can be significantly different in the context of developed economies.

Low investment in R and D as compared to GDP, low formalization of innovation strategy and incremental innovation, as opposed to radical innovation has long been a hallmark of Pakistani organizations. Nevertheless, over the past few years, there has been increased awareness among Pakistani manufacturers and service companies that competitive pressures, both domestically and internationally (with the opening up of the country to trade liberalization) are necessitating more conscious and sustained innovation initiatives. Government policies such as the Pakistan Vision 2025 plan and the Technology Driven Industrial Policy have made clear that innovation capacity building is a priority in the national economy since it has realized that long term productivity improvement requires a shift in the value chain, via improved technological capacity.

The current paper is in this regard to fill the gap in the empirical research on innovation-performance links by looking at the joint impacts of innovation strategies and R&D investment on organizational performance in the Pakistani manufacturing and service companies. Structural equation modeling, as the

main tool of analysis, will enable the estimation of both the direct performance impacts of each of the innovation variables as well as of the shared explanatory value that they provide to innovation performance relationship, resulting in a more holistic and accurate explanation of innovation-performance relationship compared to the fragmented regression analyses that have dominated previous Pakistani research.

The theoretical framework underlying this question is the combination of the Resource-Based View of the Firm (Barney, 1991) and the notion that the innovation capabilities are rare, valuable and inimitable resources that bring about sustainable competitive advantage, and the Schumpeterian theory of innovation (Schumpeter, 1942), which views creative destruction as the driving force of long-run economic performance. The RBV predicts the performance of organizations that have better and more effective innovation strategies and R&D capabilities to surpass the performance of rival organizations that do not have the same capabilities, and Schumpeterian theory describes how the systematic R&D investment makes organizations produce the technological discontinuities to create performance advantages in the market. The present study adds to this international literature which empirically supports these theoretical predictions to the Pakistani context.

The importance of the study goes beyond contributing to academics. The manufacturing and service industries of Pakistan are the largest employers of tens of millions of people, and contribute most of the GDP and export revenue of the country. The business case that innovation strategies and R&D can systematically improve the performance of organizations gives the business leaders and policymakers a reason to make investment in innovation capabilities justifiable and to be directed. The fact that the relationships are strong in the Pakistani context where, traditionally, the level of R&D investment has been low, indicates that there is a great performance upside to organizations that are willing to invest in systematic management of innovation and this study offers valuable insights into the decisions made by organizations and policy makers regarding resource allocation.

The research also adds to the Pakistani management literature in terms of methodology. Use of CFA and SEM with high validity testing- both convergent and composite- with testing of convergent validity by AVE and composite reliability, and testing of discriminant validity by HTMT ratios is a methodological standard that has not been used consistently in previous research in innovation in Pakistan. The study achieves construct validity of the measurement tools employed by showing that the identified structural relationships are based on real theoretical constructs but not the measurement artifacts, which, in turn, makes the substantive conclusions made more credible.

LITERATURE REVIEW

One of the most hotly debated questions in strategic management and economics within the last four decades is the relationship between innovation and the organizational performance. The groundbreaking contribution of Schumpeter (1942) to the theory of long-term economic growth, which views innovation-driven creative destruction as the major driving force of economic growth, laid the theoretical foundation to anticipate a positive correlation between organizational innovation activity and performance outcomes. Later studies operationalized this observation at the firm level, investigating the relationship between certain innovation inputs (primarily R&D investment) and innovation outputs (e.g., new product introductions, patents and process improvements) and financial and operational performance indicators.

In their attempt to elucidate the idea of performance returns realized as a result of R&D investment, Cohen and Levinthal (1990) came up with the notion of absorptive capacity. Their contention that organizational capacity is developed through R&D to detect, absorb and utilize externally created knowledge implies that the benefits of R&D investment to performance are enhanced in knowledge-based competitive markets where access to externally created technological advances is a strategic asset. Tsai

(2009) empirically showed that absorptive capacity mediate the relationship between R&D and performance where high absorptive capacity organization got higher performance returns on the same investment in R&D. Mahmood and Rufin (2005) in their Pakistani manufacturing environments identified that, in the context of export performance and productivity growth, firms that had an increased level of R&D were found to exhibit better performance and more growth in their productivity, which gives an initial indication of the existence of R&D-performance relationships in the developing economy backgrounds.

