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EXPLORING THE LEADING DRIVERS OF FIRM COMPETITIVENESS: THE MEDIATING ROLE OF TECHNOLOGICAL INNOVATION

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ABSTRACT

This research examines that how economic policy efficiency, infrastructure development, and human capital affect firm competitiveness in Pakistan, with technological innovation as a mediating variable. Drawing on theories of endogenous growth and innovation diffusion, study mixes core economic constructs with innovation capability to assess firm-level performance in a transforming economy. Total 300 responses were collected from managerial -level employees across manufacturing & service industries via structured survey instrument. Using PLS-SEM, analysis confirms that all independent variables have a positive and significant effect upon firm competitiveness, both directly and indirectly through technological innovation. The findings underscore the strategic role of innovation in translating macroeconomic enablers into firm-level advantages. This study offers practical insights for policy makers and business leaders to boost competitiveness over targeted investments in innovation ecosystems. The novelty of this study lies in its integration of macroeconomic enablers with firm-level innovation adoption in context of a developing economy. It is among the first empirical studies in Pakistan to use PLS-SEM to explore mediation pathway across service and manufacturing sectors.

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INTRODUCTION

In the fast-paced global environment of increased economic interdependence and high rates of digitization, the need to ensure the competitiveness of firms has become a top priority of scholars, policy-makers, and companies. In case of emerging economies like Pakistan, the need to enhance corporate competitiveness goes beyond an economic requirement; it is a strategic requirement to

sustainable growth, poverty alleviation and effective integration of the economy into the global value chains. Acting in environment of continuous structural reorganization and reform-oriented economic management, businesses in Pakistan operate in complex and fast-changing institutional environment the quality of which, along with the sufficiency of infrastructure and the quality of the human resource capabilities, significantly influences the efficiency of operation as well as strategic responsiveness (Soomro & Khan, 2025). The pressure to innovate in the market, to implement high-tech technologies, to dynamically adapt to environmental variability have increased that qualifies technological innovation as a byproduct of and means of economic resilience and competitiveness at the enterprise level.

In such circumstances, the explanation of how macro-level economic enablers can be turned into micro-level firm performance has become an essential part of the informed developmental policy and strategizing of private sector (Kühl, Skipworth, Bourlakis & Aktas, 2023). The effectiveness of economic policy, the quality of infrastructure, and richness of human capital are the main pillars of national and firm level competitiveness in the transition economies like Pakistan. The predictable regulations reduce the uncertainty, transaction costs, and encourage entrepreneurial risk-taking, which promotes use of resources in productivity-enhancing activities (Haruna & Ackah, 2025). In tandem with this, the size and stability of the transport networks, energy systems, communication technologies, along with logistics platforms are essential drivers of industrial growth, technological absorption and market access. At the same time, the human capital stock, as the aggregate skills, educational levels, diverse experiences and organizational capabilities, is a key factor in allowing firms to adopt, adapt, and internalize the emerging innovative technologies (Moncada, Carbonero, Geuna & Riso, 2024).

Quality human capital enables organizational learning, complex problem solving and enhancing the ability of a firm to grow through innovation. Even though the macroeconomic enablers have independent effects, they interact to influence the system at the firm level through capabilities like technological innovation, thereby acting as intermediary between systemic input and competitive performance (Liu, Shen & Ullah, 2025). Technological innovation in this regard is envisaged as the capacity of firms to either create or acquire new products, processes or business models that can improve the performance, lower costs or access new markets. As a result, the ability to innovate is closely connected to the effectiveness of the economic policy, the sufficiency of the infrastructure and the quality of the human capital, which all provide the incentives, the opportunities and the absorptive capacities to innovate (Kitamura & Brehm, 2020). The propensity of firms to conduct strategic R&D and invest in the digital technologies and cooperate with knowledge institutions is significantly higher in a favorable policy environment to take effective advantage of the emergent technological paradigms.

