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The Determinants of Exporting Firms and Their Impact on Profitability: A Case Study of Industrial Estate Hayatabad, Khyber Pakhtunkhwa

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	Abstract
<p>Prof. Dr. Rabia Ishrat Professor, Department of Business Administration, Sarhad University, Peshawar</p> <p>Dr. Asghar Kamal Assistant Professor, Department of Business Administration, Sarhad University, Peshawar</p> <p>Dr. Waheed Ur Rehman Associate Professor, Department of Business Administration, Sarhad University, Peshawar</p>	<p>This research aims at exploring the relationship between production efficiency and adoption of technology and export competitiveness and profitability of the manufacturing firms within the Hayatabad Industrial Estate (HIE), Khyber Pakhtunkhwa, Pakistan and use as a quantitative descriptive survey design that utilizes primary data measures in the form of designed questionnaires capturing lean manufacturing practices, level of technology adoption, export performance, and profitability measures across the manufacturing firms to the key decision-makers of the firms comprising of owners, CEOs, general managers, and production managers and using descriptive statistics to analyse prevalence Findings indicate that 54-percent of HIE company are highly productive (high production efficiency through lean production and waste reduction) but only 41 percent are highly-technological-adoption (high production with ERP systems, automation and Industry 4.0 tools) with high-efficiency companies attaining a cost-competitiveness and profitability in the short-term and high-technological-adoption firms securing long-term export business and sustainable financial performance, and the 13-percentage-point efficacy-technology disconnect in which most firms are maximizing existing The findings are used to inform the implementation of the Khyber Pakhtunkhwa Industrial Policy 20202030, with the emphasis on firm-level institutionalization of continuous improvement associated with the investment in technologies, the facilitation by the government of the access to Export Import Bank Long-Term Financing Facility, the Shared Technology Hubs led by the industry associations, the systematic efficiency-technology capabilities building instead of individual interventions, and this study contributes to the first systematic empirical evaluation of the HIE operational capabilities, the extension of the Resource based View and Dynamic Capabilities.</p>
<p>Keywords:</p>	<p>Export competitiveness, dynamic capabilities, Hayatabad Industrial Estate, lean manufacturing, production efficiency, Resource-Based View, technology adoption.</p>



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1.1 1.1 Background of the Study

The world has put the developing countries under pressure to increase exports. This assists in accelerating the economic growth and diffusing industries. It also maintains foreign exchange at a constant level. Pakistan has trade deficits to contend with. Therefore the country should be able to extract maximum out of its manufacturing industry. That industry is a major constituent of the economy. It has over the years contributed to the Gross Domestic Product by approximately 12 percent to 13.11 percent. It also employs approximately 15 percent of the formal employees. The latest economic statistics indicate that volatile and fluctuating this sector may be. The GDP decrease rate was recorded as 0.21 percent in the last fiscal year 2022-23. This is an indication of the challenging nature of the businesses of this tough condition. Even tentative estimates show GDP growth of 2.68 percent in the fiscal year 2024-25. All this national ups and downs imply that companies should be concerned with their efficiency and toughness. This is how they will be able to maintain export revenues. This kind of income is important to the financial well being of the country. It promotes large aspirations such as the Uraan Pakistan plan. The plan is aimed at 60 billion dollars exports.

Pakistan has the lowest export performance compared to its neighbors such as Bangladesh and India. This loophole manifests itself in external reports. Use World Banks Statistical Performance Index 2023. Pakistan got a score of 68.6 there. India scored higher at 73.6. Bangladesh was at 70.8. Home grown problems the Pakistani sellers have. They are also operating in an environment whereby the country is perceived to be riskier. This is as a result of problems with the economic data and trade regulations. In this organization level operations must shine. Risks are controlled through certified methods of doing things. They compensate national trust that is weaker. They create trust in buyers.

Hayatabad is an industrial estate located in Peshawar. That is in the province of Khyber Pakhtunkhwa. It constitutes a significant sector of industries. The location assists in accessing the local Afghan and Central Asian markets. It has more than 400 manufacturing locations. Their specialization is in textiles pharmaceuticals packaging and food work. This much though the estate has a big problem. The weaknesses counter its strengths as its operations in the region fall apart. This is indicated in negotiations with the Industrialists Association Peshawar. They demand the reintroduction of 400 failing companies. They desire superior installation such as cheap power. They also advocate relaxed rules via one window assistance.

The internal problems are the root cause of the predicament of the estates. Specialists note a lack of usage of new technology. They observe poor working habits and imbalanced trade. Thus, this paper examines two items that can be manipulated by firms. These assist in bridging the gap to remain competitive. They also contribute to the success of business. One of them is production efficiency. This is to produce good products at low prices. The other is the adoption technology. This comes with the addition of automated or even superior production equipment in the digital setting. These factors enable Hayatabad companies to go beyond surviving. They are able to target continuous profits. This is in line with the Khyber Pakhtunkhwa governments Industrial Policy during 2020 to 2030. The policy emphasizes the modernization of operations.