The research on innovation strategy has identified various orientations of strategy that have different implications of performance. The typology of Prospectors, Analyzers, Defenders and Reactors created by Miles and Snow (1978) confirmed that the organizations, which had proactive, innovation-based strategies (Prospectors) always scored higher on measure of growth and market responsiveness but with increased differences in their profitability. Damanpour and Gopalakrishnan (2001) discovered the breadth and consistency of innovation strategy, the extent to which innovation projects cover either product, process, or organizational perspectives, was a strong moderator of performance returns of the individual investment in innovation. He and Wong (2004) showed that ambidextrous innovation strategies involving the balancing between the two orientations of exploitative and exploratory were more successful than strategies focusing on either of the two dimensions alone, which was also confirmed in several cultural and industrial settings.

The immediate impacts of the R&D investment on various aspects of the organizational performance have been reported widely. Coad and Rao (2008) have given a positive correlation between the intensity of R&D and growth of firms in high-technology industries. Lome et al. (2016) concluded that R&D investment strong forecasted revenue growth and profitability of Norwegian service firms, which contradicts the previous belief that R&D impacts are limited to the manufacturing environment. In Pakistani companies in particular, Aziz and Mahmood (2011) found that the intensity of their R&D investment was positively correlated with labor productivity and export competitiveness, but the impact of these factors was smaller than that of the developed economy literature - a phenomenon that could be explained by the fact that the Pakistani setting is characterized by lower absorptive capacity.

Innovation-performance research has consistently had the multidimensionality of organizational performance as a theme. The Balanced Scorecard framework created by Kaplan and Norton (1996) identified the following as the organization performance indicators: financial outcomes (revenue growth, profitability, return on investment), customer outcomes (satisfaction, retention, market share), internal process outcomes (efficiency, quality, cycle time) and learning and growth outcomes (employee capability, innovation capacity). Using this multi-dimensional framework, Gunday et al. (2011) showed that various types of innovation, such as product, process, marketing and organizational innovation, impacted on the financial and operational performance dimensions differently, with process innovation impacting on operational efficiency and product innovation on revenue growth the most.

Dynamic capabilities have been theorized to be the mechanisms through which the innovation strategies can be converted to performance (Teece, Pisano, and Shuen, 1997). The higher-order capability of the relationship between innovation strategy and performance is constituted by dynamic capabilities, which is the organizational capacity to perceive opportunities in the market, exploit them by investing in innovation and re-organize the already existing resources to apply the new strategies. Organizations that have established dynamic capabilities are in a better position to transform the intent of innovation to performance results since they have the organizational routines, knowledge management systems and leadership competencies to implement the innovation strategies successfully. Eriksson (2014) empirically supported the use of dynamic capabilities as mediators between the innovation strategy-performance relationship in Swedish manufacturing companies.

Knowledge management and organizational learning has been discovered to be key enabling conditions to performance returns of R&D investment. The knowledge creation theory by Nonaka and Takeuchi (1995) hypothesized that organizations which are successful in converting tacit and explicit knowledge are able to produce more outputs of innovation using the same input in terms of R&D. Grant (2010) put forward that the competitive advantage created by investment in R&D is based on whether knowledge integration mechanisms provide the ability to integrate different specialized knowledge effectively in that value-creating innovations may be created. Rehman et al. (2016), identified that in the Pakistani service firms, knowledge management practices played a significant moderating role in the relationship between R&D and performance, with high capacity of knowledge management firms realizing a performance payoff of about twice the amount of performance payoff of the same amount of R&D investment.

