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Edited by Nadeem Ul Haque & Faheem Jehangir Khan

# **RASTA: LOCAL RESEARCH LOCAL SOLUTIONS**

## **BUSINESS & MARKETS** (Volume XI)

Edited by Nadeem Ul Haque and Faheem Jehangir Khan



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# PART I

BUSINESS & MARKETS

*Research Papers*



# EMERGENCE AND GROWTH OF SMALL AND MEDIUM ENTERPRISES IN DAROGHAWALA INDUSTRIAL CLUSTER LAHORE

Muhammad Shafaat Nawaz and Rao Abdul Hameed

## ABSTRACT

This project scrutinizes the industrial ecosystem in the Daroghawala industrial cluster of Lahore. The project's scope primarily encompasses the examination of the emergence and growth of this industrial cluster, and the investigation into the dynamics of its small and medium enterprises (SMEs), their growth determinants, and their distinctive economic transaction patterns.

The initial phase of the research delves into the spontaneous evolution of Daroghawala into a vibrant and diverse industrial ecosystem. Influencing this development are factors such as urbanization trends, increasing growth in the automobile, steel, and iron industries, the ease of conducting business, and infrastructural accessibility. The study uncovers a historical record of the industrial units developed in this area making up an industrial cluster. Notably, the research emphasises the role of collective industrial entrepreneur associations in spearheading representation and negotiations within this area. This part of the research calls for more in-depth investigations into Lahore's unique industrial typologies and ecosystems.

The second part quantifies the causal effect of subcontracting from original equipment manufacturers (OEM) on the growth of SMEs operating within Daroghawala. The study finds that the enterprises which had higher OEM permanent clientage ratios grew rapidly in comparison to others. Interestingly, however, the study could not find significant evidence to suggest the nature of the relationship between SMEs' growth and their access to corporate loan availability and their research expenditures. It diverged from previous mainstream research but resonated with some studies in the Pakistani context. This divergence underscores the need for further exploration across diverse sectors and geographical regions in the country.

In the final phase, the research grapples with understanding formality/informality. Enterprises that develop outside planned industrial zones are usually labelled 'informal'. Through Daroghawala's economic flows, the study develops a robust transaction table showing intraregional commerce, international trade linkages, and considerable tax contributions by firms in informal clusters. These findings challenge conventional perceptions of their informality, further demonstrating their effective integration with formal economic sectors. The evidence of substantive financial flows lends credence to the structuralist school of scholarship on informality.



## 1. INTRODUCTION

This research explores a specific spatial phenomenon that routinely plays out in large Pakistani cities – unanticipated, spontaneously-formed industrial clusters that mostly comprise SMEs and ancillary land uses. These specialised urban districts house economic activities of various kinds but are mainly centered on manufacturing units of light industrial and consumer goods. Examples include farm implements, surgical instruments, leather products, automobile parts, and sports equipment. Most importantly, these places serve as organic economic centers providing many jobs and livelihoods even if developed in contravention of land uses specified by statutory master plans.

Punjab is Pakistan's most populous province and earns an estimated 22% of its GDP from the industrial sector which also employs 24% of the workforce in the province. Moreover, nearly 80% of the industries in Punjab are located in or near a city. The government has prepared formal industrial estates for planned spatial planning, but only 3.5% of the industries are located in these formal zones (The Urban Unit, 2018). A majority of industrial units, i.e., 96.5%, are developed in cities but outside any industrial zone presents a challenge for spatial planning of cities. However, official planning documents have missed any opportunity to prepare a policy for industrial clusters formed outside formal industrial zones. Since not identified as planned industrial districts in land use plans and government records, these clusters developed without direct support from the government (Haynes, 2012).

Even though industries develop in clusters outside the planned industrial zones, these industries still develop due to multiple supporting factors as this research will show. Therefore, we argue that location outside the formal zones must not mean that these places develop without any planning. The literature suggests that such places are a result of wide-ranging planning efforts carried out by multiple stakeholders that operate beyond the state.

Pakistan's industrial policy aims to harness employment generation opportunities in SMEs. However, the government's efforts are simultaneously limited by financial challenges to actively support SMEs through public funds and by the constraints of legal government operations (Ajmal et al., 2020; Hull, 2012). Urban experience in Pakistan suggests that the country has ubiquitous cases of ingeniously developed industrial areas that originated and continued to operate without direct government support. This research argues that comprehending the planning and organization of such industrial clusters can help pave the way for a locally grounded approach to industrial policy coordinated with the on-ground reality.

Lahore, with the fastest population growth rate in the country, has seen organic development of industrial clusters in and on the peripheries of the city. These clusters, though not developed to the perfect industrial standards, have been generating business and employment opportunities. These clusters present a great starting point for exploring the factors that have supported the establishment and survival of these SMEs. Furthermore, the investigation of these industrial clusters is an opportunity to explore and document the flows and linkages that tie these economic activities with the larger economic structure. Such investigation could provide an economic history of development in Lahore on a pattern similar to that noted by Cronon (1991) for Chicago's development as a regional trade hub, and Gandy (2002) for the role of New York's public infrastructure in the spatial organization of the city.

To document the factors that have caused the development of industrial clusters in Lahore, this study aims to provide insights for policymakers interested in encouraging SMEs in Pakistan. Moreover, the development of such enterprises in large Pakistani cities is an organic process taken up by the actors involved in their setup and organization. This study explains this process to enable the readers to better understand the spatial organization of Pakistani cities. Lastly, this study quantifies the monetary flow of the industrial clusters in Pakistani cities at four spatial scales, namely, intra-cluster, inter-cluster, regional, and international scale.



This research focuses on the following three study objectives:

1. To profile an industrial cluster to understand the industrial typology of such clusters in Lahore
2. To factor the industrial production change of the enterprises in Daroghawala to estimate the impact of different factors on industrial growth
3. To estimate the transaction of the Daroghawala industrial cluster at different spatial scales to document its economic linkages

These three research objectives, though closely interlinked, have their independent expositional background and methodology. Therefore, this report is divided into three sections. Each section explains the theoretical reason for the corresponding research objective. The methodology, data, analysis, discussion, and conclusion are further presented separately in each section to explain the outcomes of each research objective. However, before detailed sections, it is important to set the base by explaining the data and key points of interest for this report.

## Scope of Research

This research provides a profile of the industrial clusters in Lahore with the main focus on the Daroghawala industrial cluster. The report explains how this cluster emerged as a hub for industrial activity and the factors that contributed to its growth. Moreover, this report delves into the characteristics of enterprises in this cluster to quantify the factors that affect their growth or decline over time. Finally, the study constructs a transaction table showing the estimated monetary flows of Daroghawala enterprises within the cluster and outside the cluster at different spatial scales. While doing so, this study mainly focuses on SMEs even though some large-scale industries were interviewed for data requirements as explained in the next section.

SMEs have been defined differently by different organizations based on the number of employees, business turnover, and total assets. For example, the European Commission defines SMEs as those enterprises that employ less than 250 employees with total assets of no more than 50 million euros (Eurostat, 2022). On the other hand, the International Finance Corporation (IFC) defines SMEs as enterprises that have two of the following three characteristics: 10–300 employees, \$100,000 – \$15 million in assets, and \$100,000 – \$15 million in annual sales (IFC, 2022).

In Pakistan as well, the definition of SMEs varies. The SME bank defines a small industry as one that employs less than 10 employees and has less than PKR 100 million in assets, while industries with over PKR 100 million in assets are categorised as medium enterprises (Dar et al., 2017). Punjab Small Industries Corporation defines scale industries with respect to fixed investment. Industries with fixed investment of up to PKR 20 million excluding land and building are defined as small-scale industries. The State Bank of Pakistan (SBP) defines SMEs as ones that employ up to 250 employees and have an annual turnover of up to PKR 400 million (PERI, 2018).

Through comparative analysis of the definition of SMEs from around the world and the country, the Punjab Economic Research Institute (PERI) has suggested the following definition of SMEs: *“A small scale firm is considered as that firm which employs 5-19 employees and medium scale firm which employs 20-99 workers”* (PERI, 2018). This study takes up this definition because of its simplicity in identifying the scale of the industry. This research is based on primary data collection on previously undocumented industries. Taking PERI’s definition based on the number of employees provided the clarity to identify SMEs during data collection because industry owners usually share the number of employees more easily than assets.

While focusing on Daroghawala SMEs, the scope of this research is to prepare a grounded explanation for the making of industrial clusters in metropolitan Lahore without direct government support. The study identifies key characteristics that make a location favourable for such kind of industrial activity. Furthermore, the focus of this



research is on the growth factors of SMEs to find out which policy interventions could help such SMEs grow in future. Finally, this study seeks to engage with the scholarly debate on informality by highlighting the extent of monetary transactions. By doing so, this research seeks to demystify many generalised conceptions about informality that do not apply in the case of industrial clusters like Daroghawala. Hence, the scope of this research is to contextualise and explain an industrial cluster and its SMEs to bring their growth dynamics to the fore.

## Data and Methodology

Industrial clusters in Lahore do not have extensive data readily available for research. Therefore, this study was mainly based on primary data collection. There were different types of data collected for this study and used in various ways throughout the parts of this research. While the use of data for each objective is explained in the corresponding sections ahead, this introductory part explains all the data collected and used in this report.

The most basic data source for this study was the primary interviews of 175 SMEs in Daroghawala. All the interviews for this research were conducted after the IRB approval of the interview protocols. Appendix A lists the variables for which the data was collected during these 175 interviews from SMEs. Detailed interviews (the interview protocol is provided in Appendix B) from these SMEs produced both qualitative and quantitative data. The qualitative data was mainly used to find the reasons for the emergence and growth of SMEs in Daroghawala. The quantitative data on multiple variables was used to quantify the factors that affected the growth or decline of these SMEs, and their transactions at different spatial scales. The sample collected data from these interviews is shown in Appendix-C.

In addition to these 175 interviews, data of other kinds was also collected as required by different research needs. For example, detailed industrial land uses were noted through land use surveys to prepare industrial land use maps of key industrial clusters in Lahore. These land use surveys were the key to understanding the spatial extent and organization of these industrial clusters, and the spatial characteristics like area and location as explained in the further sections. Furthermore, while the original 175 interviews from SMEs were conducted only in the Daroghawala industrial cluster, an additional 60 interviews were conducted from other industrial clusters (10 from each of the other six profiled in this report). Hence, profiles of the industrial clusters in Lahore were created by conducting non-structured open-ended interviews from different industrial clusters. As should be clear from the further sections, these interviews were conducted in each industrial cluster separately for cluster-specific information. A list of questions asked from these different industrial clusters is included in Appendix-D. These 60 interviews (10 from each cluster) were conducted with different types of businesses in each cluster to get a due representation of the whole cluster.

Further, the construction of a transaction table to show the monetary transactions of Daroghawala enterprises at different spatial scales required the collection of data from other sources otherwise not included in the original 175 interviews. For example, those 175 interviews did not include data from large-scale industries in Daroghawala. Likewise, commercial businesses in the cluster supporting the industrial activity were also an inherent part of the transactions but their data was not collected during the original 175 interviews. Therefore, additional data on the pattern of the original interviews was collected from large-scale industries, and industry-supporting commerce in the cluster. The number of original 175 interviews (the sample size calculation explained in the following section) denoted 14 per cent of the total industries in Daroghawala as marked during land use surveys. A similar proportionate 14 per cent of the large-scale industries and industry-supporting commerce were, therefore, interviewed to complete the data for the transaction table. A total of 6 large-scale industries (~14% of 40) and 24 industries supporting commerce (~14% of 175) were conducted in addition to the original 175 interviews from SMEs. It was found that all the large-scale industries were also primary metal manufacturing industries. In addition to these different sources for data collection, 12 interviews were additionally conducted with key persons in Daroghawala who either had decades of experience in this cluster, were part of the Daroghawala Industry Owners Association (DIOA), or were a part of the association in the area.





The purpose of these interviews was to understand the history of the area and to validate our study findings through open-ended discussions.

In addition to these many primary data collection sources, this study also used secondary data sources from government bodies, namely, the Federal bureau of revenue (FBR), the Trade Development Authority of Pakistan (TDAP), the Pakistan Customs Department, and the local office of Deputy Commissioner Revenue. These secondary data sources were used in the construction of data with a limitation that the original data was not allowed to be shared, hence only the results of the analysis are presented in this study.

## Key Findings of the Study

This research makes several arguments, which are presented in the following sections. Key arguments are being summarised at the outset for the sake of brevity. This study focuses on the spontaneously formed industrial hubs prevalent in major Pakistani cities, particularly Lahore, that have often been overlooked in economic policies. From multiple clusters existing in metropolitan Lahore, this research takes Daroghawala as a case study to make its arguments. Firstly, this research argues that unlike state-driven Special Economic Zones (SEZs) with predetermined zones, such clusters organically emerged over time. Entrepreneurs in such clusters incrementally transform affordable agricultural land into manufacturing units in response to economic demands.

These clusters in Lahore do not strictly adhere to typical land-use zoning found in planned cities. They often intermingle commercial, residential, and industrial areas. This has resulted in certain benefits like reduced commuting times for workers who live nearby. These clusters feature diverse industries, ranging from small cottage industries to medium or large-scale units. Such diversity promotes resilience against economic shocks and encourages symbiotic industrial relationships.

Such clusters often have an associated body of entrepreneurs representing their interests, ensuring their collective voices are heard on various platforms. The example cluster, Daroghawala, grew in response to a surge in demand for products related to the iron and steel sector and automobile industry. Represented by the DIOA, this cluster now manufactures various metal products, some of which cater to Original Equipment Manufacturer (OEM) clients both domestically and internationally.

Historical and infrastructural aspects, such as proximity to the major connectivity infrastructure influence the choice of industrial clusters such as Daroghawala, as an industrial site. Over time, as residential areas surround these clusters, large industries migrate to newer urban fringes, leaving previous locations for trade. This study argues that SMEs in Daroghawala prosper when they work with original equipment manufacturer clients. However, we could not find significant evidence to comment on the impact of access to credit and research investments on SMEs' growth.

Based on the transactions table, this research argues that Daroghawala's primary metal manufacturing industries contribute significantly to the country's struggling economy, with an impressive transaction volume hinting at the value added by these enterprises. Monetary flows within the cluster and outside of it at different spatial scales, along with the amount of tax paid to the government, show that industrial clusters, such as Daroghawala, have huge economic potential to capitalise on.

## Limitations of Research

The limitations of this study were mainly due to the lack of preexisting data. As most of this study relied on primary data collected through interviews, the responses through other data sources could not be verified. While we have triangulated data as explained in the report, there were still instances where interviewees were trusted with the provided data. For example, they were asked about the amount of loan that they could avail for their



business and their responses were taken on their word.

Another key limitation of the research was the definition of the 'growth or decline' of SMEs. While growth or decline could be a complex term with its measuring method as a composite of its nuances, the lack of data did not allow for such a level of comprehensiveness. Therefore, we have used the change in the amount of metal processed as a proxy for the growth or decline of the enterprises. While this may certainly represent the change in their business capacity, it does not necessarily mean that a business with a reduction in processed metal declined. There could be cases where businesses grew even when the weight of metal processed decreased because they produced quality goods of lower weights. However, this quality-quantity trade-off could not be accommodated due to lack of data.

While this research provides valuable insights into Daroghawala's economic landscape, the findings are specific to this cluster. For broader application, further studies on other industrial areas are needed. This research certainly provides a base for future research, but further research will be required to explore the factors that enable SMEs to modernise their production process or secure stable clientage and the role of policy in facilitating such changes. Moreover, research will be needed to assess if the findings of this study can be replicated in other cases.

## 2. EMERGENCE AND GROWTH OF AN INDUSTRIAL CLUSTER

### Introduction

Lahore is a city of over 12 million residents with the fastest rate of urbanization in the country (GOP, 2017). The city has expanded rapidly over the past two decades. The city area increased by 27.41 per cent from 2000 to 2020 and is projected to increase by 23.15 per cent in the next two decades (Ahmad et al., 2023). The city area has been increasing at an annual growth rate of 3.81% (Javed & Riaz, 2020). Lahore is expected to become Pakistan's largest city by 2035 if it continues to urbanise at the same pace and proportion in comparison to Karachi.