1.2 1.2 Research Problem

The Hayatabad Industrial Estate is a weight to the region. Its companies continue to face problems, however, in terms of profits and world leadership. Larger companies occasionally invested in robotization and streamlined the approaches. The vast majority of small and medium enterprises remain stuck with an old tool and snail-paced means. This is detrimental to their competitive power. It cuts into export money too. One of the main gaps is local evidence, which links efficiency and the use of technology with exports and profits. This occurs within the special estates setting. These omitted details serve as blind spots to decision makers in the government. The heads of industries and scholars are ill informed in this.

1.3 1.3 Research Questions

This study was conducted to answer the following questions:



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RQ1. How the production efficiency shapes the export performance and profitability of firms in the Hayatabad Industrial Estate?

RQ2. How adoption of technology affects export competitiveness and profitability in the Hayatabad Industrial Estate?

1.4 1.4 Research Objectives

In the light of above problem statement and research questions, the following objectives are designed:

RO1: To explore the impact of production efficiency on export performance and profitability for firms in the Hayatabad Industrial Estate.

RO 2: To assess about technology adoption boosts export competitiveness and long-term financial health for those firms.

1.5 1.5 Significance of the Study

This study has practical significance to different communities. The results can be used by policymakers to support such plans as the Khyber Pakhtunkhwa Industrial Policy of 2020 to 2030. The policy that focuses on creating strength is based on improving processes and digital transformations. The work provides valuable tips to the companies in the estate. They get to know that reaching to profit heights by just making minor management adjustments and cost-effective technology can be achieved. This also assists in their positioning in the world markets. Scholars get new figures on a subject that has not been covered much in Pakistan. That is concerning the performance of industrial areas. The information contributes to the comparative studies of the regions.

1.6 1.6 Scheme of the Study

Chapter 1 covers the background and the main problem. It includes the questions objectives and why the study matters.

Chapter 2 goes over key theories and past studies in depth.

Chapter 3 explains the methods for research and how to analyze the data.

Chapter 4 lays out the results. It talks about them against what others have found.

Chapter 5 wraps things up. It offers suggestions for policy changes.

2 Chapter 2: Literature Review

2.1 2.1 Introduction

Studies and practices that have been conducted always indicate that internal efficiency and technology competencies are significant to the long-run success in exports. In such countries as Pakistan where the manufacturing productivity has fallen behind other Asian states, it would be reasonable to take a closer look at what makes firms move at this level. By doing so, we will be able to enhance performance on the low level and will increase the trade outcomes on the larger level.

2.2 2.2 Empirical Literature

2.2.12.2.1 Production Efficiency

Research indicates time and again that the level of success of a firm in its internationalization depends on the effectiveness of its running of its production internally. This is particularly so among the small and middle sized businesses in developing hubs. A company must demonstrate the ability to manage capacity consistently and maintain quality in order to prepare to exports. A study by Shah and Ward as far back as 2007 demonstrated that

waste and costs are reduced through application of lean techniques such as reduction in inventory and correction of errors. It also prepares firms to be exported. Not to mention that an emphasis on quality such as that of Deming that were advanced in 1986 constructs trust with customers in foreign countries. It is this trust that keeps export deals alive.

The affiliation to the world manifests high here locally as well. In 2019, Siddiqui and Malik observed that Pakistani small firms that were more efficient in processes and had a higher export share (23 higher) than small firms that failed to keep pace. Such local evidence supports the reason why we are narrowing down to efficiency in the HIE set up. Also, high efficiency counters the weak areas of the system on the supply side. Lack of certifications of products and processes is one of the major problems keeping Pakistani export down. This is automatically fixed by the companies that operate tight and standard operations. They develop the documentation that is required to achieve quality that allows entry into superior markets in foreign countries. So, the component of the HIE firms which lacks in efficiency not only fights with the money but also maintains those certification walls. That tarnishes the image of the entire estate in quality.

2.2.22.2.2 Technology Adoption

Embracing technology does not only imply the replacement of the machines. It is a blending of sophisticated tools in the creation of things, information handling, and business management in an intelligent manner. The rewards of doing it the right way are quite high around the globe. In 2023, the OECD estimated that the export money increased by an average of 20 percent in companies employing Industry 4.0 items, such as automation, artificial intelligence, and big data analysis. Investing in this increases profits due to the expanded markets and improved and more cut-throat products. The companies are able to charge more and receive greater advantages, as Cassiman and Golovko provided in 2011.

In Pakistan, however, technologies are going at a slack pace. Expensive capital and intense phobia on risks contribute to that. In 2021, SMEDA estimated that only approximately 32 percent of small firms throughout the nation are utilizing sophisticated technology. That is a low threshold to remaining competitive. The importance of looking at HIE is that its performance regarding tech integration provides valuable information. Those are able to influence the effectiveness of national policies. Notably, new research in South Asia indicates that technological preparedness requires skills training among individuals as well. Employees must be able to work with AI and process digital information. That is the one that really tunes up activities and raises efficiency. In the case of HIE firms, the introduction of technology should be rated among the clever skills. It enhances efficiency in processes under RQ1 and maintains competitiveness on the high under RQ2. Through continuous organizational learning.

2.2.32.2.3 Export Competitiveness and Financial Sustainability of HIE firms

Export competitiveness implies the acquisition and retention of market share in a good manner. Financial sustainability implies maintaining profits and recovering in the long distances. Expansion to international markets enables the local firms to expand. That has a direct positive effect on profitability. In the case of HIE, financial health depends on inner mechanisms to protect massive external blows. Such situations as the malfunction of infrastructure, the wild fluctuations of the energy prices, or the rapid alteration of the rules are frequent. The IAP addresses them by negotiations with the provincial government.