Technological innovation is thus a key mediating process whereby macroeconomic forces impact on the competitiveness of the firms (Boikova, Rivza, Rivza & Rivza, 2021). Competitiveness of firms, which refers to the ability to deliver high-level performance in comparison to the competitors, is supported by various strategic, operational, and environmental factors. Resource-based view (RBV) of the firm assumes that sustainable competitive advantage is a result of valuable, rare, inimitable,

and non-substitutable resources, that include innovation capability as most important (Rantanen, 2021). When combined with favorable external environments like effective policy frameworks and strong infrastructure, companies are in the better place to make use of their internal strengths to attain and maintain competitiveness. This paper therefore conceptualizes competitiveness of firms as a factor of macroeconomic bases, which is sifted through technological innovation (Li, Han, Zhang, Philbin, Liu & Ke, 2022). Thus, the literature available is rich in discussing the respective contributions of the economic policy, infrastructure and human capital to firm performance, but empirical studies that combine these factors in an integrated model are limited especially in the developing economies.

In addition, extensive empirical literature considers innovation as a result of strategic effort or a performance driver on its own, overlooking its mediating role in association amid macroeconomic enablers and competitiveness (Černe, Čater, Čater, Koman & Redek, 2024). The Pakistani context has not been thoroughly examined in this discourse, despite the current economic reforms, massive infrastructure investments (China-Pakistan Economic Corridor projects), and growing focus on skill development and digitalization. It is thus important to empirically analyze the process over which such structural changes can be translated into concrete benefits in firm competitiveness and how their effect is mediated (Baccarella, Maier, Meinel, Wagner & Voigt, 2022). Previous studies have primarily examined separately the direct relationship between policy efficiency and innovation or infrastructure and firm productivity and have not examined simultaneously the relationships that consider intermediate or mediating effects. Therefore, this gap has limited the understanding of the dynamic relationship between the macroeconomic factors as well as firm performance (Amarhyouz & Azegagh, 2025).

Such inquiry is especially relevant to managerial and policy making decisions given the specific institutional, economic, as well as cultural context of Pakistan. This study addresses this gap in the methodology by researching the extent to which economic policy efficiency, the infrastructure development and human capital interact to influence the competitiveness of firms, and whether technological innovation plays an important mediating role in these relationships. In this way, it can donate to theory, empirical verification, and contextual applicability of strategic management, innovation research, and development economics (Kharazishvili, Kwilinski, Dzwigol & Liashenko, 2021). The research question thus is how much economic policy efficiency, structure investment and human capital promote firm competitiveness in Pakistan and whether technological innovation is an important mediating channel in the relationships. Therefore, this question connects macro-level development priorities with micro-level strategic results, and it is possible to conduct an empirical study of the way in which systemic economic enhancements can trigger the enterprise dynamism and competitiveness.

Understanding of such dynamics is critical in developing policies and interventions that not only promote innovation, but also that are consistent with firm level performance demands. In this drive, methodologically, the research fills the abovementioned gaps by using PLS-SEM, a methodological approach that is aimed at the systematic study of the multi-level relationships. This method allows testing sequential mediating effects and provides very interpretable path diagrams. The study will

add depth and breadth to insight into the way firms in Pakistan exploit the external environments to become competitive, by using primary data obtained in a survey of managers in manufacturing and services sectors conducted nationwide. Predictable regulations reduce indecision, transaction costs, and inspire entrepreneurial risk-taking, promotes use of resources in productivity-enhancing activities. The results will be used in scholarly discourse, evidence-based policymaking, and assist managers in designing resilient, innovative, and competitive businesses in an ever-more-volatile global environment.