After Karachi, Lahore is the hub of the second-largest economic activity in Pakistan. However, the annual GDP growth rate of the city has been higher than that of the country recently. The city accounted for 11.5 per cent of the national and 18.9 per cent of Punjab's GDP in 2014–15. With an estimated size of Rs. 1.23 trillion in 2014–15, the city economy grew at an annual rate of 6.7 per cent. After the services sector, the second major contributor to the city's economy was industry (LCCI, 2016).

Lahore is growing on each parameter: the population is increasing, the city size is expanding, and the economy is growing. For a city with such promising projections, the policymakers have an opportunity to make the best out of this city. Great cities of the world, as we see them today, have been actively shaped by their policymakers. Whether it is London or Chicago, city planning has been the key focus of policymakers for metropolitan cities (Abbott, 2020). Lahore has seen the most frequent efforts of city planning in comparison to any other city in Pakistan. There have been multiple city-scale planning efforts for Lahore. Specifically, there have been four pivotal urban planning documents for Lahore. These include the Master Plan for Greater Lahore (MPGL) 1966, the Lahore Urban Development and Traffic Study (LUDTS) 1980, the Integrated Master Plan of Lahore 2004–2021 (IMPL), and the most recent (currently under preparation), the Master Plan of Lahore 2050.

The MPGL represented the city's initial endeavour in organised urban planning. The plan proposed a greenbelt boundary around the city and the establishment of self-contained satellite towns to manage urban expansion. The next effort was LUDTS in 1980. This study suggested roads as the city's backbone, forming a rough grid pattern. The third effort was the creation of the IMPL in 2004. This comprehensive plan aimed to provide





land-use zoning regulation guidelines for the city. The latest planning effort is currently ongoing for the Master Plan of Lahore 2050. However, these planning efforts have been criticised by scholars for their inability to develop a nexus for the spatial dynamics of a complex city (Hameed & Nadeem, 2008; Hussain & Nadeem, 2021).

Lahore is a complex tapestry of diverse, often conflicting, developments. Multiple areas in the city diverge from formal planning systems and are, therefore, variously tagged as informal, illegal, or organic developments. The city's formal planning system fails to acknowledge cases where land activities are undertaken without the approval of the government bodies. Such activities are undertaken by two socioeconomic extremes. The city's elite often bypasses formal planning to construct their posh residential districts. Those at the socioeconomic ladder's lowest rung start activities outside the formal system because they are systematically excluded from it. The city's skyrocketing real estate prices, a byproduct of formal planning, exclude them from the formal land market. They resort to creating incremental developments resulting in unplanned yet organic working places for them.

Interestingly, these sections of the city, whether developed by the elite or the disadvantaged, find recognition within the formal planning framework. The elite leverage political access to legitimise their developments, while the less fortunate utilise their voting power to forward their agendas. Government bodies typically accommodate these communities by providing utilities and infrastructure, even awarding land tenure rights, especially during election periods. As such, Lahore's formal planning system, characterised by a top-down approach and institutional conflicts, has resulted in flawed urban planning in the city. Both the affluent and the impoverished choose to sidestep this system, adding layers of complexity to Lahore's urban fabric.

While the city is complex, the official bodies try to operate in a purely legalist manner following the rule of law. Policymakers see unplanned parts of the city as illegal or informal. These tags make those places undesirable and disadvantaged. The result is that such places remain ignored in the official documents even though thousands of Lahori citizens make and operate these places. Studying these informal parts of Lahore can offer valuable insights to enrich our understanding of the city.

The city of Lahore includes planned industrial districts such as Quaid-e-Azam Industrial Estate Kot Lakhpat and Sundar Industrial Estate. These officially recognised industrial areas are marked on the official urban planning maps prepared by government bodies such as the Lahore Development Authority. Likewise, other key industrial enclaves such as Railway workshops near the railway station are also marked as industrial activities. However, there are many other parts of the city where industrial activities exist in the city without an official status of industrial land. For such places, these official maps show general industrial use but do not provide any detail on them. The official documents do not provide any detail on the type of industrial activity, the organisation of those industries, the size or granularity of land uses in those areas, or the type of land use interactions by these industries. Without the availability of these details, these parts of the city are left unattended by the urban planning policies. A recent report has made a first-of-its-kind effort to map the industrial units in Punjab with useful insights, but the regional scale of the report does not offer disaggregated level details (The Urban Unit, 2018). This section of the report aims to study such important yet ignored industrial places in Lahore city.

## Literature Review

Scholars interested in the spatial organisation of cities have often tried to develop models to explain the location of different land uses. For example, the Chicago School developed critical theories on urban growth. In the 1920s, the Chicago School sought to understand how migrants from diverse backgrounds integrated into the urban society of Chicago. The sociologist Ernest Burgess proposed a model that visualised the city as a series of concentric zones, each characterised by the professions and socioeconomic status of its inhabitants. At the core was the Central Business District (CBD) followed by transitional zones of factories, residential areas, and outer suburbs. This model, however, was not static; as newcomers arrived, they created a ripple effect, pushing



established inhabitants further out in a process known as 'succession.' The model was visualised as moving from the city centre outward, symbolising the immigrants' journey from less affluent areas to more affluent suburbs (García, 2019).

This model became a paradigm for urban ecology, showing how urban organisation could be disrupted by incoming migrants. The Chicago School, thus, conceived of urban processes in a modernist manner, with the city centre as a formative force on the periphery. Subsequent researchers, such as Harris and Ullman, used and modified this model, introducing the concept of multiple nuclei and industrial zones at the periphery.

However, as cities continued to evolve, a new school of thought emerged, i.e., the Los Angeles School, focusing on postmodern urban planning. Los Angeles, a city developed not during the industrial era but in the age of the automobile and post-industrial society, represented this new urban reality. The city lacked a traditional centre and had a more fragmented, decentralised structure. The Los Angeles School proposed a representation of postmodern urban planning characterised by random processes and a discontinuous layout. This model symbolises the unpredictable, random nature of urban development in Los Angeles (Dear, 2003).

This fragmented model represents socially segregated urban enclaves and highlights the significant role that motorways play in personal mobility. It shows how the urban periphery is now free from the control of the city centre. Los Angeles has become a prototype of future urban development. Lahore is a city of area and population size comparable to Chicago or Los Angeles. The city shares a common feature with Los Angeles in that it developed in a postindustrial period. Yet the city includes multiple industrial clusters that include both the government-initiated industrial estates and others. The spatial organisation of these clusters in metropolitan Lahore has not been modelled before. While urban plans have shown the location of these clusters often on maps, they have ignored the modelling of their location.

The analysis of the location of industrial and economic districts has been done in different parts of the world. For example, (Haynes, 2012) explained the location of artisanal textile manufacturing in western India and (Babb, 2013) studied the making of precious stones manufacturing in Jaipur. Such scholars explore how sectorial economic activity tends to concentrate geographically and cluster in a physical space (Clark et al., 2003). These clusters, like many other abstract constructs, have been conceptualised by scholars in different ways (Martin & Sunley, 2003). For instance, according to Porter (1998), clusters are “... *geographical concentrations of interconnected companies and institutions in a particular field; these clusters represent a kind of new [sic] spatial organizational form.*” Such areas have been explained through the diamond model illustrating the comparative advantages of certain industries in given regions (Porter, 1990), or core-periphery models to spatially describe the comparative advantage that a metropolitan city has in comparison to its countryside (Krugman, 1991).

This literature investigates questions like the factors that make a certain location feasible for the existence of a particular cluster; the enabling factors and how can they be enhanced further; and how a specific location gets negotiated amongst changing technology and infrastructural provision. To answer these questions, studying the co-dependence of geography and networks has been a key avenue for research (Speldekamp et al., 2020). Scholars have documented market demand for products (Babb, 2013) along with prerequisites, triggering events, and self-augmenting processes driving the emergence of local clusters (Brenner & Mühlig, 2013).

The making and growth of the clusters have been explained in a variety of ways. The most prevalent and canonical, and possibly the earliest, work on the topic was the 1890 (later republished in 1919) *Principles of Economics* by Alfred Marshall. He studied industrial districts and argued that the industries colocated in the form of a cluster because of the three types of externalities: (i) a shared pool of suppliers and customers; (ii) a shared labour pool; and (iii) technological spillovers. His work was later elaborated by industrial location theorists of the inter-war period amongst whom Alfred Weber's location triangle illustrates a balance between market and different raw materials, while Edgar Malone Hoover's localisation economies explain the benefits of the existence of many firms in the same industry, which got the most attention for their work (Sforzi & Boix, 2015).



In the postwar period, the industrial location choices became disparate in many ways owing to the complexity of the technology as well as the effects of globalization. Regional economists, such as Walter Isard, through his location theory of explaining places as the location of economic activities (Sforzi & Boix, 2015), and Benjamin Chinitz through his thesis on small suppliers' impact (Glaeser & Kerr, 2009) studied these changes and extended Marshall's pioneering work by highlighting the difference between clusters and complexes. Other researchers like Michael Piore and Charles Sabel argued in their book *The Second Industrial Divide* that while mass production was the first divide in capitalist history, the second divide is the technology which can push industries to abandon mass production to adopt flexible specialisation. Finally, this school of thought advanced via the diamond model of regional competitiveness (Porter, 1990) in the last decade of the 20th century.

Alongside this line of enquiry, another viewpoint was suggested by Jacobs in her seminal book *The Economy of Cities*. This work resonated with that of Benjamin Chinitz's idea that urban agglomerations can adapt to maintain their competitiveness (Norton, 1992). In contrast to the Marshallian externalities, which focused on similar industries colocated as a cluster, Jacobs highlighted cases where industries apparently different from each other harnessed themselves via conglomeration. In other words, Jacobs's thesis observed economic diversification in an urban setting, while Marshall's promoted specialisation regardless of the location.

A path-dependent account for the evolution of clusters often centres on a geographical explanation because this approach takes historical evidence as the base for further developments of industrial clusters (Martin & Sunley, 2006). However, in contrast, the development of a cluster has also been documented to have a nondeterministic fashion of oscillation between various phases in opposition to path-dependence (Menzel & Fornahl, 2009).

This body of knowledge has continued to explore nuanced externalities that arise from these clusters (Delgado et al., 2014) like availability of a labour pool, interlinked services, infrastructure, and institutions. Likewise, scholars have noted the roles that actors of these clusters play in infrastructure provision essential to their business (Levy, 2017). Research has also demonstrated that these actors cleverly adapt the government's vocabulary to negotiate the presence of their businesses (Haynes, 1991).

This literature on the spatial organisation of metropolitan cities and the location of economic clusters in them offers points of investigation for this study. Spatial models described earlier to explain the city organisation, motivate the development of such a model for a growing city like Lahore. Moreover, the literature on economic clusters offers many possible insights for such modelling. Historical exploration for a path-dependent account of Lahore's industrial clusters is a promising avenue for research. Past research on industrial clusters in Punjab has highlighted that nearly 80 per cent of industries were located within the city boundary or near one, but only 3.5 per cent were located within planned industrial zones (The Urban Unit, 2018). However, an in-depth study of industrial clusters remains an untapped research avenue. Therefore, an analysis of the regional geographic factors promoting these industrial clusters makes a great point of investigation. With this review of the literature, this section of the report analyses the industrial clusters in Lahore to find a local explanation for the development of these areas.

## **Research Methodology**

### ***Case Study***

The emergence of industrial clusters in Pakistani cities is a contemporary phenomenon, and most of them are still in the making. This study is focused on an in-depth investigation of this contemporary phenomenon. However, this phenomenon needs to be examined within its real-world context because the boundaries between this phenomenon and its context are not clear. For example, the development of such industrial clusters has many linkages with other factors, such as infrastructural access and business links with other production centres. An exploration of such a context will help explain the phenomenon of industrial clusters. For exploring a



contemporary phenomenon in its context, the case study research is the most suitable research design (Yin, 2014).

The choice of case study research design was guided by the type of research objective. As already mentioned, this study focuses on profiling an industrial cluster to understand the industrial typology of such clusters in Lahore. There has been little mention of these clusters in any of the formal planning efforts. The fact that these clusters have existed in Lahore but have been almost entirely ignored by the formal planning is the gap that this study attempts to fill. Such clusters have also lacked representation in research so far.

### ***Daroghawala as a Case Study***

The phenomenon of bazaar industrial clusters is exemplified by multiple industrial clusters in metropolitan Lahore. This phenomenon needed an in-depth inquiry, regardless of the selection of a case study. However, these clusters are inherently complex, and this study cannot cover all of the nuances in enough depth. The details in such clusters were often also difficult to access because of the secretive nature of the business owners in these areas. Therefore, this study selected one such cluster – Daroghawala Lahore – as the area of inquiry so that the phenomenon of industrial clusters could be explored rigorously and in-depth.

Each industrial cluster could be a representative case of the phenomenon, but choosing one was due to several factors. The literature has continuously documented that actors in these clusters are secretive of their operations. Therefore, the biggest factor in the selection was the access to the study area. During the pilot study phase, the Daroghawala Industry Owners Association (DIOA) responded positively to this research endeavour and developed a sense of confidence and support for this research. This access to Daroghawala was the defining reason for the selection of this case study.

Daroghawala can be a key representative case of the phenomenon of industrial clusters in Lahore. Evidence for this can be found through many features found in these industrial clusters during the pilot study phase. Daroghawala exhibited similar features to other industrial clusters as is explained in the following sections. The research in the Daroghawala industrial cluster was conducted through a mixed-method research methodology.

### ***Methods of Analysis***

The use of remote sensing technologies for this research served the purpose of understanding the historic development timeline and pattern of Daroghawala as an industrial cluster. This included the temporal land cover change analysis. Moreover, land use surveys were performed to document the industrial typology with the classification of the primary metal manufacturing SME, ancillary metal-based cottage industry, and the commercial areas developed in the area to support the industrial activity. In addition to these tools, semi-structured interviews were conducted with key stakeholders of these industrial clusters. A total of 60 interviews were conducted from different industrial clusters to prepare the cluster profiles. These interviews included questions about the history of these clusters and the type and characteristics of industrial activities in these areas. Moreover, the case study of Daroghawala was investigated in depth by conducting interviews with those persons who have worked in this area for decades. The interview transcripts were later coded for analysis to develop a grounded theory for Daroghawala.

The use of grounded theory to understand built spaces is a recently acclaimed approach (Clarke et al., 2016). This approach is a part of the post-colonial and post-modernist (Vasudevan & Novoa, 2022) efforts to understand the lesser-represented built spaces in the scholarship through a lens of investigation guided by those places. As such, this approach calls for entering the study area without prejudices against the area that comes from the modernist theory of studying built spaces.



Without a pre-conceived opinion of the case study, the grounded theory suggests understanding the built spaces by learning from them. This approach encourages the researchers to observe and investigate the study area and then try to develop a theory from these observations. This approach was used to understand the built space of Daroghawala because it was an organically developed area, which needed its way of understanding. The stages of methodology for this section of research are presented in Table 1.

*Table 1: Methodology for Section 01*

No.	Methodology stage	References
1.	Choice of case study research	(Yin, 2014)
2.	Daroghawala as a case study	
3.	Use of land use surveys, remote sensing technologies and interviews	(Clarke et al., 2016)
4.	Grounded theory for case study	

## Findings and Discussion

### *Industrial Clusters in Lahore*

Pakistan had little to no industrial base when it became a country in 1947 with only 1 per cent of the country's national income being contributed by industries at that time (Ali & Malik, 2009). However, the country has slowly seen an increase in industrial activity. Lahore contributed 11.5 per cent of national income until currently and has a strong industrial base, being the second largest sector of income for the city (LCCI, 2016). Through land use surveys and interviews in different industrial clusters in Lahore, this study mapped the location of these clusters alongside the typologies of industrial activities in this area.

Industrial clusters in Lahore are shown in Figure 1. Each industrial cluster was mapped after the land use surveys. As should be clear from the map, the number of establishments in each cluster was documented alongside the interquartile range (IQR) of the age of enterprises and IQR of the area of enterprises in these clusters. Interviews in these clusters highlighted idiosyncratic features of each as explained in the following cluster profiles. We have made interpretive arguments about these clusters based on the qualitative analysis of the interviews conducted for cluster profiling.