Flexibility in skills through technology becomes a necessity in such a wobbly structure. Flexibility to deal with ups and downs is developed by firms that adopt high amounts of tech. That holds money firm beyond short term profits. The higher performing exporters tend to be the most knowledgeable and equipped such as foreign owners so that they can acquire smooth running to sustain international deals. In addition, the extent to which HIE is as one cluster to the bottom line of all firms. In case of failure of many units or morbidity, it puts the entire place at a risk. This is the reason why the IAP



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drives towards group fixes such as shared labs and testing points that are certified. It refers to an obvious necessity to increase the level of basic quality and technology. It aims at countering more powerful groups in the area.

2.2.42.2.4 Export Competitiveness and Profitability in HIE.

This writing clarifies that the two factors influence profits in a varying manner. Productivity is directly connected to increase in short run profits. It achieves this by keeping the cost low and increasing the margin. The 54 percent of HIE companies that are efficient exploit this advantage to price accurately on the global arena. They maintain their finances firm as well. That solidity is essential in making entry into export markets.

On the other hand, adoption of technology results in long-term profits. It achieves this through the addition of high value. The 41 percent of the firms that have high adoption become a part of special global chains. Such chains demand current inspections of quality, precision of production, and digitally tracking. Getting into it is a source of a constant inflow of money and long-term financial security. The low tech groups, at only 16 percent, are left out in the majority of this. The expensive cost barriers that prevent the slow ones to embrace tech place them in price wars in low-end markets. That causes weak points constructed and reduced edge in general. This trend actually demands immediate policy interventions to inject finances to upgrade technology. Such aspects of funding as the long-term financing model of the Export-Import Bank, the E-LTFF, meet the requirements.

2.3 2.3 Theoretical Underpinning

The research has been undertaken through a theoretical framework which is a combination of two theories of strategic management. They are the Resource-Based View or the RBV and the Dynamic Capabilities Theory or DCT. The theories assist in the explanation of how the internal elements of a firm, including efficiency of production and adoption of technology, contribute to the development of sustainable competitive advantages in foreign markets and increase in profitability.

Resource-Based View of RBV is a product of the work of Barney who carried out a study in 1991. It proposes that a company can have a long-lasting competitive edge brought about by the internal resources and capabilities. These have to be valuable, rare, difficult to imitate, and easy to replace. Within the HIE, or Hayatabad Industrial Estate, production efficiency can be considered the primary manifestation of RBV. The resources in this case include the physical assets, human capital, and accumulated knowledge. Skilled individuals and low wastage due to lean production line give an efficient production line. This makes it a VRIN resource. It allows the HIE firms to compete effectively in terms of cost and quality variations. The 54 percent of HIE firms that have high efficiency success is consistent with RBV. It demonstrates the way they organize tasks with the help of processes and skills. They allocate resources in an efficient manner to save on cost and better market positions.

Nevertheless, it is possible to create a fixed advantage by relying solely on the present efficiency. As the case of efficiency of old machinery (9 percent of critical laggards of HIE) illustrates, the risk of the efficiency under the influence of market changes and technology changes is real. This requirement introduces the Dynamic Capabilities Theory or DCT of Teece and others in 1997. DCT examines how the firms identify opportunities, seize them through innovation, and redesign the resources. This retains benefits in volatile, dynamic markets. That is compatible with the wobbly geopolitical and economic structure in KP.

Adoption of technology makes DCT go into operation. The introduction of modern tools such as automation, Enterprise Resource Planning systems or Industry features facilitate the learning in the organization and rapid changes. This flexibility can assist HIE firms to respond quickly to evolving international requirements and buyer demands. It leads to increased export incomes. Recent research emphasizes that technology can only have real competitive advantages when it is combined with organizational capabilities. Management control systems come in handy here. They ensure that investments in technology enhance employee skills and learning within the company. Therefore, when the HIE companies decide to invest into



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technology, it is a change. They are no longer at a risky cost-oriented position, which is founded on the static RBV, but at a more difficult, value-oriented competitive position under DCT.

2.4 2.4 Research Gap

Many studies in the world support the direct relationship between efficiency, technology and export outcomes. However, a major gap is still present with localized, firm-based data that is centered on the Hayatabad Industrial Estate in KP. HIE has an exception with its combination of industries, which are mostly low-tech small and medium enterprises. It is vulnerable to infrastructure deficit and extreme up and down the market because it is located. This paper bridges such a gap immediately. It provides policy-makers with particular quantitative information about the KP Industrial Policy.

2.5 2.5 Summary

The literature review establishes a good theoretical foundation in the study. The Resource-Based View is the ability of competitive advantage to be locked in on production efficiency. The Dynamic Capabilities Theory is a strategy that creates a long-term success and a strength through technology adoption. Practical evidence indicates that it is paramount to enhance local operations and invest in technology in Pakistan. They can assist in overcoming such supply-side problems as persistent certification problems and low nationwide adoption of technology. These essential aspects are measured in the next chapter on the approach of the measurement of the HIE cluster.