LITERATURE REVIEW

The paper is based on two theoretical perspectives: the endogenous growth theory and innovation diffusion framework that highlight the central role of innovation in the long-term competitiveness and economic transformation. The endogenic growth theory assumes knowledge, technological advancement, and active investment in innovation process are reasons of sustained development, both at the macroeconomic and firm levels. Unlike classical growth models where technological advancement is exogenous, the endogenous approach defines technological advancement as a product of policy design, institutional performance, and human capital formation (Arjun, Sankaran, Kumar & Das, 2020). In this perspective, firms are the actors of innovation but their innovation capability is meaningly influenced by enabling environment. The innovation diffusion framework examines diffusion of technological innovations in and between organizations, which is dependent on the quality of infrastructure, absorptive capacity and strategic adoption behavior. This leads to the conceptualization of technology innovation as outcome and mediating process through which the macroeconomic enablers create their impact on competitiveness of firms (Černe, Čater, Čater, Koman & Redek, 2024).

Policy efficiency has long been a subject of discussion in policy debate as well as research inquiry as a factor that determines firm level competitiveness. Effective economic policies provide a stable, transparent, and predictable environment in which the business firms operate, which encourages business firms to engage in long-term investment in innovation, talent development, and market expansion. On the contrary, policy uncertainty or regulatory inconsistency environments usually encourage firms to shift resources to compliance and risk management as opposed to activities that increase productivity (Fiemotongha, Igwe, Ewim & Onukwulu, 2023). Empirical studies have shown that policy clarity and institutional support have positive effect on the innovation behavior of firms, investment decisions and performance. Policy efficiency, by cutting down bureaucratic friction, easing access to finance and encouraging innovation via tax and investment regimes, acts as the driver of the firm-level dynamism (Kuosmanen, Kaitila, Kuusela, Lintunen, Maczulskij & Valkonen, 2023). Another important variable that determines firm competitiveness is the quality of infrastructure and lowers cost of operations, expands the market reach, and facilitates effective supply-chain management.

The empirical research is becoming more and more evident that infrastructure can reduce logistical and communication barriers, allowing firms to expand and speed up the process of the innovation diffusion (Polyakov & Kovshun, 2021). In some countries like Pakistan, identified infrastructure

shortages discourage the productivity and competitiveness of firms. Infrastructure investments that are specific, such as those launched through the China-Pakistan Economic Corridor, have been linked with better industrial performance, especially when combined with the favorable policy environments. The literature points out that infrastructure development should be wide-ranging and all-encompassing so that companies in various industries and geographies could utilize the infrastructural resources to innovate and compete favorably in domestic and international markets (Oosthuizen, 2022). The human capital is another pillar of firm competitiveness particularly in the knowledge intensive and innovation-based industries. Human capital is defined as the pool of skills, education, and experience that is stored in a workforce, thus affecting the ability of a firm to create, absorb, and utilize new knowledge. Many empirical studies show that the higher the level of employee education and training, the better the performance of innovation and competitiveness of firms (Na, 2021).

Investments in vocational training, technical education and managerial capacity building have been associated with better firm level outcomes in the developing economies. The flexibility and learning capacity of human capital become key factors that determine the capacity of a firm to be competitive in a situation where there is a high rate of technological change (Hitka, Kucharčíková, Štarchoň, Balážová, Lukáč & Stacho, 2019). In the modern literature, technological innovation has been seen to be a cause as well as an effect of competitiveness of firms. Technological innovation has been defined as the creation or acquisition of new products, processes, or business models that allow firms to differentiate, to lower costs, and to enter innovative markets. The positive correlation between innovation and firm performance is continually recorded in the empirical studies, where companies investing in R&D, digital technologies, and process optimization are better off than those not investing in these areas when companies absorb these technological changes through innovative practices (Tian, Chen, Tian, Huang & Hu, 2023). In Pakistani scenario, companies that integrate technological innovation into their strategic planning are always productive, export oriented and resilient.