#### *Misri Shah*

Misri Shah, located near the Railway Station in the north of Lahore, is a prominent trade hub for iron and scrap metal. With a history dating back to the 1960s, this area has witnessed significant growth and has become one of Asia's largest iron markets. The cluster is characterised by a wide range of businesses involved in the trade and processing of iron scrap, iron rods, motor spare parts, and various other products made from iron and other metals. These other metals include copper, aluminium, and lead.

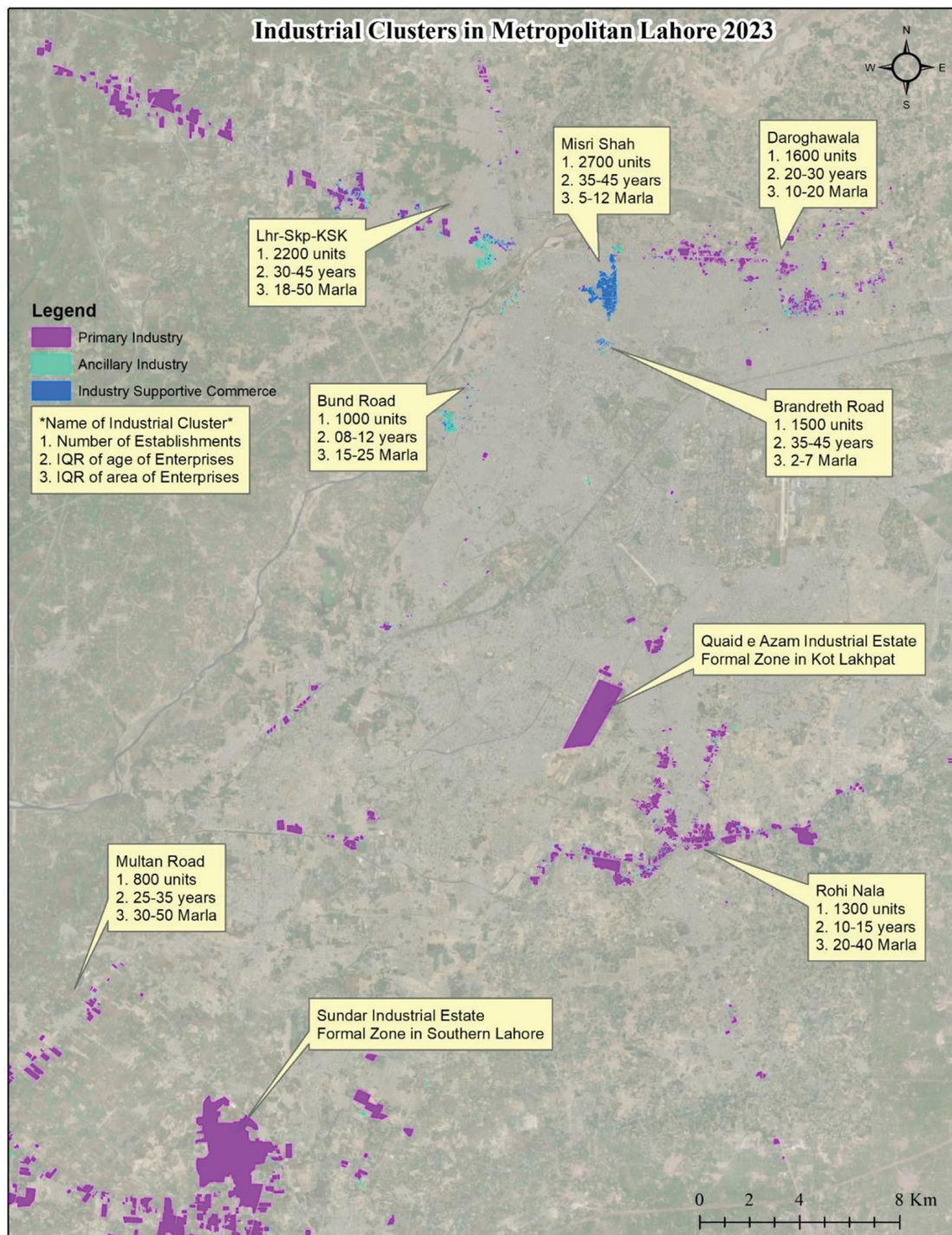
Initial industrial activity in this area was geared by Batala Engineering Company (BECO) later renamed PECO (Pakistan Engineering Company) in the 1970s. BECO was established in 1933 in Batala (a town now in the Indian Punjab). The presence of BECO in Lahore was only as a branch office before partition (1947). After the partition, however, BECO moved its key operations to the large land parcel left by the shifting of previously operating Mukand Iron & Steel Works Limited to Mumbai. Consequently, during the 1960s, the industrial activities in Misri Shah started to take shape when the land was cheap and mostly agricultural. As the industrial area expanded, scrap metal from all over the world found its way to this bustling market. The establishment of iron furnaces and

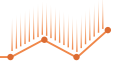


the presence of industries in neighbouring cities including Lahore, Faisalabad, and Gujranwala further fuelled the growth of trade activities in Misri Shah.

Misri Shah owes much of its reputation to its status as a major iron and related metal scrap market in Asia. Businesspersons in Misri Shah claim that around 80 per cent of Pakistan's iron and related metal scrap is sold and traded on this market. This percentage, however, needs further research for validation. Regardless, Misri Shah has become a hub for various metal-related products, including iron rods, TR guards, engines, motors, spare parts, and plastic materials.

Figure 1: Industrial Clusters in Metropolitan Lahore





One striking feature of Misri Shah is its diverse business landscape. The cluster hosts a multitude of businesses engaged in the trade of old iron items, imported iron scrap, and other recyclable products. This diversity ensures that customers can find nearly every type of scrap product made from iron and other metals within the cluster. From old chains and gearboxes to steel rods, scrap metal, and motor components, Misri Shah offers a comprehensive range of related goods. Misri Shah is close to Badami Bagh. The two areas, though with two different names, practically make up one big cluster. While Misri Shah is currently a hub of the metal scrap trade, Badami Bagh is the hub of the market for auto spare parts. Both areas include some manufacturing operations as well, but trade is the prime economic activity in these areas. The current manufacturing is majorly located around Amir Road and Khokhar Road.

While there is no single leader in the cluster, several major industry owners play a significant role in shaping its dynamics. These business owners, with their experience and expertise, contribute to the growth and development of Misri Shah and Badami Bagh as a thriving hub. The geographical location of the cluster has played a crucial role in its evolution. Situated near the historic walled city of Lahore, this area enjoys proximity to major transportation routes including railway, inter-city bus transport, and cargo services and, thus, easy access to markets. Its strategic location has made it an attractive option for industrial and commercial development.

This cluster is primarily focused on commercial activities rather than heavy industrial operations. While the area did witness industrial growth in the past, many industries, including major steel mills, have gradually moved out of Misri Shah. Currently, commercial activities, including trading and processing of iron-related products, dominate the cluster.

The cluster's workforce primarily consists of individuals who migrated from different parts of Pakistan. Businesspersons in Misri Shah claim that approximately 80 per cent of the workforce in Misri Shah originates from other districts of Punjab and other provinces. This migration has contributed to the cluster's cultural diversity and brought together a wide range of skills and expertise.

The average age of businesses in Misri Shah ranges between 35 and 50 years, with some establishments having been in operation for more than 50 years. While it is rare for businesses to change their core operations, they often adapt and expand their product offerings to meet market demands. In terms of education, the workforce in Misri Shah is generally limited in formal education but possesses extensive practical experience in their respective fields. Many individuals have completed their matriculation but have gained significant market experience over the years.

Regarding customer relationships, Misri Shah is known for having a mix of regular and new customers. Regular customers often have a good understanding of the products they seek, while new customers rely on the expertise of market professionals and business owners to guide them in their purchasing decisions. Trust and relationship building play a crucial role in transactions within the cluster. Credit transactions have been a common practice in Misri Shah, although cash transactions are also prevalent. The close-knit community of business owners and customers fosters a sense of trust and reliability, allowing for smooth trade and long-term relationships.

Over the years, the Misri Shah Industrial Cluster has faced some challenges. One of the primary challenges is the lack of modern infrastructure and facilities. The area has limited access to basic amenities such as proper roads, drainage systems, and waste management, which can hinder the efficiency of operations. However, despite these challenges, the industrial spirit of the cluster's stakeholders has kept the business activities thriving. Moreover, there are opportunities for collaboration and partnerships with international stakeholders in the iron and scrap metal industry. By leveraging technology and adopting modern practices, Misri Shah can enhance its global competitiveness and become a prominent player in the regional and international markets.



### *Brandreth Road*

Located in Lahore near the Railway Station, this cluster stands as a testament to the resilience and growth of the industry-related commercial sector in the country. With a history spanning over five decades, this vibrant market has evolved from a residential area to a bustling hub of hardware and metal businesses, earning a reputation as one of the largest and oldest industrial and trade clusters in Pakistan.

The roots of the Brandreth Road Industrial Cluster can be traced back to the pre-independence era when the area was predominantly vacant and available for industrial activity with cheap land. However, over time, the region witnessed a gradual transformation, particularly in the 1960s and 1970s, when infrastructural developments gave way to commercial activities. Today, this cluster serves as a thriving centre for the trading of hardware, power tools, hand tools, iron sheets, and a wide range of metal products. The area provides developed cargo services for trade not only inside Pakistan but also in other countries like Iran and Afghanistan.

Though this area is majorly a trade hub, there are still a considerable number of manufacturing businesses in this area, mainly around Sarai Sultan and Dil Mohammad Road. The business owners in this cluster take great pride in their long-standing presence in the market. Many of them have been operating their businesses for several decades, with some tracing their origins even before the formation of Pakistan. The average age of businesses within the cluster is around 40 to 45 years, with a few establishments boasting a rich heritage of over 60 years.

The success and longevity of the businesses in the cluster can be attributed to a combination of factors. First and foremost, the strategic location of the market close to the Railway Station plays a crucial role. Situated near other economic clusters like Misri Shah and Badami Bagh, the cluster enjoys easy accessibility for both customers and cargo due to its proximal infrastructure. Furthermore, the presence of Lahore's largest hardware market and Pakistan's biggest metal market has been a significant draw for businesses, attracting a steady stream of customers and fostering a competitive business environment.

This cluster caters to a diverse customer base, with clients coming not only from Lahore but also from across Pakistan. The market serves as a one-stop destination for a wide range of products, including hardware, power tools, hand tools, iron sheets, metal wires, and other products made from stainless steel, copper, zinc, and brass. With such a comprehensive product range, the cluster has earned a reputation for being a reliable source for various industrial needs. Moreover, this area is also a trade hub for imported industrial equipment and instruments.

In terms of business dynamics, the Brandreth Road Industrial Cluster demonstrates a combination of family-owned enterprises and a few independent business owners. Businesspersons in this area claim that family businesses make up a significant portion of enterprises in this area, with approximately 85 per cent to 95 per cent of the establishments falling under this category. These businesses have been passed down through generations, ensuring the preservation of expertise and knowledge within the market. This, however, leads to the difficulty of an outsider entering these older business lines.

Education levels among business owners in the cluster vary, with a focus on professional experience rather than formal qualifications. While education levels may range from matriculation to intermediate (FA), a significant emphasis is placed on the extensive experience gained over the years. Many business owners have spent a minimum of 10 to 20 years working in the industry, which has allowed them to develop a deep understanding of the market and its intricacies.

Owners here usually boast a loyal customer base, with regular customers forming the backbone of many businesses. Customers trust the quality of the products offered and maintain long-term relationships with the business owners. These relationships, built on trust and reliability, contribute to the continued success of the cluster. The cluster primarily relies on cash transactions. While some businesses may accept bank transfers or





cheques from established clients, cash remains the predominant mode of payment. This preference for cash transactions is common in many traditional markets in Pakistan, where it allows for immediate settlements and facilitates quick business operations.

The area witnessed significant growth and evolution over the years. Businesspersons claim that in recent times, there has been a gradual shift towards modernisation and embracing digital technologies. Some businesses have started adopting electronic payment systems to cater to the changing preferences of customers who seek convenience and efficiency in their transactions.

The Brandreth Road Industrial Cluster has a close-knit community of business owners who actively engage in networking and collaboration. Associations and unions have been formed within the market to address common concerns, protect business interests, and promote growth. These organisations also play a vital role in liaising with government authorities and advocating for the needs of the cluster.

### *Bund Road*

Bund Road Industrial Cluster is a recently developing industrial area located on the northern and northwestern outskirts of Lahore. Mainly including areas from Batti Chowk (Niazi Chowk) to Sherakot between River Ravi and Lahore Ring Road, this industrial cluster has witnessed significant growth in the past decade, transforming from an agricultural or barren land to a centre of industrial activity. With its strategic location, favourable business environment, and diverse range of industries, Bund Road Industrial Cluster has now become the youngest industrial cluster in the city.

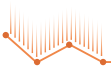
While there are a few cases of old establishments in this area, the key industrial activity in Bund Road boosted around 10–12 years ago. It was after 2010 that industrial activity began to gain momentum, leading to the establishment of a considerable number of factories. Over the years, the number of industries has steadily increased, with various businesses finding this area suitable for their operations.

The cluster hosts a wide array of industries, showcasing its versatility and adaptability. From traditional crafts, such as embroidery and chairs to modern manufacturing processes such as plastic pipe production, Bund Road Industrial Cluster offers a diverse range of products and services. Other prominent businesses include cycles, plastic work, wall clocks, and plastic recycling. These businesses contribute to the cluster's dynamism and create a symbiotic ecosystem where different industries coexist and collaborate. This area is close to the renowned Urdu Bazaar market of stationery products in Pakistan. Many paper-related products are manufactured in this area and traded in the Urdu Bazaar.

In terms of leadership within the industrial cluster, there is no single dominant business that emerges as the leader. Instead, the area houses numerous small and medium-sized enterprises, each making their mark in their respective fields. While other industrial clusters have recognised powerful associations, this area still has not been through such comparable organisations.

Several factors have contributed to the growth and attractiveness of the Bund Road Industrial Cluster. Firstly, its location away from the city centre provides numerous advantages. The availability of affordable rents and ample space makes it an attractive destination for businesses looking to set up manufacturing units. Additionally, the area's proximity to major markets, such as Azam Market, Misri Shah, and Timber Market, ensures easy access to customers and suppliers, further facilitating business operations.

The products manufactured and traded in the Bund Road Industrial Cluster cater to both domestic and international markets. Embroidery, chairs, plastic pipes, cycles, wall clocks, machines, shoe-making metal peddles, carpets, polyester bags, and plastic work are among the various goods produced here. The cluster also engages in plastic recycling, contributing to environmental sustainability by reducing waste and promoting



resource efficiency. This diverse range of products reflects the adaptability and responsiveness of businesses within the cluster, catering to a broad customer base.

#### *Lahore-Sheikhupur-Kala Shah Kaku Triangle Industrial Cluster*

Geographically like an inverted triangle with the tip in Shahdara, and three sides defined by the roads being Lahore Sheikhupura Road, Lahore Kala Shah Kaku Road, and the Lahore Bypass Road linking motorway M-2 and M-11, this industrial cluster comprises medium to large scale industries. Driven by the establishment of large industries like Mughal Steel (est. 1950), Sohrab Cycles (est. 1952), Atlas Honda Ltd. (est. 1962), Millat Tractors Ltd. (est. 1964), Tariq Glass (est. 1978), Nestle Pakistan Ltd. (est. 1988), and such leading industrial manufacturers, this industrial cluster has gained prominence due to its strategic location near prime transport corridors, favourable economic conditions, and a wide range of industries operating within its bounds. Moreover, this area has become a key shifting place for previous factories within the city. The factories in the city find this place more feasible to shift to when a larger manufacturing setup is required. This place does not only provide cheap and large tracts of land but also a developed ecosystem for industrial activity.

The cluster owes its origin to several factors, including the availability of cheap land, a main market for PVC pipes, and the presence of a drain (nalla) that supports industrial activities. Over the years, the area has witnessed a significant influx of industries, transforming it into a thriving industrial centre. The area hosts a diverse array of industries. Among the prominent sectors are steel industries, PVC pipes, garments, pharmaceuticals, shoes, electric materials, dying units, plastic units, auto parts, paper, leather, and packaging. These industries collectively contribute to the region's economic growth and provide employment opportunities for the local population.