3 Chapter 3. Methodology

3.1 3.1 Introduction

In this chapter, the methodological set-up of investigating the drivers of the export competitiveness in the Hayatabad Industrial Estate, or HIE, is laid out. It explains how data was collected and analysed in a step-by-step manner. This provides a clear and repeatable perspective of research steps. The chapter begins by justifying the selected quantitative, descriptive and survey-based design. It demonstrates the reason why this suits the objectives of this study. Subsequent sections discuss population, and sampling procedure, the data collection instruments and procedures, and the descriptive data analysis procedures. It concludes with restrictions in design. It simultaneously validates the strength in providing empirical evidence to provide answers to the research questions.

3.2 3.2 Research Design

The research design employed in the study is quantitative, descriptive, and a survey research design. This option will enable us to have a clear, objective picture of the prevalence and the strength of the key export factors among HIE firms. The descriptive method is based on the frequency counts and percentages. It is suitable to a narrowed case study in a field where there is limited research still. This increases the utility of outcomes to policy and is comprehensible to organizations such as KPEZDMC and the IAP. The core objective of the design is to gauge the degree to which the firms adhere to the operational standards of efficiency. It also measures their contribution towards modernisation of capital by using technology.

3.3 3.3 Population and Sample

The entire population consists of all the manufacturing units within the Hayatabad Industrial Estate, or HIE. This has been estimated to be in excess of 400 companies in key industries such as textiles, pharmaceuticals, food processing and packaging. One hundred and twenty firms were obtained through random selection. This has provided equitable coverage in those major industries. The random approach maintains the validity of the results within and without of the HIE cluster. It is important to consider the aspects that have high values such as pharmaceuticals. Such companies may require a higher level of technology. They were also very aggressive in such infrastructure demands as common labs.

3.4 3.4 Data Collection



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Structured questionnaires were used to provide primary quantitative data. In order to ensure the validity of the measures to the concepts, the items of the hidden variables were obtained based on previously tested scales. To be efficient in production, they measured such metrics as waste reduction and process mapping elicited by lean production equipment in 2007 by Shah and Ward. On technology adoption and its association to going international, Cassiman and Golovko scales of 2011 were employed. The data was initiated at 5-point Likert scales. However, to give final descriptive report it reduced to three levels. High, moderate, low aided to make the prevalence rates understandable and interpretable by policy groups.

3.5 3.5 Data Analysis

Simple descriptive statistics were applied in analyzing the data that were collected on the questionnaires. These statistics are frequencies, percentage, and summary tables. This method will assist in making the patterns, trends, and distribution of the responses of the firms being studied in the Hayatabad Industrial Estate (HIE) clearly defined. The descriptive analysis would be appropriate in this research as the primary aim is to comprehend how the production efficiency and adoption of technology manifest themselves across companies and the relation of these variables to the export competitiveness and profitability.

All the responses of the completed questionnaires were initially checked, arranged and coded. The data were coded after which a spreadsheet was used to process the data. The generation of descriptive results was then created to describe the nature of the firms and the most important variables of the study. These variables are efficiency in production, adoption of technology, competitiveness in export and profitability. The analysis enables one to easily compare groups of firms based on their high, moderate or low efficiency and respond to the research questions in a coherent and systematic manner.

4 Chapter 4: Findings and Discussion

4.1 4.1 Introduction

The chapter provides and discusses the results of a survey conducted on 120 manufacturing companies in the Hayatabad Industrial Estate (HIE). It gives us a clear picture of the present situation of the cluster in terms of two key variables to successful export performance; efficiency in production and technology adoption. To achieve credibility of data, the chapter begins by describing the sample demographics and the profile of the respondents. The key results are then identified and presented in the form of tables and graphs. Every group of findings is supplemented with a descriptive discussion which relates the findings to the theoretical models- Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT) and literature which has been reviewed in Chapter 2. This will mean that the findings will be analyzed in terms of their theoretical and practical implications to the export competitiveness of HIE.

4.1.14.1.1 Sample Demographics and Structure

A total of 120 randomly selected manufacturing firms found in the Hayatabad Industrial Estate formed the sample of the study. This choice helped to represent the industries like textile, pharmaceutical and food processing. In the questionnaire of the survey, even though the total sample was 120, there was no specific data on the gender of the owners or lead managers of the surveyed firms. This lapse represents a more systemic problem of collecting data despite the provincial policy being to promote the interest of women in industrial work and workforce towards more widespread economic objectives.

4.1.24.1.2 Profile of Surveyed Firms and Respondents

In this study, a random sample of 120 manufacturing firms in Hayatabad Industrial Estate (HIE) has been used as a basis of conducting the study. The sample was stratified so that it represented the various important industrial sectors such as textiles, pharmaceuticals, food processing, and packaging.