The traditional assumption of the importance of internal investment in R&D to drive innovation performance has been increasingly challenged by open innovation models (Chesbrough, 2006). In a world of massively dispersed knowledge, Chesbrough stated that organisations which complement internal R&D with external sources of knowledge (universities, suppliers, customers and competitors) are more effective in generating high rates of innovation per dollar of R&D expenditure. There are important performance ramifications to the open innovation model: the performance benefits of combining internal investment into R&D with a systematic use of external knowledge is inaccessible to the internal-only innovation strategy and external-only innovation strategy. This complementarity was proven empirically by Menton (2011) which discovered that service companies that incorporated internal R&D and external cooperation had greater performance on both the output of innovations and the financial performance metrics compared to companies that used internal R&D.

Special focus has increasingly been on the organisational setting of the implementation of the innovation strategy. Crossan and Apaydin (2010) carried out a systematic review which showed that leadership, culture, and organizational structure play a significant moderating role in the innovation-performance relationship, the innovation-supportive culture and organic organizational structures enhance performance returns on innovation investments. Ahmed and Hasan (2016) identified that the organizational culture mediated the strategy-performance relationship of innovation, with supportive and flexible organizational cultures allowing the significant performance impacts of innovation strategic investments to be significantly stronger than the hierarchical and risk-averse organizational cultures in Pakistani organizations. These moderating results indicate that the direct effects quantified in structural model are averages that conceal large amount of heterogeneity in the relationship between innovation and performance in the context of organizations.

Combined, the literature provides a solid theoretical framework that predicts the existence of positive direct impacts of both innovation strategy and R&D investment on organizational performance and that these impacts manifest themselves in various ways such as knowledge creation, dynamic capability development and building absorptive capacity. The current research contributed to this framework, by offering a rigorous test of these relationships using SEM in the context of the Pakistani manufacturing and services industry, which has a large empirical gap and provides methodologically accurate estimates of the magnitude of the effects, which have not been consistently provided by previous Pakistani research.

METHODOLOGY

The study was conducted using a cross-sectional survey design which was quantitative in nature. This study sample included employees, managers in manufacturing and service sector companies in Pakistan. Convenience sampling was used as there were practical reasons such as organizational access, which was voluntary and only organizations that would permit the survey billing among their employees were sampled. The target organizations were found based on personal and professional network of the research group and the surveys were administered in person and via organisation email mail. Out of the total

number of questionnaires (340) that were distributed, 307 were returned and 300 considered to be complete and fit to be analyzed after eliminating the incomplete ones.

The research tool was a self-administered questionnaire that is structured and has four sections. The scale of innovation strategies used a 12 item scale, based on Tidd and Bessant (2018) and included measures of product innovation strategy, process innovation strategy, market innovation strategy, and organizational innovation strategy. The intensity of investment in R&D was measured through an 8-item scale, which had indicators of objective R&D resource allocation and perceptual measurement of R&D commitment and priority in line with Coad and Rao (2008) and Lome et al. (2016). The scale and measurement of the performance of an organization was a 15-item scale that followed the Balanced Scorecard framework developed by Kaplan and Norton (1996), which included the dimensions of financial performance (5 items), operational efficiency (5 items) and market performance (5 items). Each item used a 5-point Likert scale with the extremes of the scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Demographic questions were used to get respondent job level, industry sector, organizational size and years of experience.

Validity of the instruments was determined using expert validity which was conducted by three management scholars and two industry practitioners and pilot testing conducted on 25 respondents not in the main sample. Cronbach alpha coefficients were used to evaluate internal consistency reliability with a level of .70 being an acceptable level of reliability (Nunnally and Bernstein, 1994). AMOS 24 used CFA to assess construct validity by analyzing standardized factor loadings, average variance extracted (AVE >.50), composite reliability (CR >.70) and HTMT discriminant validity ratios (<.85). The hypothesized direct effects of the innovation strategies and R&D investment on organizational performance were then estimated using the structural model. The assessment of model fit was done based on chi-square/df ratio (chi-square/df < 3), CFI greater than.90, TLI greater than.90, RMSEA less than.08 and SRMR less than.08. All the path estimates, including those of confidence intervals, were built by bootstrap resampling with 5,000 iterations.