Businesses in this interact with various government departments and agencies. These include the Labor Department, WAPDA (Water and Power Development Authority), Gas Department, Social Security, Environment Department, and Police. However, the level of support or assistance provided by the government to businesses in the area is relatively limited.

The area boasts an average age of businesses ranging from 18 to 40 years, with an estimated average of around 20-35 years. While most businesses maintain their specific types of operations, a small percentage may change their business types over time. Most businesses in the cluster have been moved from other areas, showcasing the region's appeal as an industrial destination.

Industry owners in this industrial cluster employ various strategies to attract clients, including marketing efforts, customer relationships, quality assurance measures, and satisfaction guarantees. Financing business operations often rely on personal sources, investments, bank loans, or family support. However, new businesses currently face hurdles such as high rates of raw materials, an unstable economy, inflation, and the need for prior experience to enter the market. There are, however, large industries in this area which makes the presence of other industries easier because of the fringe benefits of access, labour, and services.

#### *Rohi Nala*

The Rohi Nala Industrial Cluster is a thriving industrial hub located on the south side of Lahore. This cluster has gained prominence in recent years due to its strategic location at the intersection of Ferozepur Road (with mass transit transport services), and Lahore Ring Road most feasible for freight movement. The cluster owes its name to the nearby Rohi Nala (drain).

The industrial activities in the Rohi Nala area date back to the mid-1980s, but it was not until the last decade that the industrial activity began to boost. The relaxation in taxes and the opening of imports during this period contributed to the growth of industries in the area. Over the past few decades, this once-agricultural area has transformed into a bustling industrial zone, primarily driven by the textile and garment sectors.



The Rohi Nala Industrial Cluster encompasses a wide range of industries, including garments, plastics, packing, machine parts, and industrial machine repairing. Garment production constitutes a significant portion of the industrial output with various types of garments being manufactured, such as shirts, pants, women's suits, kids' suits, and more. The cluster also includes industries involved in the production of plastic bottles, catering to the packaging needs of various industries.

The industrial activities in this cluster are predominantly driven by business owners. Around 80 per cent of the businesses in this area are family-owned, reflecting a strong tradition of generational businesses. These business owners bring a wealth of experience and knowledge to the table.

The Rohi Nala Industrial Cluster serves both domestic and international markets. Products manufactured in this cluster are supplied to local markets in Lahore, as well as exported to Germany and other European Union nations. The cluster benefits from regular customers who have established long-standing relationships with the businesses. Additionally, new customers also contribute to the market dynamics, ensuring a healthy mix of both regular and walk-in customers.

Operating in the Rohi Nala Industrial Cluster presents both challenges and opportunities for businesses. One of the key challenges faced by new businesses is the initial struggle to generate profits within the first year. The intense competition and unstable economic conditions further add to the difficulties. Additionally, the availability of materials and parts can be a challenge, particularly during times of limited imports or disruptions in the supply chain. The industries in this cluster use a nearby drain, the Rohi Nala, as a convenient disposal system for wastewater generated by industries, particularly those in the garment sector that use various chemicals in their production processes.

#### *Other Industrial Clusters in Lahore*

Aside from these industrial clusters profiled in earlier pages, there are other industrial clusters in Lahore. Daroghawala, the case study of this research, is a key cluster for metal manufacturing. However, there are other industrial clusters in Lahore. For example, the Multan Road industrial cluster in the south of Lahore has medium to large-scale industries in multiple sectors. Most of these industries include textile sector manufacturing, but there are other sector industries like food, pharmaceuticals, chemicals, leather, and others in this area. The industrial activity from this area is further extended on Multan Road to Manga Mandi.

Another key industrial activity of medium and large-scale industries is observed around Raiwind Road between Thokar Niaz Baig Lahore and Raiwind. These industries mostly include iron, steel, automotive, chemicals, and other manufacturing works mostly developed around two decades ago. Likewise, on the city's North, the Lahore Ring Road from Quaid-e-Azam interchange to Batti Chowk is surrounded by industries on both sides of the road. Part of this area is included in the Daroghawala industrial cluster for which details will be furnished in the coming sections. However, there are other smaller-scale industrial activities in the city some of which were planned at a small scale like the ones on Gurumangat Road, and industrial areas in Gulshan Ravi and Gujjarpura. However, this study has not focussed on the profiling of formal industrial zones because of their relatively better representation in previous literature and government records. Moreover, formal industrial zones did not have location choice factors as in the case of informal clusters which were our focus of research.

### **Emergence and Growth of Daroghawala as an Industrial Cluster**

#### ***Daroghawala as an Industrial Cluster***

Daroghawala encompasses a high concentration of metal manufacturing businesses. The narrative of its transformation into an industrial hub has largely remained untold, even as the area continues to grow and evolve.



With a variety of stakeholders exerting their influence, Daroghawala is a vibrant and constantly growing area.

The boundary of Daroghawala as an industrial cluster is somewhat imprecise. There is no officially recognised boundary, hence, it is mainly defined by the common perception of the locals. Certain landmarks can provide insight into the area's location and scope. Daroghawala is situated at the northeastern periphery of Lahore and falls within the revenue jurisdiction of Shalimar Tehsil and the municipal limits of Wagah Town. Locals typically consider Daroghawala to be bounded by the Bund Road to the west, the Ring Road to the north and east, and the G.T. Road to the south. The area encompassed by these roads is roughly 7 square kilometres, yet the industrial developments spill beyond these confines, with many businesses associating themselves with Daroghawala. Therefore, instead of attempting to rigidly define Daroghawala's limits, it is more practical to understand its broader, perceived spatial extent (see Figure 2).

By analysing historical land cover changes (see Figure 3), we can understand the temporal development of industries in the area that's traditionally considered Daroghawala. This analysis reveals the area's development patterns over time. Over 90 per cent of the current built area was constructed within the past two decades, with the pace accelerating after 2010. As clear from Figure 3, development occurred on the western side of the area first because of a nearby road. Construction of new industries, however, continued to happen eastward over the years. This timeline aligns with Lahore's overall growth patterns. The city's population doubled from roughly 6 million in 1998 to around 12 million in 2017 (PBS, 2017). Accompanying this population surge was an increase in Lahore's built-up area, from 119,000 acres in 2000 to 177,200 acres in 2023, with an additional 64,456 acres of agricultural land converted into vacant plots for future development (calculated through classification of remote imaging as shown in Figure 4). These growth dynamics partly explain Daroghawala's temporal development.

While Lahore's expansion accounts for Daroghawala's growth in built-up areas over the past two decades, the genesis of its industries in this area is still another interesting point of investigation. Our field research and data analysis from existing sources provide partial insights.

Our interviews disclosed that there were only a handful of industries in this area in 1947 at the time of independence. Initial industrialists in this area were those who moved here from other parts of Lahore, or current India. This area was close to the technical college (now University of Engineering and Technology) and Railway workshops. These two landmarks had previously developed some industrial activities around this area in the pre-partition era. However, an industrial area near the engineering university on the G.T. Road gradually became encroached upon by residential developments, limiting space for further industrial growth. New industries then emerged in Daroghawala, which, at that time, was on the city's outskirts and offered affordable land.

During the mid-1970s, the area was given the supply of natural gas which could be used for heating sources of metal at a cheap cost. It is interesting that even though this area was not earmarked by the government for industrial activity, the government continued to offer its services anyway. The government supplied (and continues to do so) natural gas, water, and electricity, while the private companies provided telecommunication networks. Availability of these utilities ensured smooth operations of industrial in this area.

These services attracted many entrepreneurs to develop rolling mills in the area at the start. Though there were some industrial activities near this area before the 1970s, the key boost came with rolling mills majorly constructed in the 1970s which produced iron and steel bars and rods for building and bridge construction. The entrepreneurs in this wave of industrial activity in the area were mostly local residents. Daroghawala was a preferred location for them due to its proximity to previous industrial areas of Brandreth Road, and Misri Shah. The area around Shahdara could be a competitor location for Daroghawala but that area was too close to the river and experienced frequent floods, while Daroghawala did not have flood risks. Once the river stopped flooding, that area finally became an industrial cluster (read the profile of the Bund Road cluster described above), though far later than Daroghawala.



As found through the temporal land cover change analysis, Daroghawala's industrial activity has boosted in the last two decades. Interviewees indicated that businesses established in this area within the last two decades primarily chose Daroghawala for two reasons: minimal bureaucratic barriers to industrial development and the presence of an existing industrial ecosystem that lowered startup costs. Additionally, the area had a variety of metal manufacturing businesses producing a range of quality levels. These quality levels included top quality prepared for original equipment manufacturers (OEM), locally called grade A (high-quality new automobile components) to the lowest level, locally called grade C (lower quality replacement parts) and only sold in the local market. Thus, new businesses benefited from both a clientele for high-quality products and a market for lower-quality items within the same vicinity.

Our structured interviews with SMEs in Daroghawala asked about the nature of their operations. The data gathered revealed that over 90 per cent of the SMEs in Daroghawala were in steel and cast-iron manufacturing or processing industries. A significant portion also manufactured metal automobile parts or performed subcontracting work for larger-scale industries. As such, Daroghawala's SMEs were heavily influenced by the growth of the country's iron, steel, and automobile sectors. To corroborate these initial findings, we compared Daroghawala's overall production scale with the quantum index of large-scale manufacturing of Pakistan's 'Iron & Steel Industries' and 'Automobile Industries' (see Figure 5 for which data is explained in Appendix E).

This comparison has many implicit interpretations. First, production in Daroghawala seems to be stable in comparison to the national industrial production (see LSMI line in comparison with Daroghawala line in Figure 5). Production in Daroghawala, however, dropped during the past 5 years. We think it is because we estimated Daroghawala production based on available data on three time points within an enterprise's age (initial, highest, and current). The current values were mostly the least reported values by the enterprise owners because industrial activity suffered due to economic and political crises at the time of the interviews (from Nov 2022 to Jun 2023). The currency exchange rate reached a record high and the political scene was upset. Businesses were suffering and, thus, the low values reported at the time of research. This lag in recent years in the case of Daroghawala could either be a result of low reporting by the interviewees only to be revived in the coming years or an indication that the country's large-scale manufacturing index might also drop as the data for the recent years becomes available. Whatever the case may be, future research can explain better.

The correlation matrix in Table 2 explains that there was a significant relationship (at  $p=15\%$ ) between Daroghawala and the joint production of two sectors at the national level: Iron & Steel and automobiles. We found that the correlation was significant at  $p=15\%$  also because of the recent drop. We ran the correlation excluding the recent 5 years and found it to be significant at  $p=5\%$ . This correlation, however, does not prove any causality. It, nevertheless, gives a hypothesis that Daroghawala is an important industrial cluster in Pakistan's economy and it might be a reliable estimator to predict national production should causality be proved through future research.

Table 2: Correlation of Daroghawala's Aggregate Production with Pakistan's Manufacturing Index

	LSMI	Iron & Steel	Automobiles	IS+ Automobiles	Daroghawala
LSMI	1				
Iron & Steel	0.1072	1			
Automobiles	0.7286**	0.3245	1		
IS+ Automobiles	0.5550**	0.7642**	0.8581**	1	
Daroghawala	-0.2906	0.3483	0.3127	0.4023*	1
**Correlation is statistically significant at $p<0.05$					
*Correlation is statistically significant at $p<0.15$					

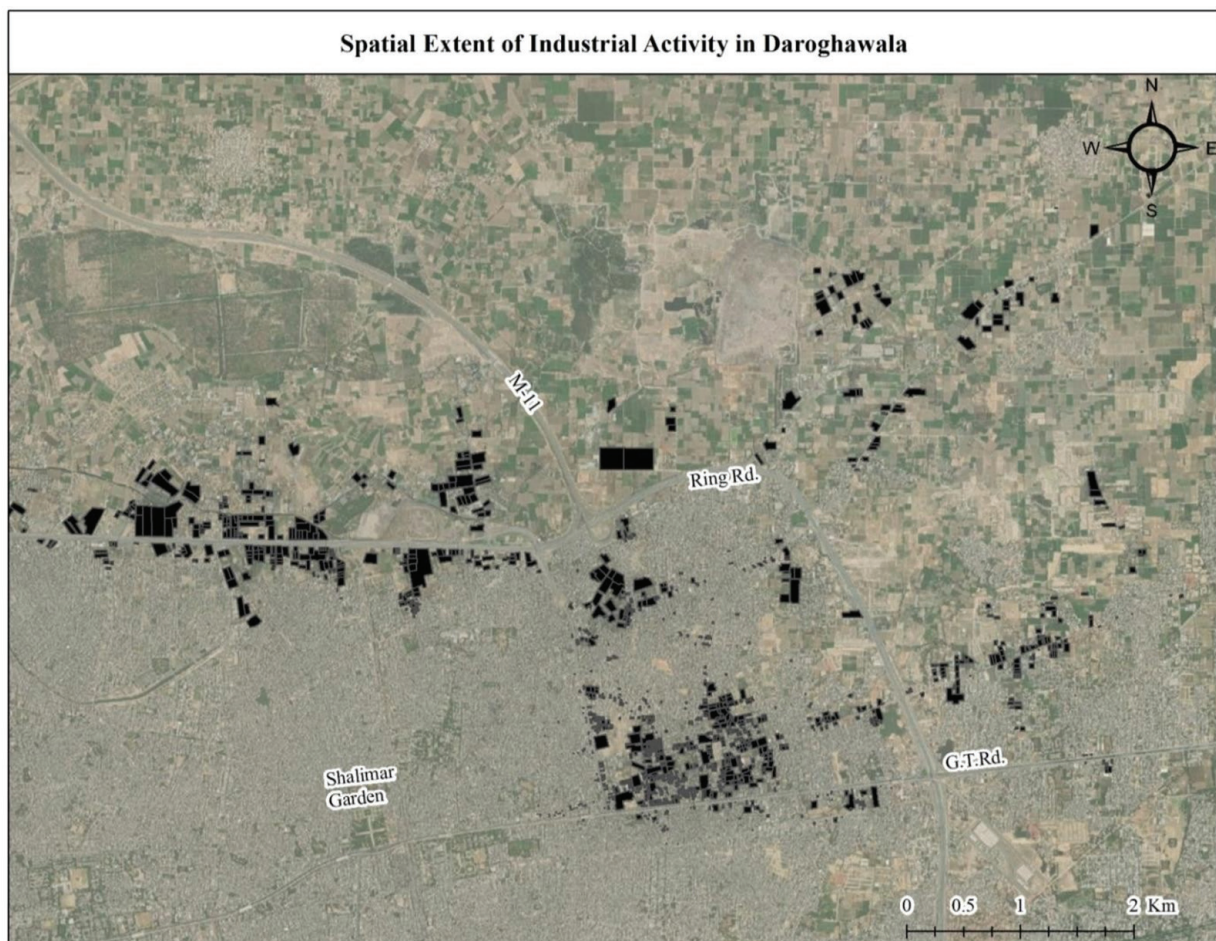
Sources: GOP (various issues) and Field Interviews (2023).



Interesting trends presented in Figure 5 can have multiple possible explanations. First, the jump in the automobile sector in 2022 might be an anomaly and 2023 numbers might show a decline, thus, explaining Daroghawala's consistent low. Second, Daroghawala might be taking longer to catch up with that pace and might do so in the coming few years. Third, the national automobile sector might be supported by another industrial cluster. However, this third possibility will need other studies to be rejected or proved.

This discussion makes a convincing case for the making of Daroghawala. The area was on the urban edge of a rapidly expanding city, and the country had an increased industrial production in iron and steel, and automobiles, which generated enough business for new SMEs to be established. The area was further offering access to the primary road network and had lower property rates with the flexibility of developing SMEs on smaller lots with affordability and access, without paying development charges of a planned industrial estate. Moreover, many SMEs in Daroghawala start their production by renting land or a small structure, which reduces their installation costs. A common observation during fieldwork in Daroghawala was the mixed use of a rented or owned small parcel of land with an ancillary industrial workshop on the ground floor with owners or labourers living on the upper floor. Such factors together contributed towards the making of Daroghawala an industrial cluster with mixed-use.