The questionnaire was administered orally to the key decision-makers in respective firms to ensure the quality of the data. The respondents were the following positions:

- **Business Owners / Chief Executive Officers (CEOs): [30%]**
- **General Managers / Factory Managers: [45%]**
- **Production Managers / Operations Managers: [25%]**

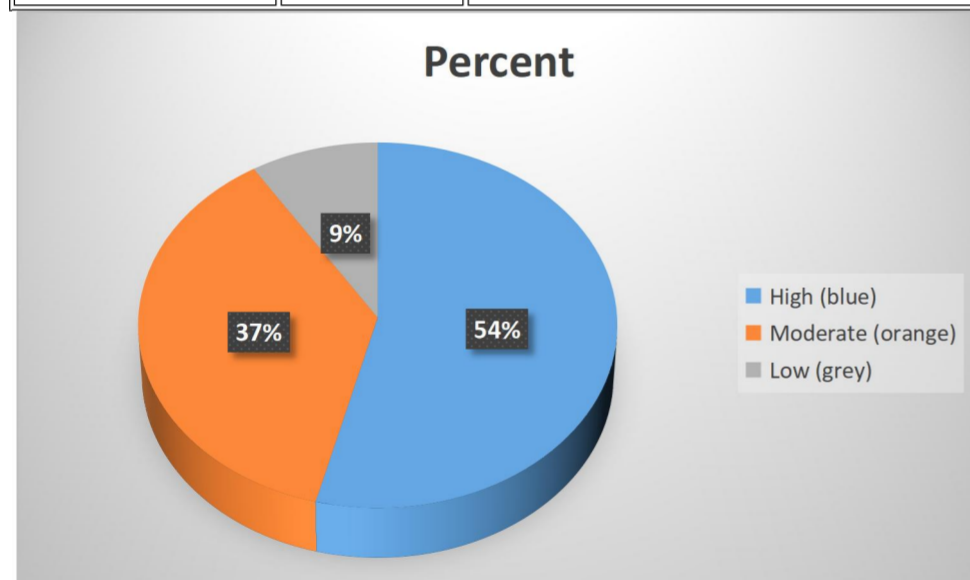
This approach ensured that the data on production efficiency, technology adoption, and financial metrics came from individuals with the highest operational knowledge and authority in their organizations.

4.1.34.1.3 Production Efficiency

Production efficiency was measured by looking at the adoption of internal lean practices, waste reduction initiatives, and effective process control within the sampled firms.

4.1.4 Table 4.1: Observed Production Efficiency Levels in HIE Firms

Efficiency Level	Percentage	Implication
High	54%	Firms saved costs, improved delivery, better positioned in foreign markets.
Moderate	37%	Struggled with occasional process waste; stable but not highly competitive.
Low	9%	Critical inefficiencies reduce profitability and export readiness.



Graph 4.1: Visualization of Production Efficiency Levels

4.1.54.1.4 Discussion: Production Efficiency

It is deemed as a strength of the industrial cluster that most of the HIE firms (54% have been able to realize high production efficiency). This achievement endorses Resource-Based View (RBV) in that these companies are adept at maximizing their available resources, reducing their operating expenses and acquiring a cost-based competitive advantage. The result is the higher level of operational efficiency, resulting in shorter delivery times and a more reasonable cost environment in the foreign market, which is aligned with the results of Shah and Ward (2007) and Siddiqui and Malik (2019). Nevertheless, the percentage of the minority group that records very low efficiency (9%) poses a serious burden to the potential of the cluster. Such companies experience simple productivity problems in most of the cases because they operate using old machines. This population is

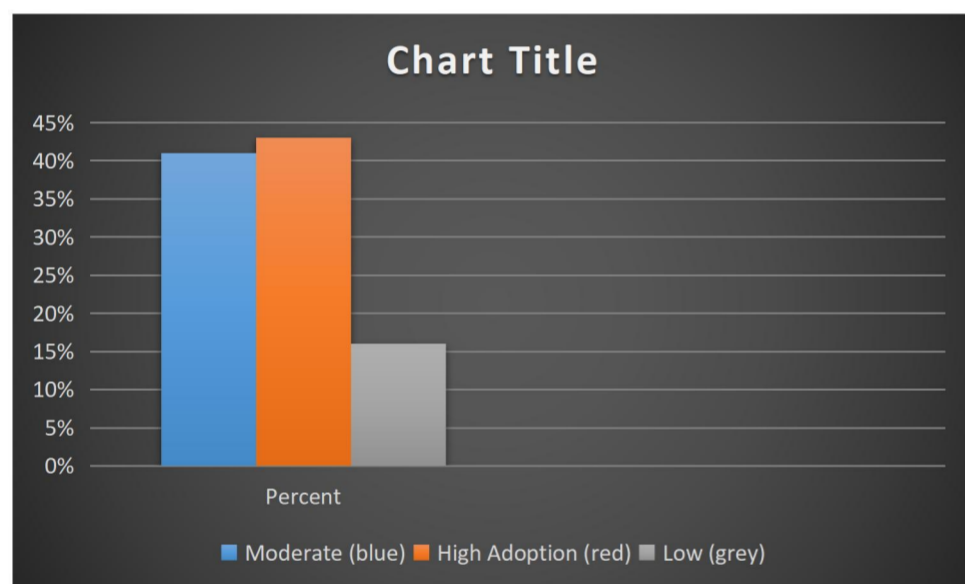
economically disadvantaged and reflects the current issue of the sick industry in HIE that IAP aims to solve. Companies that fail to comply with minimum quality standards add to the current problems associated with supply-side, such as non-certification. Thus, the 9% should be targeted to be intervened in order to enhance the overall credibility and performance of the HIE cluster in the international markets.