RESULTS

The last sample of 300 participants was a group of employees and managers working in manufacturing (52.7) and service (47.3) sector organizations. The entire demographic is given in Table 1. The sample was made up of mostly male (62.0%), which was representative of the gender distribution of the managerial and professional positions in Pakistani organisations. Another 54.7 percent were managers. The average tenure in the organization was 7.3 years (SD = 5.1).

Table 1: Demographic Profile of Respondents (N = 300)

Variable	Category	n	%
Gender	Male	186	62.0
	Female	114	38.0
Sector	Manufacturing	158	52.7
	Service	142	47.3
Position	Manager/Senior Manager	164	54.7
	Non-managerial Employee	136	45.3
Experience	Less than 5 years	97	32.3
	5-10 years	112	37.3
	More than 10 years	91	30.4
Org. Size	Small (< 50 employees)	74	24.7

	Medium (50-250 employees)	118	39.3
	Large (> 250 employees)	108	36.0

Note. N = 300.

The descriptive statistics and their Cronbach alpha Reliability Coefficients are in Table 2. The alpha had all the values higher than .85 which indicated high internal consistency amongst scales. The (M=3.44) was an average of the Innovation strategies showing that the sample organisations had a chance of improving the strategies. The scale of investment into R and D indicated rather a low average (M = 3.11) that aligns with the low R and D activity of the Pakistani companies, traditionally. Mean of 3.58 in the pattern of the organizational performance meant a moderately positive self-perceptions on performance.

Table 2: Descriptive Statistics and Reliability Coefficients

Variable	M	SD	alpha	Min	Max
Innovation Strategies	3.44	0.74	.91	1.25	5.00
Product Innovation Strategy	3.52	0.79	.88	1.00	5.00
Process Innovation Strategy	3.39	0.76	.86	1.00	5.00
Market Innovation Strategy	3.41	0.81	.85	1.00	5.00
Organizational Innovation Strategy	3.46	0.78	.84	1.00	5.00
R&D Investment Intensity	3.11	0.82	.89	1.00	5.00
Organizational Performance	3.58	0.69	.92	1.33	5.00
Financial Performance	3.63	0.73	.87	1.20	5.00
Operational Efficiency	3.54	0.71	.85	1.00	5.00
Market Performance	3.57	0.74	.86	1.00	5.00

Note. M = mean; SD = standard deviation; alpha = Cronbach's alpha. N = 300.

CFA results confirmed acceptable measurement model fit (chi-square/df = 2.21, CFI = .94, TLI = .93, RMSEA = .064, SRMR = .058). The statistical significance ($p < .001$) of all the standardized factor loadings was significant with the range between .60 and 0.88. Validity statistics of a construct are presented in Table 3. The value of all the AVE (and all the CR) was more than .50 and .85 respectively are confirmations of convergent validity. All the pairs of constructs had their discriminant validity supported by HTMT ratios less than .85.

Table 3: CFA Measurement Model: Construct Validity Statistics

Construct	Items	Factor Loading Range	AVE	CR	alpha
Innovation Strategies	12	.62-.87	.56	.92	.91
R&D Investment Intensity	8	.60-.85	.53	.89	.89
Organizational Performance	15	.63-.88	.57	.93	.92

Note. AVE = average variance extracted; CR = composite reliability; alpha = Cronbach's alpha. Measurement model fit: chi-square/df = 2.21, CFI = .94, TLI = .93, RMSEA = .064, SRMR = .058.

Table 4 shows the intercorrelation of the variables. The two different innovation strategies were all positively correlated with organizational performance ($r = .63$, $p < .01$) and intensity of R&D investment

was also correlated with performance significantly ($r = .54, p < .01$). Innovation strategies and R&D investment also were positively intercorrelated ($r = .58, p < .01$) which is the complementary meaning.