However, innovation process is seldom spontaneous, but is influenced by external factors like policy incentives, the quality of infrastructure and human capital preparedness and hence the mediating effect of innovation~ whereby macroeconomic enablers only leads to competitiveness when it is filtered over firm-level innovation capabilities (Khyareh & Rostami, 2022). Empirical research is gaining ground in the conviction that technological innovation plays the mediating role in the relationship between macroeconomic conditions and firm competitiveness, but this process has not been studied adequately in the context of developing countries. Similarly, the presence of good infrastructure also accelerates the process of diffusion and integration of new technologies, yet its impact on competitiveness is felt when companies absorb technological changes over innovative practices (Blanco, Coninck, Anadon, Lim, Pengue, Sagar & Tanaka, 2022). Human capital is directly related to efficiency but at same time it develops the ability of firm to utilize technological opportunities and therefore a precondition to the effective innovation. However, the studies that combine these relationships into one framework, especially in the South Asian economies, are rare (Snetselaar et al., 2021).

Competitiveness as a concept is multidimensional and it includes financial performance, market share, productivity and strategic adaptability. It has been indicated in the contemporary literature that the factors that drive competitiveness are shifting towards the intangible assets like the ability to innovate, organizational learning, and strategic alignment as opposed to capital and labor input. This change in the concept of dynamic competitiveness has resulted in a shift of focus of the concept of efficiency to agility of strategy where innovation becomes the most important differentiator (Balzano & Bortoluzzi, 2024). This is empirically supported by the fact that companies with strong innovation ability perform better in various indicators of competitiveness especially when they are backed by favorable external conditions between macroeconomic enablers, innovation capacity is essential to the long-term competitiveness (Jjagwe et al., 2024). Despite the increased awareness of such interconnections, there are still a number of gaps in current literature. First, despite the fact that the individual relationships between infrastructure and firm performance, or between human capital, innovation have been studied, there are few studies that apply unified analytical model with all the variables.

Most studies are done in the developed economies, which limits their applicability to other settings such as Pakistan, where institutional factors as well as resource scarcity could result in different interaction patterns. Third, technological innovation as a mediating factor is theoretically accepted but greatly under-tested, especially with more sophisticated techniques like PLS-SEM that can model complicated multi-path relationships (Zhang, 2025). Fourth, a majority of the studies are based on macro level data or secondary data, and therefore the lack of precision in measuring the firm-level differences in the perception, behavior and performance. As a result, there is a need to conduct primary data-based studies based on context-specific evidence and methodological rigor to develop theory and guide practice (Henawy, 2025). Based on these theoretical and empirical findings, the present study offers a set of hypotheses to test direct and indirect connections between the identified constructs. The development of the infrastructure will have a strong positive effect on the competitiveness of firms as it will lower transaction costs and make their operations scale able (Jaspers & Proff, 2025).

Third, the hypothesis is that human capital has a positive effect on firm competitiveness because highly skilled and educated workforce positively affects innovation and productivity. Fourth, the efficiency of economic policy is assumed to have a positive impact on technological innovation as well since consistent policies provide incentives and decrease obstacles to innovation activity. Fifth, the impact of infrastructure development is also likely to be positive on technological innovation as it provides the physical and digital infrastructure that is needed to adopt new technologies (Shabalov et al., 2021). Sixth, human capital is theorized to have a positive impact on technological innovation, as competent workers are in better position to invent and assimilate new technologies. Lastly, technological innovation will be mediating factor between all three independent variables, including economic policy efficiency, infrastructure development, and human capital and firm competitiveness. This mediating effect indicates the hypothesis that macroeconomic enablers are manifested in competitive advantage in way they give rise to, and promote innovation within firms (Černe et al., 2024).

RESEARCH METHODOLOGY

The research design that is used in this study is quantitative research design which is deemed to be most appropriate in investigating hypothesized relationships among economic policy efficiency, infrastructure development, human capital, technological innovation and firm competitiveness. Quantitative procedures enable the gathering of the standardized data that could be statistically analyzed to test theoretical propositions and make generalizable conclusions. The study is based on a positivist research philosophy, which presupposes the objectivity of reality and its measurement with the help of empirical observation and statistical methods. Positivism is consistent with the purpose of the investigation that aims to determine a causal relationship between variables and determine the structural channels over which macroeconomic enablers affect firm-level outcomes. This philosophical position lays stress on hypothesis testing, empirical evidence, and replicability, which are also the key elements of the rigor and validity of the research. The population is made up of the managerial level employees of the manufacturing and service sector companies that are based in Pakistan.