4.2 4.2 Technology Adoption

Technology adoption was assessed by examining the integration of managerial systems (like ERP), automation tools, and modern equipment into the firms' core processes.

Table 4.2: *Observed Technology Adoption Levels in HIE Firms*

Adoption Level	Percentage	Implication
High Adoption	41%	Firms using ERP, automation, or modern equipment reported better sustained export contracts.
Moderate	43%	Partial adoption (some IT/software, limited automation) useful but not transformative.
Low	16%	SME-dominated segment without technology, blocked from high-value exports.



Graph 4.2: *Visualization of Technology Adoption Levels*

4.2.14.2.1 Discussion: Technology Adoption

This is due to the degree to which the technology is being adopted, which indicates a major structural problem to the long-term sustainability of HIE. This high adoption rate, which is 41 percent, is encouraging and fits the world trends in OECD Organization of Economic Co-operation and Development (2023) that indicate a profitability increase through Industry 4.0 applications. Nonetheless, the representation that 59 percent of the companies (43 percent moderate and 16 percent low) are lagging behind suggests a significant breakdown in the formation of Dynamic Capabilities (DCT) Dynamic Capabilities Theory required to achieve resiliency in the long run. Among the major discoveries is the 13-point difference between high efficiency rate of 54% and the high adoption rate of 41%. This gap indicates that a large number of HIE companies are streamlining their fixed resources (efficiency/RBV) Resource-Based View but are unwilling or incapable of making strategic investments in resiliency adjustment (technology/DCT). A short-term operational efficiency that was not accompanied by modernization is a threat to the competitive capacity of the cluster as technical standards across the world are changing. The low adoption segment of 16 percent has severe capital constraints as their cost barrier is a significant constraint. The group is concerned with lower-value exports and represents a nationwide issue of low SME Small and Medium-sized



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Enterprises technology integration described by SMEDA (2021) Small and Medium Enterprises Development Authority. These companies require dedicated and sponsored long-term funding to acquire the equipment which is required to support the current demands in production, and begin the necessary process of education on the use of technology. In the case of the 43 percent moderate adopters, special attention is required to change them into full adoption to ensure that they are able to fully adopt technology to change their operations in ways that will make a big difference.

5 Chapter 5: Conclusions and Recommendations

5.1 5.1 Introduction

The chapter concludes the research by giving a summary of the key findings of the Hayatabad Industrial Estate (HIE) in order to provide explicit conclusions and recommendations to be taken. It is a step further to the descriptive analysis in the preceding chapter by attempting to explain what the data tells us about the key determinants of export competitiveness. The chapter begins with a clear answer to the research questions, which confirms the occupational uniqueness and complementary nature of the factors production efficiency and technology adoption as defined by the Resource-Based View and the Dynamic Capabilities Theory. It next explains the strategic problem of key significance found in the research the Efficiency-Technology Disconnect, and it puts it in context as the major challenge of the future of the cluster. Based on this diagnosis, the chapter presents a list of concrete recommendations to several important stakeholders, such as firms, government and financial institutions and industry associations. It is intended to offer a clear policy and practice plan that is intended to bridge the identified gaps and lead the HIE cluster to financial sustainability and higher levels of export performance.

5.1.15.1.1 Conclusion

The study provides sufficient evidence on the various functions that the production efficiency and adoption of technology play in the determination of the profitability and export competitiveness of firms in Hayatabad Industrial Estate. The results demonstrate that the efficiency of production is the key to the short-term financial sustainability, which facilitates the competition on the same level due to the cost decrease, which confirms the premise of the Resource-Based View. High efficiency rate of 54% in HIE is a good asset to the organization. Nevertheless, the review indicates that the use of technology is important in financial sustainability in the long-term and the ability to access high-value export markets. The 41 percent of highly integrated firms are effectively forming the Dynamic Capabilities to respond to changing markets and gain stable contracts. The Efficiency-Technology Disconnect is threatening the strategic health of the cluster because the gap between these two figures is 13 points. Although the cluster is doing a very good job at keeping prices down, the concerted effort to not invest in technology has a large percentage (16% critically low adoption) risking falling behind. This low adoption segment is unable to reach high-value markets and is directly a cause of the instability that is being pointed to by the IAP being concerned about 400 sick industries. The current financial barrier of costs that does not allow adoption of technology is not only a problem of micro-firms, but a policy system failure that is supposed to allow capital to grow and upgrade technology in the long run. The HIE cluster will be at risk of further downturn unless the 16% lagging firms and the 43% moderate firms can be assisted with the help of targeted interventions to move towards strong technology adoption and achieve their economic goals of the KP Industrial Policy (202030). It should stop considering the efficient as the only policy focus but consider the capital investment required to achieve dynamic resilience.

5.2 5.2 Recommendations

To successfully shift HIE from a static, cost-focused base to a flexible, value-focused cluster, comprehensive interventions from multiple stakeholders targeting cost barriers and infrastructure gaps are necessary.

1. Recommendations for Firms



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The companies must take a systematic, incremental strategy whereby the current efficiency is transformed into strategic technology expenditure:



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- **Institutionalize Continuous Improvement:** The companies of moderate efficiency are to institutionalize lean management instruments (such as Kaizen and 5S principles) to ensure the cost minimization is always at the same level to create the internal capital that can be used in the further investment into the technology.