*Figure 2: Spatial Extent of Daroghawala as an Industrial Cluster*

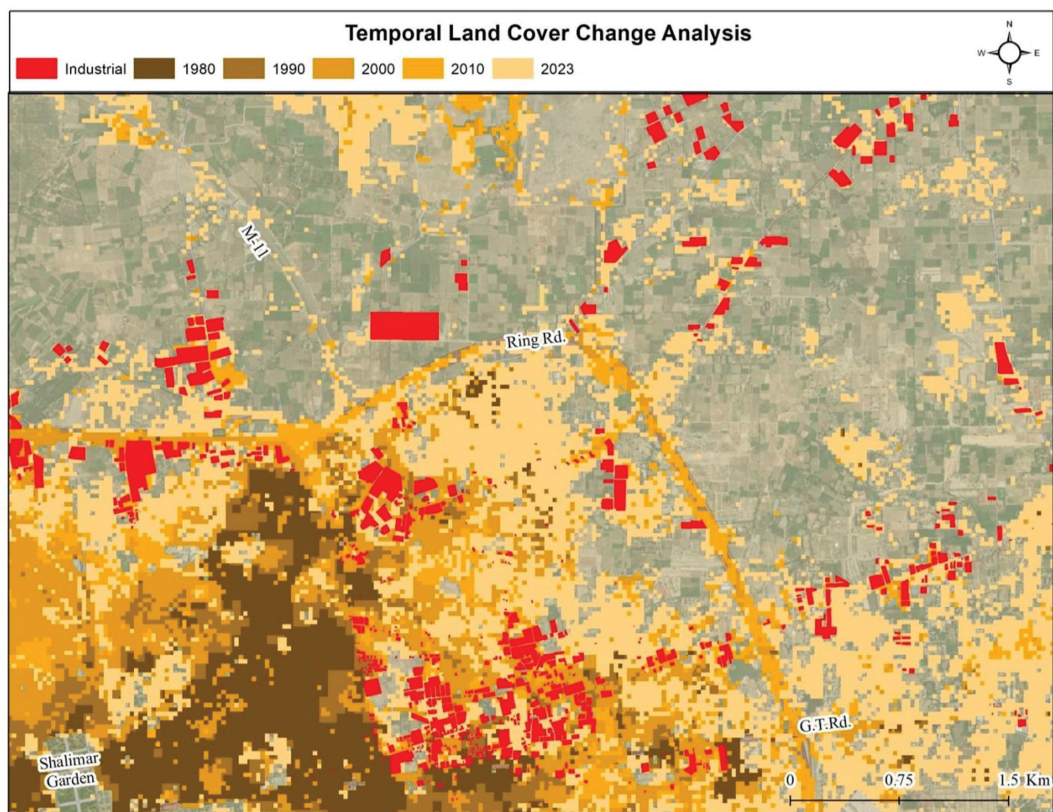


*Source: Land use surveys (2023).*



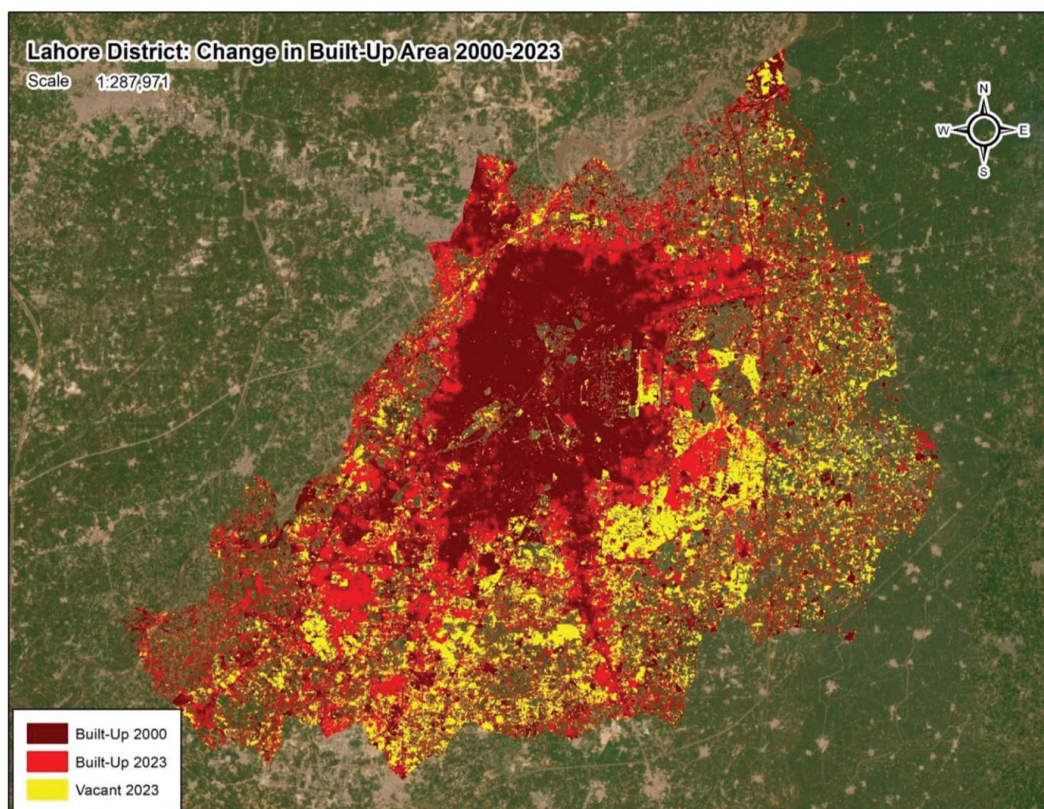


Figure 3: Temporal Land Cover Change Analysis of Daroghawala



Source: Land use surveys (2023) and Google Earth.

Figure 4: Lahore District Change in Built-Up Area 2000-2023



Source: Google Earth, analyzed by authors through image classification.

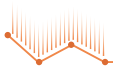
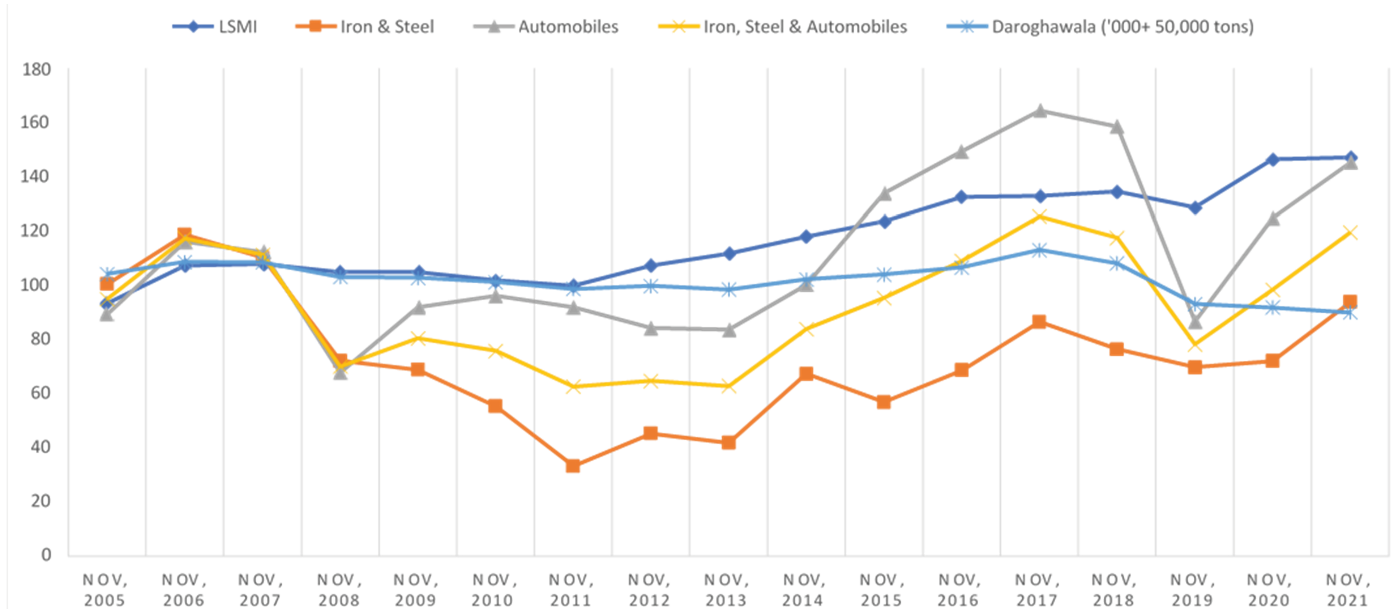


Figure 5: Comparison of Daroghawala Aggregate Manufacturing with Pakistan Large-Scale Manufacturing Index



Sources: GOP (various issues) and Field Interviews (2023).

## Typological Analysis of Industries in Daroghawala

Land use surveys conducted during this research were useful in understanding the type of industries in Daroghawala. It was found that Daroghawala had a combination of industries with varying sizes and types. However, some of those industries were the basic manufacturing units that developed their products independently, while others were the units that helped these first types of industries by providing them with ancillary support. Accordingly, the industrial ecosystem currently operating in Daroghawala can be explained by the following classification.

**Primary Industry:** This is the manufacturing industry in Daroghawala and is the core of the area's industrial ecosystem. The other two types exist in the area to support and generate business alongside these primary industries. There are three major types of manufacturing industries in the area, namely, rolling mills; forging industries; and foundry workshops.

**Ancillary Industry:** This is the processing setup in Daroghawala that does not necessarily manufacture the product, but rather cuts, polishes, threads, fabricates, moulds, or processes it in another way to add value. There are many types of ancillary industries in Daroghawala. Some of these are workshops of lathe machines, milling machines, computer numerical control (CNC) machines, thread-making machines, fabrication workshops, or plastic injection moulding machines.

**Industry Supporting Commerce:** This type of land use exists in Daroghawala to generate mercantile business from the primary and ancillary industries. These are the commercial stores or shops that offer readily available materials and equipment to industries. Some of these are furnace oil stores, scrap stores, molasses stores, pattern shops, hardware stores, steel pipe and rod stores, old machinery godowns (warehouses), metallurgical coke (coal), and firewood stores.





Table 3: Count of the Units Making Up the Industrial Ecosystem in Daroghawala

Classification	Type	No. of Units	Total
<b>Primary Metal Industry</b>	Rolling Mill	334	661
	Foundry Workshop	198	
	Forging Industry	129	
<b>Ancillary Metal Industry</b>	Workshop of Lathe Machines	274	576
	Fabrication Workshop	94	
	Workshop of Milling Machines	65	
	Workshop of Thread-Making Machines	41	
	Workshop of CNC	39	
	Electroplating Setup	23	
	Sheet Drawing Setup	20	
	Die Casting Setup	20	
<b>Industry-Supporting Commerce</b>	Scrap Store	52	175
	Old Machinery Godown	48	
	Steel Pipe & Rod Store	20	
	Hardware Store	18	
	Molasses Store	13	
	Furnace Oil Store	12	
	Pattern Shop	12	
<b>Total</b>		1412	
<b>Non-Metal Industries</b>		283	
<b>Grand Total</b>		1695	

Source: Land use surveys (2023).

The land use map of the industrial ecosystem in Daroghawala (see Figure 6) shows the spatial distribution, linkages, and relative sizes of the firms. The primary industry is mostly abutting the major road because of ease of access to the freight. The ancillary industry is distributed near the primary industry but with comparatively smaller lot sizes. The industry-supporting commerce is concentrated near the core of the cluster, with the smallest lot sizes of all. As found by the land use survey, there are 661 primary metal industries, 576 ancillary metal industries, 175 units of industry-supporting commerce, and 283 non-metal industries in Daroghawala (Table 3). The total number of enterprises noted during land use surveys means the total enterprises in the cluster (including large-scale industries). The Daroghawala Industry Owners Association (DIOA) claimed that these industries create around 200,000 jobs.

While the detail on metal industries follows, it is worth mentioning that this research did not study non-metal industries because of its main focus on metal ones. However, non-metal industries in Daroghawala manufacture products of various materials like plastic, glass, polymers, chemicals etc. These products, however, are often closely related to the metal products in Daroghawala. For example, while metal industries produce building structure products, non-metal industries produce related glass and plastic products. This close interaction of products explained the colocation of non-metal industries with metal-dominant Daroghawala. Our investigation into non-metal industries remained rudimentary as we focused in detail on the metal industries.

Primary industries in Daroghawala – foundries, forging mills, and rolling mills – have different processes. The



foundry uses a casting process wherein the raw metal is melted at high temperatures and then shaped into required products through moulds. Likewise, a forging workshop includes space for preheating the metal, which is then shaped through forging machines. Finally, rolling mills have furnaces to melt the metal and then shape it into bars and rods, etc.

The type of industries existing in Daroghawala can be understood under the Pakistan Standard Industrial Classification (PSIC) standardised by the Pakistan Bureau of Statistics. Table 4 lists the 3-digit, 4-digit, and 5-digit PSIC industrial coding of the industries in Daroghawala. This categorisation highlights that industries in Daroghawala are engaged in the manufacturing of basic iron & steel, the manufacturing of basic precious and other non-ferrous metals, the casting of metals, the manufacturing of structural metal products, and the manufacturing of other fabricated metal products, and metalworking service activities.

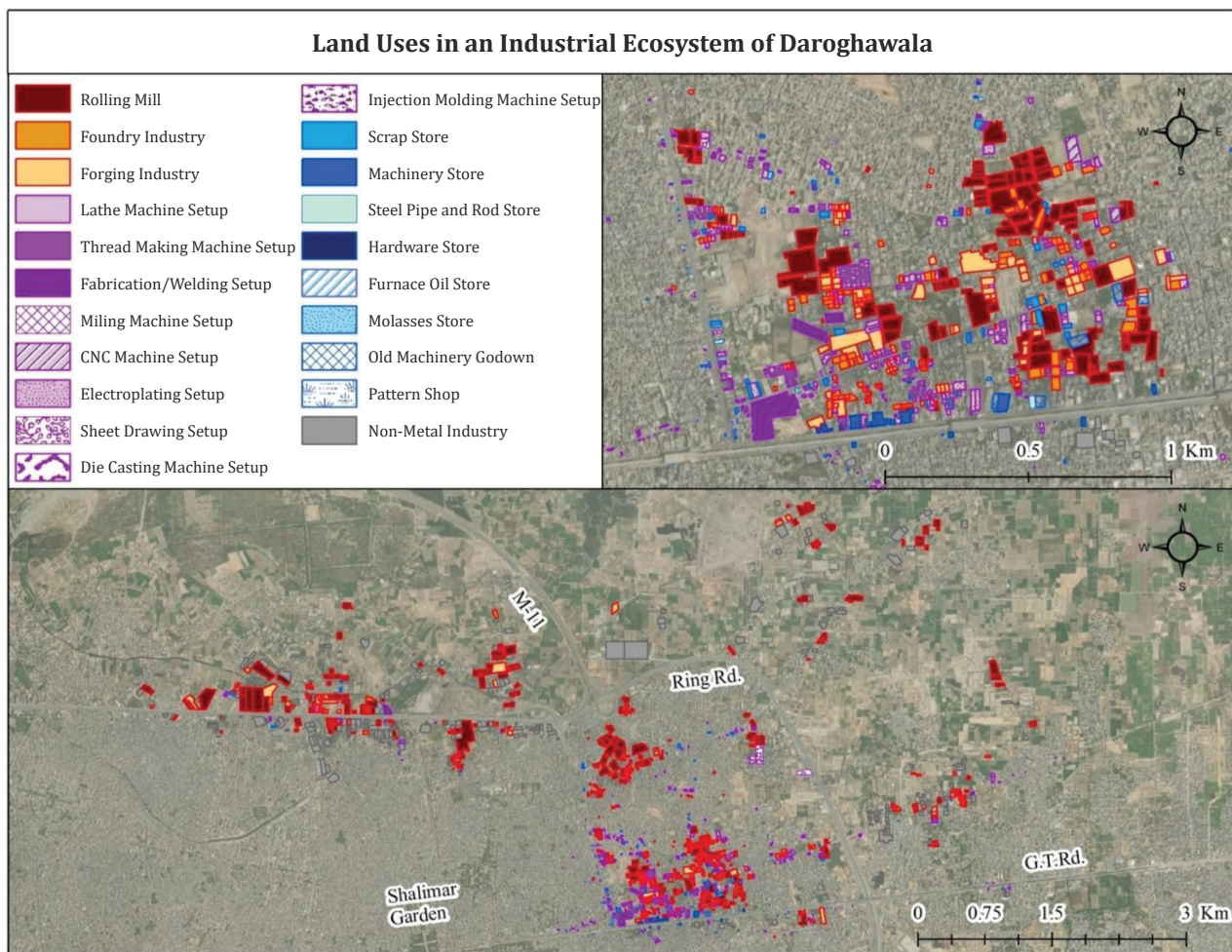
*Table 4: Industries in Daroghawala as per PSIC Coding*

Description	3-Digit	4-Digit	5-Digit	Related Daroghawala Industries
Manufacture of Basic Iron & Steel	241	2410	24104	Primary Metal Industries
			24105	
			24106	
			24108	
Manufacture of Basic Precious and other Non-Ferrous Metals	242	2420	24202	
			24204	
			24205	
Casting of Metals	243	2431	24311	
			24312	
			24313	
		2432	24321	
			24322	
			24325	
Manufacture of Structural Metal Products	251	2511	25111	Ancillary Metal Industries
Manufacture of other fabricated metal products, and metalworking service activities	259	2591	25911	
		2592	25921	
			25922	
			25923	
			25924	
		2599	25992	
			25993	
			25997	

*Sources: Pakistan Standard Industrial Classification (PSIC) and Field Interviews (2023).*



Figure 6: Land Use Map of Industrial Ecosystem in Daroghawala



Source: Land use surveys (2023).