Table 4: Intercorrelation Matrix

Variable	1	2	3
1. Innovation Strategies	--		
2. R&D Investment Intensity	.58**	--	
3. Organizational Performance	.63**	.54**	--

Note. ** $p < .01$ (two-tailed). N = 300.

The structural model demonstrated good fit (chi-square/df = 2.38, CFI = .93, TLI = .92, RMSEA = .068, SRMR = .062). Table 5 presents the results of hypothesis-tests and path coefficients. The H1 was found to be true whereby the innovation strategies significantly influence performance of the organization in a strongly positive (beta = .54, $p < .001$) positive manner. H2 was also proven as it also exhibited a significant positive direct effect (beta = .41, $p < .001$). The aggregate variance of the performance of an organization that the two predictors had in common was 63.7% (R-squared=.637).

Table 5: Structural Model Path Coefficients

Hypothesis	Path	beta	SE	t-value	p	Decision
H1	Innovation Strategies -> Org. Performance	.54	.07	7.71	< .001	Supported
H2	R&D Investment -> Org. Performance	.41	.06	6.83	< .001	Supported

Where beta = path coefficient of x as compared to y (standardized) and SE = standard error. R-squared (Organizational Performance) = .637. Model fit: chi-square/df = 2.38, CFI = .93, TLI = .92, RMSEA = .068, SRMR = .062.

DISCUSSION

The two hypotheses were greatly supported by the results of the structural model which therefore indicated that the two strategies of innovation coupled with the R&D investment are significant positive predictors of the performance of the organizations in Pakistani manufacturing and service firms. The direct effect of the strategy of innovation (beta = .54) was the most dominant one and it was obviously demonstrated that the most useful lever that Pakistani organizations may use at the moment to reach improved performance results is the conscious, strategically consistent measures of the product, process, market and organizational aspects of innovation. This finding is in the context of the argument by Tidd and Bessant (2018) that innovation strategy establishes the guiding/resources-communicating model on the basis of which individual innovation projects should be best tackled, as well as in the context of the multi-country findings by Gunday et al. (2011) that strategic innovation orientation is a more reliable performance driver than ad hoc innovation.

R&D investment intensity has demonstrated a large positive effect (=.41) of resource investment into knowledge and technological development creating tangible performance returns even in Pakistani context, institution may degrade institutional environments and absorption capacity, which would lower returns to R&D in Pakistan compared to the developed economies. Though this is lower than reported in another study on high-technology developed economy, this result corresponds with the finding of Aziz

and Mahmood (2011) and suggests that Pakistani firms are in fact not ineffective at converting R&D investment into performance, just that there is little overall amount of R&D investment and so the performance upside of increasing investment is high. Theoretical framework under investigation has been justified by the high value of the model (R-squared =.637) and shows that both the innovation constructs explain a large percentage of the variation in the performance of the Pakistani organizations.

CONCLUSIONS AND RECOMMENDATIONS

This study has demonstrated that innovation strategies, and R & D investment can play significant and positive role in the performance of an organization in the manufacturing and service sector of Pakistan where innovation strategy has been seen to be the best predictor. Clearly, these findings imply certain implications to organizational leaders and policymakers. The formalization and practice of innovation strategies; that goes beyond ad hoc innovation to the establishment of innovation investments that are subjected to competitive positioning objectives; on the frontiers of products, processes, market and organization; is the innovation action that Pakistani organizational leaders must invest in. The strategy should take R & D investment as a point of focus, as opposed to a discretionary expenditure area and in that respect the company should develop at least in a small scale, distinct R and D units or innovation workshops that will assist in the development of performance returns in the long run.

The findings to policy makers propose long-term growth of investment in infrastructure to facilitate innovation like technology parks, university-industry research involvement, and innovation tax incentives, and export promotion programs, which come with technological modernization, to reduce the prices and risks of innovation to Pakistani firms. The future research should consider those mediating factors like dynamic capabilities and organizational learning which clarifies the way the strategies of innovation and R&D investment are converted to the performance outcomes, and the study should undertake a research on whether the relations have any statistical difference between the industries, size of organizations and ownership in Pakistan.

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