- **Prioritize Affordable Digital Integration:** The initial activity that firm should pay attention to is the integration of low cost, yet effective, digital technologies, e.g., the simplest ERP or specific quality control software. This will enhance process management and data transparency, which will make the organization ready to automate its expensive processes later.

2. Recommendations for Government and Financial Institutions

The systemic cost barrier should be actively prevented by the government:

- **Enhance E-LTFF Accessibility:** The Export-Import Bank of Pakistan (EXIM Bank), that runs the Long-Term Financing Facility (E-LTFF) ought to simplify the process by HIE firms willing to make technology upgrades. This plant is used to import machinery that is required to fight technical obsolescence in the 16% low adoption market.

- **Streamline Regulatory Processes:** An environment of one-window facilitation has to be met by the government to the needs of the industry. With a reduction in bureaucratic time in financing application (such as E-LTFF) and the establishment of regulatory approvals, technology investments will accelerate.

- **Provide Technology-Linked Fiscal Incentives:**

The KP government is advised to offer tax relief or subsidies to proven investment in modern equipment or digital systems because this will provide invaluable support to SMEs whose initial costs are high.

3. Recommendations for Industry Associations (IAP/KPEZDMC)

Industry associations must focus on collective investment to share technology access and elevate the cluster's standards:

- **Establish Shared Technology Hubs (STHs):**

KPEZDMC should lead the creation of STHs, potentially through public-private partnerships, to provide shared access to modern, expensive equipment like testing labs or advanced manufacturing tools. This approach addresses cost barriers for SMEs by allowing them to pay usage fees instead of full ownership costs.

- **Targeted Training and Certification:**

The industry associations ought to arrange collaborative training programs that integrate lean management techniques with digital skills that emphasize the way of utilizing the information and AI-generated insights in production optimization. Simultaneously, they should encourage international product and process certifications that will assist the HIE firms in solving the problems with the quality standards that have existed since times immemorial.

5.3 Table: *Framework for HIE Cluster Modernization: Roles and Responsibilities*

Recommendation Target	Action Area	Mechanism/Policy Linkage	Targeted Outcome
Firms	Organizational Learning (DCT)	Adoption of Kaizen, Integration of affordable ERP/Software.	Improved process control; Enhanced adaptive capacity; Internal capital generation.

Government (Financial)	Reduce Capital Barrier	Streamlined E-LTFF access; Tax relief for tech investment.	Finance technology upgrades for the 16% laggards; Achieve KP policy modernization goals.
Government (Regulatory)	Policy Certainty	Implementation of one-window facilitation; Timely approval of infrastructure projects.	Reduced bureaucratic overhead; Increased confidence for private capital investment.
Industry Associations	Resource Pooling	Shared Technology Hubs (STHs), Joint Pharma Lab; Sector-specific certification training.	Democratized access to high-cost assets; Overcome lack of product/process certification.

5.3 5.4 Future Recommendations

Although this research has given important understanding regarding the associations amidst production effectiveness, embracing technology and export competitiveness within the HIE, it also creates a number of clearings to explore the research even further. This foundation can be used in future research to develop knowledge and broaden the analysis.

1. Longitudinal and Causal Analysis:

This research is a key milieu of the conglomeration of HIEs. Cause-effect relationships are hard to discover and a longitudinal study that follows the same firms over a period of 5-10 years is needed to identify these relationships. It could be, for instance, a work that explores the direct relationship between current productivity and future decisions on adopting the technology and how both variables interact to affect the eventual growth of export and financial sustainability. This would not be just a correlation to seek obvious cause-and-effect routes.

2. Widening Geographical and Sectoral Scope:

Moreover, to increase the overall generalizability of the results, the comparative cluster analysis should be used in the future. It may be useful to compare the HIE with other industrial estates in Pakistan-such as in Punjab or Sindh-or with other similar clusters in other developing countries-such as Bangladesh or Vietnam-in order to find out some context-specific issues and achievements. Moreover, more sectoral deep-dives, such as targeting the pharmaceutical sector or textile sector within HIE, might result in more sector-specific policy suggestions that might suit the specific supply chain and technological needs of the industry in question.

3. Qualitative Investigation of Implementation Obstacles

It is strongly advised to use a mixed-method approach. The detailed qualitative study involving case studies and semi-structured interviews with the owners of the firms, their managers, and policymakers may contribute to the identification of the cause of the quantitative statistics. The interesting, qualitative data would give information on the perceived risk of investing in new technology, the actual effects of bureaucratic red tape, and social and managerial rejection of new processes and technologies.

4. Investigating Dimensions of Gender and Inclusivity:



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Gender participation is one of the gaps in data as revealed by the sample demographic. The role of women in industrial leadership and entrepreneurship in the HIE and other similar clusters should be the conscious effort of future research. Research on the relationship between management gender diversity and innovation, adoption of technology, and the performance of exports would be an important contribution to the academic literature and inclusion as an industrial policy.

5. The Role of Digital Supply Chains and Market Linkages:

In this analysis, emphasis was made on the internal abilities of the companies. Further studies need to be conducted on the external connection in respect of how Digital Supply Chain platforms and incorporating e-commerce can influence the export competitiveness of HIE firms. The potential extension of this work would be a rational and significant investigation into how SMEs may use the digital tools to connect directly with international buyers and, in addition, to resolve the problem of logistics and consider the regulations that regulate the cross-border trade activities.