### Products Manufactured in Daroghawala

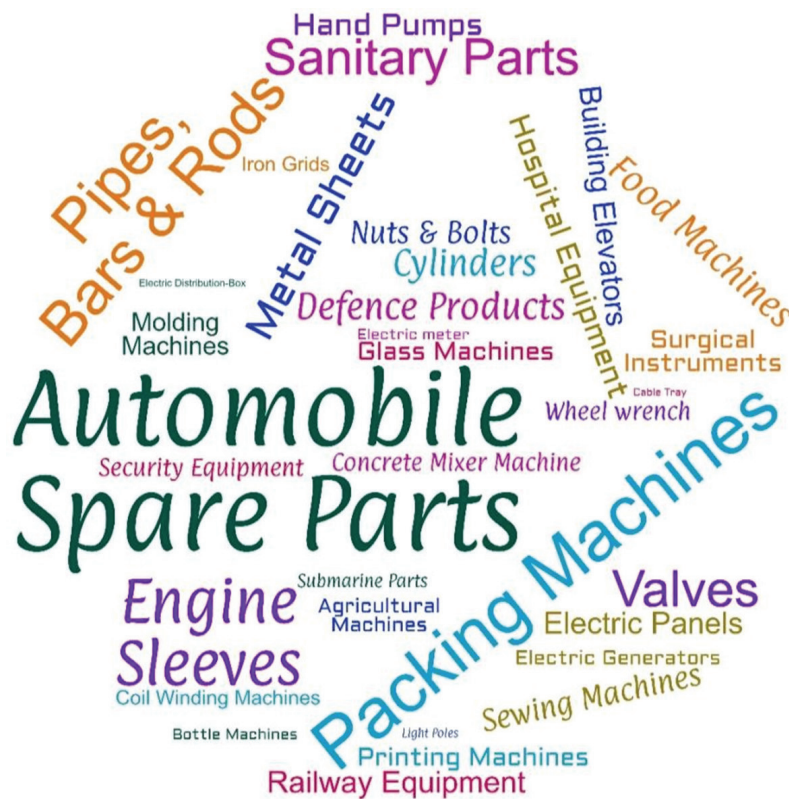
Interviews have disclosed a multitude of small to medium-sized enterprises (SMEs) in Daroghawala engaged in the fabrication of an array of metal products. As illustrated in Figure 7, Daroghawala is a hub for the manufacturing of a broad spectrum of metal items. Figures 7 to 9 were created by coding the qualitative responses from 175 SME interviews. The interview transcripts were coded to find recurring themes in interviews and the corresponding frequency of each theme was used to prepare these figures. The larger the text in the figure represents the more recurrent response in the interviews.

As it is clear from Figure 7, automobile parts (high-quality grade A for fresh manufacturing) and replacement spare parts (low-quality grade C) are the most produced items in the area. Furthermore, other frequently manufactured items include pipes, bars, rods, and sanitary parts. The region also produces a range of other products, encompassing agricultural equipment, machines, bolts, generators, defence products, metal valves, cylinders, metal sheets, submarine parts, and more.

The quality of these products is largely contingent on customers. High-quality products are manufactured for original equipment manufacturer (OEM) firms, like the large-scale automobile industry. However, many SMEs in Daroghawala produce what is locally referred to as 'grade B' or 'grade C' quality, which is typically marketed within the local market.



Figure 7: The Type of Products Manufactured in Daroghawala



Source: Field Interviews (2023).

### Process and Metals in Daroghawala

Through interviews, we discovered that the predominant industrial production in Daroghawala comprises metal manufacturing processes, including foundry (also known as casting due to its process), forging, and rolling. These three techniques are most frequently employed by Daroghawala's SMEs. However, there are also ancillary operations, typically smaller in scale, that further refine the metal products through various techniques such as tooling, machining, polishing, electroplating, and fabrication, among others. These processes are explained in Table 5.

Table 5: Explanation of the Processes in Daroghawala Metal Enterprises

Sr. No.	Process	Explanation
1.	Rolling	At rolling mills, this technique reshapes metal stock by passing it through one or multiple sets of rolls. The primary goals are not only to reduce and standardise the metal's thickness but also to introduce certain mechanical characteristics that suit the application at hand.
2.	Forging	This method is used for making high-strength metal products. Through considerable applied pressure, the metal is manipulated—either pressed, pounded, or squeezed to get desired size, shape, and strength.





3.	Foundry (Casting)	A foundry is a specialised establishment dedicated to the production of metal castings. The process starts with the melting of the metal, followed by its careful pouring into moulds. Once poured, the metal is left to solidify, resulting in the desired shape.
4.	Machining	Machining involves the adept use of machines, particularly suited for the relevant metals. Activities such as roughing, cutting, and drilling define this process. Here, the metal products are systematically reshaped through rapid machine rotations and coordinated movements of its axis.
5.	Electroplating	Electroplating employs electrical currents for material deposition. The outcome of this technique is a refined layer of metal deposited upon a specific product, commonly referred to as the substrate.
6.	Sheet Drawing	Sheet metal drawing is a meticulous process of plastic deformation along a predetermined axis. For related activities involving wire, bar, or tubes, the initial material is skillfully drawn through a designated die, achieving a reduction in its diameter while simultaneously increasing its length.
7.	Fabrication	Metal fabrication is a multifaceted process that converges techniques like cutting, bending, and assembling. Its essence lies in transforming sheet metals into configurations that align with specific designs.
8.	Polishing	Polishing of metals capitalises on abrasive materials, ensuring the surfaces of metals are rendered smooth and refined.
9.	Tooling	Tooling is about crafting specialised metal tools tailored for a range of applications, ensuring precision and efficiency in their designated tasks.

The relative frequency of these processes found in Daroghawala is shown on the left side of Figure 8, while the right side lists the metals primarily used in Daroghawala. The metals most utilised include cast iron, mild steel, stainless steel, and aluminium, while other metals like galvanised iron, brass, copper, zinc, and nickel are incorporated into the production, often combined with other metals.

Figure 8: Processes (Left) and Metals (Right) Processed in Daroghawala



Source: Field Interviews (2023).

## Entrepreneurs of SME

As we scrutinised Daroghawala as an industrial cluster, the study of the entrepreneurs behind these SMEs is an intriguing subject. By examining their profiles, we not only identified these entrepreneurs but also understood how they can be further engaged. Our investigation (see Figure 9) revealed that most of them had previous experience in similar industries, having worked in roles such as labourers, managers, machinists, mechanics, or engineers. Most possessed an academic background up to the diploma or undergraduate level. Many entrepreneurs were also drawn to this industry because they had family members already involved in the business. The major response by the entrepreneurs in Daroghawala expressed their preference for business, explaining their industrial enterprise.

Figure 9: Profile of Entrepreneurs in Daroghawala



Source: Field Interviews (2023).

## Conclusion

This study delved into a hitherto underexplored aspect of Pakistani cities, viz., the spontaneously formed industrial hubs. These industrial clusters are prevalent in large cities across the nation, yet they are rarely incorporated into economic policies. We explored the industrial clusters in metropolitan Lahore in this section of the report. This exploration was further enhanced by an in-depth exploration of one of these clusters. Through this work, we contribute to the literature on the spatial organisation of the economy in Lahore. Through the profiling of these clusters, key patterns have been identified to explain how location of industrial in an organic manner in Lahore.

Unlike planned industrial zones or Special Economic Zones (SEZs), like the Sundar Industrial Estate in Figure 1, which are typically developed by the state with predefined industrial sectors in mind, Lahore's industrial clusters have been incrementally established by industrial entrepreneurs. This implies that there was no preexisting plan set forth by the state for the development of these industrial clusters. The entrepreneurs used their resources to convert cheaply available agricultural land into manufacturing units over time, responding to economic demands and opportunities as they arose.

The industrial units in these clusters were developed in proximity to other land uses such as commercial and residential spaces, without the typical land use zoning seen in planned cities. This lack of zoning can lead to



complex interrelationships between these different land uses. For example, factory workers might live in nearby residential areas, reducing commuting times and costs, while commercial activities could evolve to support industrial operations.

These clusters did not restrict themselves to a particular type of industry. Instead, there was a mix of industries varying by type, size, and formal status. You could find small-scale cottage industries operating alongside medium or even larger-scale units. This diversity not only offers resilience to economic fluctuations by not putting all eggs in one basket, but also encourages symbiotic relationships, where the waste product of one industry could serve as the raw material for another; or one large industry could generate business demand for many proximal small units.

Each of these industrial clusters had an association of industrial entrepreneurs. These associations acted as collective bodies representing the interests of the cluster at different platforms, be it negotiating with suppliers for better rates or representing their issues and concerns to the local government. They essentially provided a collective voice to the individual units operating within the cluster.

We discovered that a naturally occurring progression, driven by various influences, led to the creation of such clusters. An in-depth investigation of Daroghawala helped us understand that each of these clusters can have idiosyncratic features driving their development. An influential factor for Daroghawala was the nationwide surge in the number of vehicles in use. This resulted in a substantial demand for products needed for the manufacturing and upkeep of automobiles. The resultant growth in the automobile, iron, and steel industries spurred the demand for industrial goods. This demand stimulated entrepreneurship; leading workers previously engaged in this sector to establish their own businesses on various scales.

Establishments in Daroghawala produce a variety of metal products of differing qualities. The highest quality products are manufactured for Original Equipment Manufacturer (OEM) clients both domestically and internationally. Additionally, numerous small businesses produce grade-B and grade-C products, which are sold locally, thus, catering to the country's low-cost automobile maintenance market.

The northeastern urban fringe of Lahore, which had an industrial appearance before independence due to its proximity to an engineering university (previously a technical college) and the Grand Trunk Road, saw industrial activity continue to move eastwards as the city grew. Entrepreneurs seeking cheaper land found it on this constantly shifting urban edge. These factors, coupled with the development of the Lahore Ring Road which facilitated accessibility to the area, led industrial entrepreneurs to opt for Daroghawala.

In this section, we have highlighted the forces that generate industrial clusters in the city. These forces include cheap land, infrastructural access, lack of bureaucratic control, proximity to other industrial activities and such. Some of our findings resonate with previous research as in the case of (The Urban Unit, 2018) report which highlighted that around 95 per cent of industries were located within 2 km of major roads. However, we have also highlighted key new insights like the emergence of new industrial clusters on the edge of the city. With time when residential area surrounds these clusters, large industries move out to the new urban fringe leaving previous locations for trade activities. Finally, we have used the case of Daroghawala to explain how each of these industrial clusters can have inherent details on their industrial typologies, industrial ecosystems, path-dependent evolution, key actors and such which would need further cluster-specific research endeavours.



### 3. GROWTH OR DECLINE OF SMES

#### Introduction

Punjab – Pakistan's most populous province – struggles with unemployment. Amongst other strategic measures, the government aims to tap the employment generation opportunity in SMEs (Punjab Planning and Development Board, 2019). SMEs make up the highest percentage of the number of units in any industrial sector in Punjab. For example, the sector of fabricated metals in Punjab consists of 99.78 per cent of SMEs (The Urban Unit, 2018). Such enterprises become even more significant in the wake of an unstable economy during which the persistence of SMEs could be a challenge. However, the government is simultaneously too constrained by financial challenges to actively support SMEs through public funds (Ajmal et al., 2020). The government has, therefore, envisaged providing special economic zones for SMEs to grow. These zones, however, are mostly planned away from the cities and do not offer the ecosystem that breeds and supports the growth of SMEs in Pakistani cities as explained in the previous section.

Lahore, home to 12 million residents, has witnessed the organic development of industrial clusters inside the city which have mostly been developed without preplanned government policy. Such clusters are an opportunity to learn how these SMEs developed and experienced growth or decline over time. This section explores and quantifies the causal effect of the OEM permanent clients ratio on SMEs' growth rate over time.

SMEs contribute to employment generation in much greater proportions in comparison to large-scale industries (PERI, 2018). This means that encouraging SMEs in a populous country like Pakistan may help reduce unemployment. The success factors of previously developed and growing SMEs could offer insights to support such enterprises. These older SMEs, though may not have developed to the perfect industrial standards, have been generating business and employment opportunities.

#### Literature Review

Currently employing 60 per cent of the manufacturing sector employment in Punjab, small-scale industries can play a key role in resolving unemployment crises (PERI, 2018). For a country that is economically struggling with high rates of inflation and unemployment, small and medium enterprises can be a great platform for job creation. Sustainable Development Goals (SDGs) suggest that efforts should be directed, among others, toward reducing unemployment. However, the promotion of SMEs means helping them tackle multiple challenges that they face.

Literature suggests that SMEs face challenges of access to the finances and that is why initial startup cost takes up the utmost significance for such industries (Singh et al., 2010). This affects the location choice of SMEs because low seed money pushes the entrepreneurs of this domain to choose a location where setup could be completed through minimal installation cost inputs. Though the installation of the industries could vary with respect to the operations and product, the overarching costs that this study takes as a part of the installation include:

- i. Land cost;
- ii. Building cost;
- iii. Civil works;
- iv. Utility lines cost; and
- v. Machine purchasing and installation (Harper, 1981).





Moreover, the literature suggests that more regulatory controls imposed on SMEs have an inverse effect on their growth in Pakistan (Khan et al., 2019). Scholars have noted that regulations on entry into the industrial sector act as a barrier to industrial development (Klapper et al., 2006). Accordingly, loose regulatory controls in a city could be one of the encouraging factors for the development of SMEs.

Following the initial installation of SME, the next challenge occurs at the stage of securing orders or finding product markets. Evidence suggests that manufacturing orders furnished by SMEs avoid the struggle of marketing if these are placed by large-scale industries and small industries tend to cluster together at locations from where product relations exist to the larger industries (Cinar et al., 1988). These spillovers, however, could sometimes hinder the growth of SMEs because of hegemonic control over the pricing and working terms (McCartney, 2022). Accordingly, agglomeration could affect SMEs either positively or negatively depending on the context.

The relationship of SMEs with large industries has been a point of debate in the literature. One example is from the Japanese model where SSI grow due to subcontracting from large-scale industries, while the others are the Philippine and Turkish models where the growth of SSI is hindered due to linkage with large-scale industries that continue to control the prices and business terms (Cinar et al., 1988). In the case of the latter, scholars have investigated the possible support these SMEs need (Isran et al., 2019) for a developing country to ensure protection from outside competition. Regardless, factors usually mentioned in literature play different roles according to a local context (Rahman & Kabir, 2019) and the linkages between large-scale industries and SMEs vary with respect to the type of industries (Shaw, 1990).