It is assumed that these employees have suitable knowledge about their firms strategic, operational and innovation related activities, and therefore they will be the right respondents to the objectives of the research. The interest in Pakistan is especially timely because it is a developing economy that is in the process of structural reforms with the aim of improving its competitiveness by raising the quality of its economic policy, its infrastructure and human capital development. In that way, the Pakistani context offers an interesting environment in which these macroeconomic factors can be examined in their impact on firm-level performance, particularly, with the help of technological innovation as mediating factor. The population is heterogeneous about the sectoral representation, size of the firms and geographic distribution, which enhances the generalizability of the results to different organizational and economic contexts. A stratified random sampling approach was used to obtain a representative sample of this population. The stratification was done according to the type of industry, i.e., manufacturing and services, so as to have proportional representation of both industries in the sample.

In each stratum, firms were chosen randomly and managerial-level respondents were identified by professional networks, business associations, and corporate directories. This was to reduce sampling bias and obtain data that was representative of the views of the people who were directly involved in decision-making and innovation in their organizations. The valid responses obtained were 300 and this is in accordance with needs of Partial Least Squares Structural Equation Modeling (PLS-SEM), especially in research which involves complicated models and of many latent variables and paths. This sample size corresponds to statistical recommendations on adequate power and model reliability in PLS-SEM analysis. The data was obtained using structured survey questionnaire that sought to capture perception of efficiency in economic policy, infrastructure development, human capital, technological innovation, firm competitiveness. The questionnaire was prepared based on the measurement scales that were adopted and adjusted to Pakistani context based on the existing literature. The scale used to measure items was five-point Likert where the answers were measured

on scale of strongly disagree to strongly agree, easy to quantify and can be analyzed using stringent statistical methods.

The instrument was pre-tested with a small sample of managers before full deployment to test the clarity, relevance and reliability of the items. According to feedback, some changes were done to enhance the flow and understandability of the survey. Thus, the completed questionnaire was sent electronically and in hardcopy format depending on the accessibility of respondents to guarantee a good response rate and quality of data. In order to interpret the data, the Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied with help of SmartPLS software. The PLS-SEM is specifically appropriate to study because it can deal with complicated models that include several latent constructs, mediating variables, and direct and indirect effects. It is also resistant to non-normality and suitable to exploratory and theory-building studies, particularly in emergent market settings where nature of data may be less predictable. The analysis was conducted in two parts: evaluation of measurement model to evaluate reliability and validity of constructs by means of such indicators.

These indicators include Cronbach alpha, composite reliability, average variance extracted (AVE) and discriminant validity and evaluation of the structural model to test hypothesized relationships by means of path coefficients, t-values and R-square values. Bootstrapping techniques were used to test mediation effect of technological innovation, which gives strong estimations of the indirect effect and its level of significance. The survey was completely voluntary and respondents were made aware about purpose of the study, right to withdraw at any point and the confidentiality of the answers. No identifying data were gathered, and data were kept in a safe place in order to avoid unauthorized access. Data collection was preceded by ethical approval of the institutional review board concerned. All processes were in line with ethical principles of research with human subjects, which focus on respect, transparency, and informed consent. These ethical standards were observed to ensure that study builds trust between the participants and ensure credibility and authenticity of the research process.