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6. Deepening the Analysis of Sick Industries:

A dedicated study on the profile and revival pathways for the 16% of firms with critically low technology adoption and the 9% with low efficiency is crucial. Research focusing on the specific financial, managerial, and operational bottlenecks that these sick or at-risk units face could design targeted turnaround strategies, which is essential for the overall health of the cluster.

5.4 5.5 Summary

This paper comes to the conclusion that production efficiency is the foundation of the current viability of HIE whereas the future growth and sustainability of HIE depend on the adoption of technology. In order to bridge the identified gap, joint efforts are required:

- Companies need to make constant improvement institutional and pay attention to low-cost digital solutions.

Access to specialized financing (e.g., E-LTFF) Export Long-Term Financing Facility and offer technology-related incentives should also be enhanced by the government and financial institutions.

Industry associations should be at the forefront in developing Shared Technology Hubs and training to improve the overall standards of the cluster.

The lack of such targeted activities leads to the further weakening of the HIE cluster and deteriorated the purposes of the KP Industrial Policy. This study gives the facts to formulate successful policies and company strategies.

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7 Questionnaire

Study Title: The Determinants of Exporting Firms and Their Impact on Profitability:

A Case Study of Industrial Estate Hayatabad KP

Introduction for Respondent:

Dear Participant,

This questionnaire is part of an academic study to understand the relationship between production efficiency, technology adoption, and export performance in the Hayatabad Industrial Estate. Your responses will be kept strictly confidential and used only for academic purposes.

Thank you for your time and contribution.

Section A: Demographic Information

(Please tick ✓ the most appropriate answer)

1. **Gender:**

Male Female

2. **Age:**

Below 25 25–34 35–44 45–54 55 and above

3. **Educational Qualification:**

Matric/Intermediate Bachelor Master MPhil/PhD Other: _____

4. **Designation:**

Owner Manager Supervisor Other: _____

5. **Firm Age:**

Less than 5 years 5–10 years 11–15 years Above 15 years

6. **Number of Employees:**

Less than 10 10–49 50–99 100 or more

7. **Industry Type:**

Textile Furniture Food Processing Engineering Other: _____

8. **Annual Sales Revenue:**

Below PKR 5 million 5–10 million 11–20 million Above 20 million

9. **Export Status:**

Exporting non-exporting Planning to export

Section B: Lean Manufacturing Practices



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(Please indicate your level of agreement using the following scale)

Scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

B1. Just-In-Time (JIT) Practices

1. Our firm produces goods only when there is customer demand.
2. We maintain low inventory levels to reduce waste.
3. We deliver materials and products only when needed.
4. We continuously monitor production schedules to minimize idle time.

B2. Continuous Improvement (Kaizen)

5. Employees are encouraged to suggest ways to improve production.
6. We regularly review and improve our work processes.
7. Management supports continuous improvement programs.
8. Small, gradual changes are encouraged to improve efficiency.

B3. Quality Management

9. Quality is checked at every stage of production.
10. We use quality control tools to monitor processes.
11. Employees are trained to prevent defects.
12. We focus on customer satisfaction by improving product quality.

B4. Waste Reduction

13. We aim to minimize material waste during production.
14. Defective items are quickly identified and corrected.
15. We continuously reduce time and resource waste in operations.

Section C: Technology Adoption

(Please indicate your level of agreement using the same scale: 1 = Strongly Disagree → 5 = Strongly Agree)

C1. Use of Digital Technologies

1. Our firm uses computer systems to manage production activities.
2. We use digital tools (software or ERP systems) to track inventory.
3. Communication and coordination are improved through technology.
4. We use e-commerce or online platforms for marketing or sales.

C2. Investment in Technology

5. Our firm regularly invests in new production technology.
6. We upgrade our machinery and equipment to remain competitive.
7. Management supports technology-related training for employees.
8. We allocate part of our budget to technology development.



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C3. Innovation Capability

9. We use technology to design or develop new products.
10. Technology helps us to produce efficiently and reduce costs.
11. We apply modern tools to improve product quality.
12. Our firm quickly adapts to new technological trends.

Section D: Export Performance

(Please indicate your level of agreement using the same scale: 1 = Strongly Disagree → 5 = Strongly Agree)

D1. Export Sales Performance

1. Our export sales have increased over the last three years.
2. Our export market share has expanded recently.
3. Our firm has gained new international customers.
4. Our export sales growth is higher than competitors'.

D2. Export Profitability

5. Profits from export operations have improved in recent years.
6. Export activities contribute significantly to our total profits.
7. Export operations are financially sustainable.

D3. Export Market Development

8. We have entered new international markets recently.
9. We have improved our relationships with foreign buyers.
10. We have developed strong brand recognition in foreign markets.

Section E: Open-Ended Questions (Optional)

1. What challenges do you face in adopting lean manufacturing?
2. What are the main barriers to technology adoption in your firm?
3. How do you think the government can support SME exporters in Pakistan?

Response Format Summary

All closed-ended items (Sections B, C, D) are **measured on a 5-point Likert scale:**

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

References for Scale Design

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