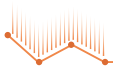
Though independent research institutes have provided overall discussions on the development of sector-supportive government frameworks (PERI, 2018), the underlying assumption that only government-driven initiatives can help SMEs grow seems limiting. Accordingly, this study hopes to highlight the factors that interplay in the market to contribute to the development of SMEs independent of active inputs by governments.

Developing countries have been trying to redefine their role in the global value chain by advancing the manufacturing processes which were classified as 'peripheral' industries for many years. However, they are not quite there yet. There is ongoing research on which factors support the growth of SMEs in developing countries. For example, scholars have documented the positive impact of providing quality physical infrastructure on the business growth of SMEs (Dou et al., 2021; Mitra et al., 2012).

In addition to the provision of the physical infrastructure, the literature has noted that the emergence of SMEs is a process triggered by large-scale industries when they sublet some production tasks. As such, most SMEs in developing countries generate their business from large-scale industries. Therefore, the literature suggests that having permanent clientage from large industries can help SMEs find a continuous stream of work and, hence, growth in the business (Jamieson et al., 2012).

Moreover, there has been a consensus in the literature that SMEs in developing countries should focus on technological innovation for their growth. Technology progress has been documented as the order parameter that dominates in its impact on the industry evolution (Li et al., 2014). Likewise, the case from Hong Kong also suggests that technological innovation is one of the major factors contributing to the growth of SMEs (Yang et al., 2021). Such technological innovation can be harnessed by eco-conscious stakeholders if SMEs are integrated into the global value chain (Aboelmaged, 2018).

However, technological innovation can be hampered by the lack of access to credit. Literature has established that access to finances is usually one of the biggest challenges for SMEs. In response to this, mechanisms to ensure access to funds and credit have been suggested (Yoshino & Taghizadeh-Hesary, 2016). As such, it is suggested that investment in R&D can bring advancement in SMEs and growth (Jamieson et al., 2012).



Such literature on the growth or decline of SMEs enlists various contributing factors. Though multiple factors are found in the literature, this research takes a policy variable ‘permanent clients ratio from OEMs’ to quantify its causal effect on the growth or decline of SMEs. Therefore, the following hypothesis has been formed to be tested:

‘The industrial production change will not be affected, *ceteris paribus*, by the change in the permanent OEM clientage of SME.’

## Research Methodology

This cross-sectional research uses the ordinary least squares regression on the primary data collected. The data was collected through structured interviews as they were the most feasible choice for the data collection. This study required data on set variables which was collected through interviews. This meant that each respondent was to be asked the same question to get their responses. Structured interviews designed for this study (Appendix B) allowed comparable responses on set variables.

The sample was selected from the population of small and medium industrial units in Daroghawala. The sampling criteria selected for this study was the stratified random sampling with strata based on the type of industrial unit (foundry, casting, rolling etc.). A proportionate number of samples was selected from each stratum to meet the sample size. The sample size was calculated using the simplified sample size formula suggested by (Yamane, 1967) for the known population:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n = sample size

N = Population size

e = Error margin

The population was the number of total metal SME firms in Daroghawala. The land use surveys (explained in the first section of this report) indicated that there were 1,237 industries in the area. With N=1,237, a level of precision of 93 per cent, and a 7 per cent error margin, the sample size came to 175 industrial units. The respondents were a proportionate number of units from each type of industrial activity. Table 6 shows the number of interviews conducted from each type of industry.

*Table 6: Number of Interviews Conducted from Each Type of Industrial Unit*

Classification	Type	Total No. of Units	Units Interviewed	Percentage Interviewed
Primary Metal Industry	Rolling Mill	334	48	14
	Foundry Workshop	198	28	14
	Forging Industry	129	18	14
Ancillary Metal Industry		576	81	14
Total		1,237	175	14

*Source: Land use surveys (2023).*



In addition to these 175 interviews from metal works enterprises, there were 283 non-metal industries in Daroghawala (as per land use surveys) but we did not include those in the analysis. Since the literature suggests that the type of industry sector affects the factors of its growth or decline, we wanted to control the type of industry. Therefore, we focused only on the major industry in Daroghawala, i.e., metal manufacturing. Hence data for this research was only gathered from Daroghawala-based SMEs engaged in metal manufacturing. The development of the causal relationship essentially required the use of measurement methods suitable for such analysis. As such, this part of the research was met using econometric models. The ordinary least squares was, therefore, used for the initial model. An instrumental variable was used to address the issue of endogeneity, which is discussed in the next section.

## Findings and Discussion

SMEs in Daroghawala were interviewed to collect data on multiple quantitative variables. The responses to the quantitative variables were thereafter normalised to make them comparable. Furthermore, the real values of the variables on which data were collected in nominal currency were calculated using consumer price index with 2015–16 as the base year. For most of the variables in Appendix A, data were directly obtained from field interviews. However, variables ACR and ABV were calculated indirectly by improvising the data obtained from field interviews. The ACR was calculated through the initial and current metal weight processed in each business, while the adjusted business volume (ABV) was calculated through the highest business capacity and current capacity (detail on the calculation of these variables is offered in the subsequent paragraphs).

This study operationalised the metric of industrial production change through the lens of the ACR – a measure representing the yearly change in the quantity (measured in tons) of metal processed by an enterprise monthly. This approach, however, has limitations. For instance, it assumes that industrial growth is primarily driven by the volume of processed metal, thereby disregarding aspects such as product quality or profit variations. Despite this limitation, it was deemed the most appropriate metric due to the unavailability of comprehensive data defining industrial change. Moreover, as our case study explores a previously under-researched area with data primarily sourced from first-hand surveys, respondents were reticent about divulging details concerning their business growth. Consequently, the volume of processed metal was utilised as a suitable measure for the ACR because owners easily shared the weightage of metal processed in their industry.

ACR data was generated from data from the structured primary interviews. Enterprises were inquired about the monthly volume of metal processed at the time of establishment (initial business volume - IBV) and the current year (current business volume - CBV). However, a significant challenge confronted was that the Pakistani economy was in severe crisis during the data collection phase, leading to a stark decline in industrial activity as mentioned by numerous industry owners during the interviews. This economic downturn partially influenced the current monthly metal processing volume. To adjust for this effect, enterprises were asked about the year in which their production was at the peak and the volume of metal processed during that period. The decline from the peak year to the current year was then linearly extrapolated to estimate each enterprise's production in 2016 – the year with the highest recorded production in Daroghawala (as depicted in Figure 5).

The ABV, representing the monthly volume of metal processed in each enterprise, was calculated as an average of the enterprise's 2016 production and the current production value. The difference between the adjusted current volume and the initial business volume was then divided by the initial business volume to estimate a change over the enterprise's lifetime. This value was then divided by the age of business (AOB) to derive the ACR.

$$ACR = ((ABV - IBV)/IBV)/AOB \times 100$$

The value of the ACR for each enterprise was used as a dependent variable, to be regressed on the independent variables.



## ***Descriptive Statistics***

The descriptive analysis, despite a few anomalous data points, reveals significant findings about the area's SMEs. These insights, visually represented in a box-and-whisker plot (please see Figure 10 while referring to Appendix A for the units of variables), are derived from a representative sample of SMEs in Daroghawala.

The sample SMEs largely had a positive annual BCR. This trend is reflected by an interquartile range fluctuating between 0 per cent and +30 per cent. Moreover, consistent with the prior finding of industrial activity in Daroghawala primarily increasing over the last two decades, the SMEs' age in our sample had an interquartile range of 8 to 24 years. The number of formal education years of the entrepreneurs in these SMEs had an interquartile range of 0 to 10 years meaning that at least 75 per cent of the entrepreneurs were not graduates.

The interquartile range of the weight of metal processed by these metal manufacturing and processing SMEs was 6 to 42 tons of metal monthly. The SMEs' total business capital, evaluated in real terms, had an interquartile range of 3 to 24 million PKR monthly. Since the focus of the study is on SMEs in Daroghawala, it is crucial to emphasise that this part of the analysis did not include data from large-scale industries within Daroghawala that have a higher business capital

The availability of loans to these SMEs, also measured in real terms, had an interquartile range of 1 to 7 million PKR. It should be noted that a significant portion of the surveyed respondents had not previously sought credit from official lending institutions. This figure is, therefore, a self-evaluated estimate of their credit acquisition capabilities and quantities.

As this part of the study's focus was primarily on SMEs, classified by their employee count, it was anticipated that the current number of employees would not exceed 99. The interquartile range for employees within Daroghawala's SMEs was between 6 and 15. Moreover, we found that most SMEs in Daroghawala did not invest in research. Even those who responded that they had invested in research, reported small amounts. Annual research expenditures on research among the sampled SMEs ranged between zero and PKR 400,000 in real terms, as indicated by the interquartile range. This shows that SMEs in Daroghawala did not usually engage in research.

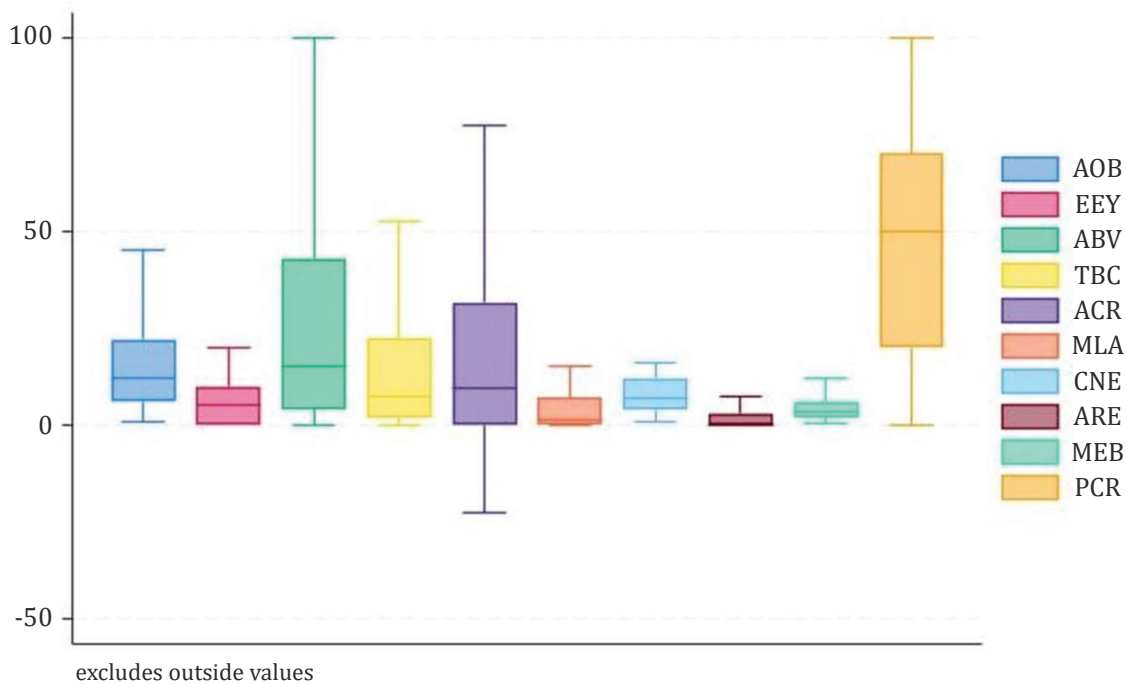
Interestingly, even though most of these industries used electricity as a source of energy, the cost of electricity paid by these industries was a small portion of their total costs. The largest proportion of the cost was on the purchase of raw materials, which was usually reported between 60 to 75 per cent of total costs. The electricity bills, however, were small amounts when seen in comparison with the business capital. The interquartile range of monthly electricity bills was between PKR 35,000 and PKR 65,000 in real terms.

We found during interviews that SMEs in Daroghawala often worked with other large industries. We asked them about their total number of OEM clients a year and the permanent clients out of the total to find the PCR. Interestingly, the interquartile range of the PCR was from 15 to 72 per cent. Moreover, regarding sourcing raw materials for metal manufacturing, it was found that proximity to scrap material dealers proved beneficial for these enterprises. Specifically, 30 per cent of the SMEs procured their raw materials from scrap dealers within Daroghawala, a majority of 68 per cent sourced it from those located in Lahore, while a negligible portion of less than 2 per cent relied on dealers from other parts of Pakistan.

Furthermore, there are inherent differences in different types and sizes of industries and the choices they make. Basic cross-tabulations (Appendix F) show that the percentage of digital and semi-digital process adoption was relatively higher in primary industries than in secondary industries. On a similar note, the percentage of high-quality products was higher in medium-level enterprises in comparison to the micro and small enterprises which produced lower-quality products in higher percentages.



Figure 10: Box and Whisker Plot Describing the Profile of Sample SMEs



Source: Field Interviews (2023).

### Model and Hypothesis Testing

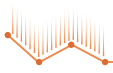
The study examined the causal effect of the OEMs' PCR on the growth of SMEs measured by the ACR by controlling for key variables that mediate this effect. Based on the literature and model selection, the following control variables were included:

1. Type of Manufacturing Process (TMP);
2. Maximum Loan Availability (MLA);
3. Annual Research Expenditure (ARE);
4. Age of Business (AOB);
5. Entrepreneurs' Education Years (EEY); and
6. Type of Industry (TOI).

The principal explanatory variable, PCR, was endogenous and, therefore, an instrumental variable, i.e., change in product demand (CPD), was used to address the issue of endogeneity, making it a two-stage least square regression model.

The literature suggests that SMEs' growth is affected by the type of manufacturing process (Jamieson et al., 2012; Li et al., 2014; Yang et al., 2021). Moreover, other scholars argue that SMEs grow through the availability of loans and the percentage of research expenditures (Jamieson et al., 2012; Yoshino & Taghizadeh-Hesary, 2016). However, evidence from the literature on Pakistan shows that the declining SMEs depend more on loans (Attari & Gulzar, 2016). These debates in the literature helped us select our controls for the model. We had to collect the data for these variables during the primary interviews and the responses on the availability of loans or the





expenditure on research were approximate values self-reported by SMEs. Such responses were difficult to triangulate by another data source. Moreover, the responses for these two variables did not have considerable variation as should be clear from Figure 10.

As seen in Appendix A, the variable CPD is an appropriate instrumental variable exogenous to the dependent variable ACR, thus helping us with the predicted values for  $PCR^*$  in the structural equation below:

$$ACR_i = \alpha + \beta_1 PCR_i + \beta_2 TMP\_Digital_i + \beta_3 TMP\_SemiDigital_i + \beta_4 MLA_i + \beta_5 ARE_i + \gamma_1 AOB_i + \gamma_2 EEY_i + \gamma_3 TOI\_Anc\_MillingMachine_i + \dots + \varepsilon_i$$

The model results are shown in Table 7 with a significant impact of the PCR on the ACR. This shows that with these controls and endogeneity issues addressed, a unit increase in the PCR increased the ACR by 0.67.

Table 7: Results of Two-Stage Least Squares Model

ACR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
PCR	.678	.129	5.25	0	.425	.931	***
TMP: base							
Conventional Digital	-3.598	3.674	-0.98	.327	-10.8	3.603	
Semi Digital	2.015	2.966	0.68	.497	-3.798	7.828	
MLA	-.014	.014	-0.97	.331	-.041	.014	
ARE	-.14	.105	-1.33	.183	-.346	.066	
AOB	-.155	.113	-1.37	.17	-.376	.066	
EEY	-.278	.236	-1.18	.238	-.74	.184	
TOI: base Ancillary Metal							
Industry Primary Metal	3.358	2.319	1.45	.148	-1.187	7.903	
Industry							
Constant	-11.465	6.634	-1.73	.084	-24.467	1.537	*
Mean dependent var		17.777	SD dependent var			23.771	
R-squared		0.645	Number of obs			175	
Chi-square		75.355	Prob > chi2			0.000	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Source: Field Interviews (2023).

## Conclusion

The analysis shows that the SMEs in Daroghawala grow when they find OEMs as their permanent clients. Having permanent clients ensures that these firms remain in business, and this can allow them to take risks, make investments, and update their systems. However, this study has not been able to find any evidence for the impact of other control variables on the growth of SMEs. Controlling for these variables, however, the causal effect of the permanent clientage offers results for policy intervention.