RESULTS OF STUDY

Table 1 Reliability and Convergent Validity Analysis

Construct	Cronbach's Alpha	Composite Reliability	AVE
Economic Policy Efficiency	0.84	0.89	0.67
Infrastructure Development	0.87	0.91	0.72
Human Capital	0.85	0.90	0.69
Technological Innovation	0.88	0.92	0.74
Firm Competitiveness	0.86	0.90	0.71

The convergent validity and reliability tests produced strong results. Internal consistency was high and convergent validity levels were acceptable in all constructs. The Cronbach Alpha of every construct was above the standard value of 0.70: Economic Policy Efficiency (0.84), Infrastructure Development (0.87), Human Capital (0.85), Technological Innovation (0.88), Firm Competitiveness (0.86). Internal consistency and increased accuracy of measurement were further supported by

Composite Reliability values, which varied between 0.89 and 0.92. Each of the constructs exceeded the 0.50 standard of the Average Variance Extracted (AVE) Economic Policy Efficiency (0.67), Infrastructure Development (0.72), Human Capital (0.69), the Technological Innovation (0.74), and Firm Competitiveness (0.71). Taken together, these findings indicate that the measurement model has sufficient reliability and convergent validity, thus validating the validity of future structural path assessments.

Tabel 2 Collinearity Statistics (VIF Values)

Construct	VIF
Economic Policy Efficiency	2.10
Infrastructure Development	2.30
Human Capital	2.25
Technological Innovation	1.90

The Variance Inflation Factor (VIF) of each of the constructs used in the current research is far lower than the generally accepted standard of 5.0, which means that the problem of multicollinearity does not arise in the study. In particular, VIFs of Economic Policy Efficiency (2.10), Infrastructure Development (2.30), Human Capital (2.25), and Technological Innovation (1.90) indicate that all predictors have unique contributions to the model and are not too strongly correlated with other independent variables. Such medium values of VIFs indicate that structural model is statistically valid and the estimates of the path coefficients are not over-estimated as a result of redundancies among the predictors. In that way, the validity of the regression paths and the interpretability of the causal relationships in the model are maintained, which strengthens the validity of the PLS-SEM analysis.

Tabel 3 Model Fit Indices

Fit Index	Value
SRMR	0.048
NFI	0.920
Chi-Square	342.15
d_ULS	0.950
d_G	0.880

The structural model has an acceptable degree of overall fit with observed data. The Standardized Root Mean Square Residual (SRMR) value of 0.048 is considerably lower than the suggested value of 0.08, which means that the relationship between the suggested model and the empirically obtained data is close enough. Normed Fit Index (NFI) of 0.920 is greater than 0.90 which is a value that is considered to be showing an acceptable fit. The statistic Chi-Square 342.15 is significant, but the value is common in large samples and cannot be regarded as the indication of misfit in PLS-SEM where fit indices are approximate. Additionally, d_ULS (0.950) and d_G (0.880) are within acceptable limits, and this fact proves that the difference between the empirically estimated and model-implied correlation matrices is insignificant. The combination of these indices is empirical

evidence that supports the proposed model structure since it confirms the validity of hypothesized diverse relationships.

Tabel 5 Structural Model Results

Path	Path Coefficient	T-Value	P-Value
EPE → TI	0.36	6.12	0.000
ID → TI	0.39	6.78	0.000
HC → TI	0.41	7.02	0.000
TI → FC	0.45	8.45	0.000
EPE → FC	0.29	5.21	0.000
ID → FC	0.31	5.67	0.000
HC → FC	0.34	5.88	0.000
EPE → TI → FC	0.16	3.95	0.000
ID → TI → FC	0.18	4.12	0.000
HC → TI → FC	0.19	4.34	0.000

The structural model tests provided in current research prove that all hypothesized relationships are statistically significant, and both direct and indirect effects exist among the constructs. All the three factors, Economic Policy Efficiency (EPE), Infrastructure Development (ID), Human Capital (HC) have a positive and significant impact on Technological Innovation and the path coefficients are 0.36, 0.39 and 0.41 respectively, and the t-values are all above 6.0 which is a strong statistical support. Firm Competitiveness (FC) in turn is positively affected by Technological Innovation with a path coefficient of 0.45 and a strong t-value of 8.45. Moreover, EPE, ID, and HC all show a direct positive impact on Firm Competitiveness, coefficients being 0.29, 0.31, and 0.34 respectively, all significant at 0.001 level. Indirect effects of Technological Innovation are significant and support the mediating role: EPE -> TI -> FC (0.16), ID -> TI -> FC (0.18), and HC -> TI -> FC (0.19) with the t-values of 3.9 and more, and the p-values of 0.000. These results demonstrate role of Technological Innovation as channel through which macro-level drivers of policy efficiency, infrastructure and human capital are converted to firm-level competitiveness, that emphasizes strategic significance of Technological Innovation in influencing economic performance in manufacturing and service industries in Pakistan.

DISCUSSION & CONCLUSION

The study provides empirical explanation of the various factors that influence competitiveness of firms in a developing economy, especially in Pakistan. The findings support the primary thesis that policy efficiency, investment in infrastructure and human capital all contribute to technological innovation, then enhances firm competitiveness. The strong causal links between the independent variables and technological innovation are testimony to normative statements of the endogenous growth theory that suggests that innovation and knowledge accumulation are basis of sustainable economic and firm performance. The general policy implications are based on the fact that the state is able to create an effective regulatory environment, develop physical and online infrastructure and develop a talented workforce, companies will increase the level of meaningful innovations that provide national, international competitive advantages. Not less remarkable is fact that economic

policy efficiency, quality of infrastructure, human capital has direct, although weak, impacts on competitiveness of firms.

These relations demonstrate that structural assets bring competitive advantages even in absence of technological innovation. As a result, enabling environment, which is coherent policy, reliable infrastructure, and skilled labor force, enhances firm competitiveness, but innovation is the main channel through which these macro-level inputs are converted into high firm performance. The great indirect impacts therefore confirm that companies that intentionally incorporate innovation are in better position to capitalize on favorable external environment and this makes technological innovation a cause and effect of competitiveness. Analytically, the results support the assumption that innovation ought to be measured in a consolidated framework that considers wider economic and institutional capacities. Where the environment is characterized by the complex regulatory environment, a poor infrastructure, and a lack of skills, as is the case in Pakistan, strengthening the underlying variables, i.e., policy efficiency, the quality of infrastructure, and human capital, has two payoffs: direct improvement of competitiveness and the indirect boost to competitiveness through increased innovation.

It is thus imperative to have a holistic approach that tackles all these dimensions. Finally, the empirical findings show that the efficiency of economic policy, the improvement of infrastructure, and the development of human capital become the key factors of firm competitiveness directly and indirectly through technological innovation. The theoretical hypothesis that innovation translates environmental and institutional advantages into practical firm-level performance is confirmed in the study. Policy reforms to improve competitiveness must thus be accompanied by innovation-based strategies and concerted efforts to improve policy coherence, augment infrastructure, and build the workforce. Such measures are necessary in order to keep innovation as a product and a driver of competitive performance. On the basis of the findings, a number of recommendations are offered. To begin with, the policy makers in Pakistan should improve the regulatory tools, simplify the administrative process and create an atmosphere that encourages innovation. Second, special investment in infrastructure, especially digital infrastructure, must be made to meet technological demand of firms.

Third, the education and training programs should be in line with the industry demand to develop a labor market that can support innovation. Fourth, proactive innovation strategies should be embraced at the firm level through exploitation of the government incentives, industry-academia partnerships and institutionalization of in-house research and development activities. The study as has implications to scholars, policy makers and business practitioners consolidated framework that considers wider economic and institutional capacities. To scholars, results offer a proven framework that can be applied to other developing economies to examine whether the same relationships are replicable under different institutional settings. To policy makers, the evidence points to the need of integrated economic policies that consider the synergistic nature of the macroeconomic enablers and firm-level innovation. To business leaders, the implications of the results are that innovation should be developed as a fundamental organizational competence that boosts gains of favorable economic conditions.

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