Findings from this research have two implications for further research and inferences. First, since this is cross-sectional research on one type of industries agglomerated in one industrial cluster, its findings are not entirely generalizable. Therefore, future research should be conducted on other industrial areas and industrial sectors to see if the results of the present study apply to other areas and industries. If so, an encompassing policy could be prepared based on the generalised findings of this and future research endeavours.



Second, the present study is the exploration of the factors that enable these SMEs to gain access to more permanent clientage. This endeavour highlights if any structural phenomena cause this access, and whether those could be altered through policy. The extent to which policy can contribute towards the growth of these enterprises could be evaluated through such future research. Important literature on global value chains (GVC) debates the issue of inclusion, focusing on the insertion of SMEs in developing countries into the global production network. The evidence from this study could be a case for future research on the inclusion of manufacturing SMEs of Pakistan in the GVC.

## 4. ECONOMIC LINKAGES OF INDUSTRIAL CLUSTER

### Introduction

The majority of Pakistani enterprises operate in an informal economy. Contributing to 33.5 per cent of the country's GDP, the informal sector employs 74 per cent of the country's workforce (GOP, 2011). Past research has already documented that there are different levels of informality exhibited by SMEs in Pakistani cities. For example, a study on 300 micro-enterprises in Lahore highlighted that 29 per cent were informal, 33 per cent had a high level of informality, 30 per cent had a low level of informality, and only 7 per cent were formal (Williams et al., 2016).

The prevalence of informally operated industries in urban Pakistani areas presents an intriguing scenario. While the activities of these industries are often observable near residential areas or workplaces in larger cities, and many people might know someone employed by these enterprises, the internal dynamics of these industries remain largely unknown. This is equally applicable to official documentation on industries or industrial clusters. While such records outline the general profiles or locations of these clusters, the absence of data restricts the information on business linkages and financial transactions in these areas, which, in turn, impacts policymaking. Numerous industrial units within these clusters continue to function with substandard infrastructure as their monetary potential remains unrecorded.

Globally, contemporary economic development strategies emphasise the measurement of local economies to ensure optimal utilisation of public funds. For instance, analyses of regional inputs and outputs are conducted to gauge the potential impacts of new investments in areas experiencing rapid economic transformations (Drucker, 2015). However, the application of such analysis requires measurements of the economic transactions within and between different economic units. This section engages with the issue of the informal nature of SMEs from the perspective of their monetary linkages. The purpose is to assess such linkages in an otherwise mainly informally operating industrial cluster through an innovative, though intuitive, methodology. We argue that the economy usually labelled as 'informal' is seldom estimated for its cash flows and transactions due to a lack of documented data. Our methodology is innovative in the sense that we use a previous standard methodology for the formal economy to estimate economic linkages of a cluster with varying degrees of (in)formality. The resulting assessment of transactions highlights the economic potential of a case study of an industrial cluster and the type of economic flows that it generates.

### Literature Review

Given the informal nature of many SMEs in Pakistan, there is a need to engage with the literature on informality. Delving into the multifaceted concept of informality requires a comprehensive understanding of various theoretical perspectives offered in existing literature. Recent literature has summarised the expositional standpoints of scholars (Chen, 2012; Thulare et al., 2021), providing a diverse overview of the numerous schools of thought that attempt to explain the intricacies of informality. Informality, as a socioeconomic construct, has



received extensive attention in academic scholarship, resulting in a variety of interpretations. The discourse is predominantly shaped by three principal schools of thought, namely, the dualist, the structuralist, and the legalist. The discourse also includes emerging perspectives such as the voluntarist and postcolonialist schools.

The dualist school of thought, whose origins lie in the interwar period scholarship of social economists, such as J. H. Boeke and J. S. Furnivall, envisions the informal economy as a discrete entity separate from the formal economy (Potts, 2008). It identifies the informal sector as a marginalised segment primarily due to differences in access to modern means of production. According to dualists, the constraints faced by informal actors, which hinder their economic efficiency, stem from this limited access to resources. They conceptualise the informal economy as a marginal realm occupied by the leftovers of the formal economy.

Dualists posit that the informal economy serves as a safety net for the economically disenfranchised, supplementing their income and providing a fallback during crises. It emerges because of a mismatch between the skills of the workforce and the demands of modern economic structures. This mismatch leads to the exclusion of informal actors from the formal sector, thereby forcing them to organise a living in the informal economy. Dualists, therefore, view informal economic activities as largely disconnected from the formal economy, mainly constituted by self-employed individuals who are disadvantaged within the formal market.

Influenced by the neo-Marxist approach of Louis Althusser, the structuralist school of thought, as advanced by scholars such as M. Castells and A. Portes, views the informal economy as a 'common sense' element within capitalist structures (Potts, 2008). Structuralists perceive the informal economy as a conglomerate of subordinate economic units that provide a competitive advantage to the formal economy by reducing input and labour costs.

From the structuralist viewpoint, informality is an intrinsic component of capitalist growth. Formal enterprises, driven by a desire for cost efficiency, depend on informal economic actors. Structuralists attribute this dependence to the structure of capitalist systems, thereby asserting a profound interconnection between formal and informal economies. They interpret informal enterprises and wage workers as subjugated actors facilitating formal capitalist entities by providing affordable goods and services.

Scholars such as H. de Soto introduced the legalist school, attributing the rise of the informal economy to exclusionary governmental legal and regulatory frameworks (Thulare et al., 2021). Legalists argue that micro-entrepreneurs operating within the informal economy intentionally evade the burdensome costs, time investment, and complex bureaucracies associated with formal registration. Consequently, they propose that these entrepreneurs create their own informal norms and regulations that exist outside official legal boundaries.

The legalist school prioritises the behaviour of informal entrepreneurs and the regulatory environment while downplaying the broader formal economy and the informal wage workers. It sees the formal economy from a mercantilist perspective, considering how it collaborates with the government in forming bureaucratic rules.

The voluntarist school posits that informal economy operators deliberately evade regulations and taxes for the perceived benefits of their businesses, thereby creating unfair competition by avoiding associated costs. Contrarily, the postcolonialist school perceives participation in the informal economy as not solely driven by economic motivations but significantly influenced by the social habitus of each geopolitical context (Thulare et al., 2021). The school suggests that informality is a social phenomenon deeply intertwined with economic and social life, making it necessary for policymakers to conduct comprehensive sociological research to understand the nuances of informality before formulating policies for its potential formalization.

In addition to these expositional standpoints about informality, there is another domain of literature which helps assess an economic unit. Economic base theory, for example, is relevant to this research for engaging with informal SMEs from the perspective of their monetary linkages. The basic premise of the economic base theory is



that the external demand for a region's products is the primary determinant of regional prosperity (Malizia et al., 2020). This theory is the basis for the economic impact analysis of an intervention. The economic activities of an area are divided into those that produce for the export market (called basic industries) and those that produce for the local market (called non-basic industries). The terms basic and non-basic occupations were first coined by Haig (1927) followed by Nussbaum (1933). The basic economic base method was developed by Hoyt & Weimer (1939) which later matured through multiple works in the following decades (Hoyt, 1954, 1961).

The manufacturing sector industries are usually taken as basic industries in the economic base model, i.e., these industries export products from the local economy (Malizia et al., 2020). While this assumption could hold for the small units of the local economy, the exclusive focus on external demand as the determinant of regional growth could be limiting when the area of study is large or metropolitan.

The application of the economic base model, however, requires extensive primary data which needs huge funds and time. To reduce the effort, employment numbers are used as a proxy for the income and the separation of the basic and non-basic sectors has been done through non-survey techniques. For example, LeSage & Reed (1989) used the location quotient method for this separation. This method is based on the assumption that each region's demand pattern is similar to the national pattern. Hence, a region should have the same employment mix as that of the nation. The sectors in which the region is more specialised could be export products (basic sectors), while the sectors which have lower regional employment than proportionate national number would be import products (non-basic sectors).

The application of the economic base model is criticised in the literature for its static nature. The underlying economic pattern keeps changing and so should the multiplier effect in the economic base model. Scholars have suggested dynamic versions of the economic base model for accommodating the dynamic nature of the economy, for example, Kraybi & Dorfman (1992) suggested a stochastic intersectoral model for a dynamic multiplier. Furthermore, the economic base model is also criticised for its simplicity to cater for the leakages like wages paid to the nonresidents or payments for intermediate inputs (Farness, 1989; Tiebout, 1962), in response to which Frey (1989) suggested that two local multipliers should be defined to accommodate the sensitivity analysis due to the leakage from the circular flow of the local economy.

Closely linked to the economic base theory are the transaction tables initially developed during the inter-war period. The transaction tables have been instrumental in understanding the economic linkages of an area. Matured through iterations with time, transaction tables are still relevant tools for economic assessment and impact analysis (Malizia et al., 2020). This study develops the transaction table for a local industrial cluster, Daroghawala, in Lahore to highlight nuanced monetary flows in the cluster and engage with the discourse of informality through this assessment.

## Research Methodology

A transaction table is usually constructed to show the amount of money flowing between different economic units of an area. The size of economic units and the area are decided according to the purpose of constructing the table. For this research, economic units were chosen as different types of industries. Therefore, the transaction table was constructed to show the amount of money that each of the industry types spends or earns from similar or different types of industries within the Daroghawala cluster. Moreover, this table was further developed to assess the money flowing in and out of Daroghawala in each type of industry. These outside flows were disaggregated at four spatial scales:

1. Metropolitan Lahore;
2. Punjab;





3. Pakistan; and
4. The global scale of outside Pakistan.

Each scale showed flows excluding the previous scale.

As already mentioned, the economic units selected for this research were the typologies of uses in Daroghawala. As discussed in Section 1, there were three major typologies, namely, primary industries independently manufacturing metal products, ancillary industries working for and with primary industries, and industry supporting commerce (ISC) providing trade services to the earlier two. The same typologies were used for the construction of the transaction table. Since the table was to show the amount earned and spent by each type of typology, data was collected from each of them separately. The number of enterprises interviewed for this part of the study was, therefore, higher than those interviewed for Section 2. While Section 2 only included data for SMEs of primary and ancillary type, this section included data for large-scale industries as well as industries supporting commerce. While data for 175 sampled industries (as explained in the methodology in Section 2) was gathered for this research, an additional 6 large-scale primary metal industries and 24 industry-supportive commerce enterprises were interviewed. This additional number of interviews was the same proportion (14 per cent of the total type of units) as 175 sampled industries for Section 2.

To assess the economic flows for each type of industrial typologies, questions were asked about the weight of metal that they manufactured or processed in a month, and what percentage of their expenses were incurred on purchasing the raw materials or wholesale products (in case of industry supporting commerce). Market rates of the different types of metals gave an estimate of the amount that each enterprise spent on raw materials. Follow-up questions were asked about the percentage of operating costs of purchasing equipment, machines, utility bills, government fees, labour costs, and such. These percentages were in comparison to that of the raw materials with the estimated amount generated and the assessed amounts spent in each category of costs. Moreover, further follow-up questions were asked about the spatial scale of the origin of cost. Likewise, these enterprises were asked about the amounts that they earned by selling their products to other enterprises, the end-user market within Daroghawala, and outside of it at the four spatial scales mentioned above.

In addition to this extensive primary data collection from the enterprises, secondary data sources were also used for completing the transaction table. Official sources were requested to provide disaggregated data for Daroghawala to show amounts collected as tax revenue, and the amounts spent on imports or earned through exports by enterprises of the area. This data (source mentioned ahead) was collected at a scale where the confidentiality of enterprises was not violated and, hence, the reporting of the analysed data in this research ensured that none of the data disclosed enterprise-level information.

Despite the extensive data collection from the sampled primary interviews, one challenge was presented in constructing the transactions table. The data generated results for the sampled enterprises, while the table was to estimate the flows at the spatial scale of the industrial cluster. Fortunately, we had a representative sample and inferential statistics were a useful tool for the inference of monetary transactions in Daroghawala at the population level. Interval estimation for the population mean was estimated through the sample data using the following formula:

$$\bar{X} \pm Z_{\alpha/2} \sigma / \sqrt{n}$$

Where,

$\bar{X}$  = Sample Mean

$Z_{\alpha/2}$  = 1.96 at  $\alpha$  (5%)



Hence, the monetary linkages of Daroghawala were estimated by gathering the self-reported data from the three types of establishments in Daroghawala. The data was gathered and improvised through a series of steps:

- A. For the selected sample, each of the three types of establishments was asked about their monetary flows, but indirectly. The indirect approach was adopted because respondents were not comfortable sharing direct monetary values. For example, the data was collected about the tons of metal that they process in one month. Furthermore, the type of metal processed was also noted.
- B. The amount of metal processed was then multiplied by the per-ton rate of each type of raw metal. This generated the total cost of raw metal that each SME paid.
- C. Each SME was asked how much per cent, out of their total per ton business cost, was the cost of purchasing the raw metal. With this percentage reported and the cost of raw materials previously estimated, the total business cost was estimated.
- D. Each SME was asked about the percentage of cost that they paid in (i) purchasing services from the secondary metal processing workshops; (ii) purchasing raw material from industry-supporting commerce; (iii) purchasing equipment and maintenance tools from industry-supporting commerce; (iv) paying official bills and fees; (v) paying wages; and (vi) miscellaneous costs. Furthermore, the breakdown for these costs was asked for Daroghawala, Lahore, Punjab, Pakistan, and beyond to generate an estimation for the different spatial scales.
- E. The total business capital was estimated by adding the profit margin percentage reported by each SME. They were further asked about the percentage of income that they earned by selling their product to other industries and selling their product directly to the commerce for sale in the market. Furthermore, the breakdown for the income was asked for Daroghawala, Lahore, Punjab, Pakistan, and beyond to generate an estimation for the different spatial scales.
- F. Similar approaches were adopted for the other two types of establishments to assess the resulting economic linkages.
- G. The primary data collected through the sample cases was used to assess the interval estimation for the population mean using four steps.
  - Step 1: Estimate sample mean and standard error. We calculated this from our primary interviews.
  - Step 2: Estimate population mean interval.
  - Step 3: Convert values to millions of Pakistani rupees.
  - Step 4: Aggregation by multiplying per-industry values with the number of industries in each type. (The details on the calculation can be seen in Appendix H.)
- H. Secondary data was also used to complete the cells regarding government fees, imports, and exports in the transactions table. The secondary data was obtained from the Federal Bureau of Revenue (FBR), Pakistan Customs Department, and Trade Development Authority of Pakistan (TDAP) for the last six fiscal years from 2017 to 2023 as shown in Table 9. The table shows annual average cash flows from the data from the last five years.



## Findings and Discussion

The economic linkages of Daroghawala are assessed as can be seen in Table 9 which shows the annual economic linkages of Daroghawala. The table highlights the economic linkages that each type of establishment in Daroghawala has with similar and other establishments within Daroghawala and beyond. Detailed calculations along with low and high estimates for population mean for the transaction table may be referred to in Annex C. The table offers many insights about Daroghawala.

The table comprising rows and columns shows the purchase and sale of each industrial typology. For example, the first column from top to bottom shows the amounts those primary industries spent, and the first row with primary industry as the row heading should be read from left to right indicating the amount that these types of industries earned by selling their products. The smaller box in the table shows linkages between the enterprises within Daroghawala, while the cells outside show their linkages at different spatial scales outside this area.

As should be clear from the smaller box, there were considerable amounts of transactions among the enterprises within Daroghawala. This hints that these enterprises benefited from agglomerating together, producing business for each other. For example, the primary industries purchased goods worth PKR 792.1 million in real terms rupees from industry-supporting commerce annually and sold products worth PKR 986.9 million in real terms to other primary industries within Daroghawala.

The transactions table further shows that many enterprises in Daroghawala sold their products to other industries within and outside Daroghawala. For example, ancillary industries in the area sold products worth PKR 820.2 million in real terms annually to the primary industries of the area. This might hint that the structuralist school of informality may have merit in the case of Daroghawala. Large-scale manufacturing could support most SMEs in this area by subcontracting some parts of the manufacturing to avoid labour and regulatory costs.

Furthermore, as can be seen in the transactions table, the purchase, and sale of products from enterprises of Daroghawala at different scales show the strongest linkages with metropolitan Lahore in comparison to any other scale. For example, primary industries sold their products worth PKR 5,723.3 million in real terms rupees annually in Lahore which was greater than their sales at any subsequent spatial scale. This hints that most of these enterprises engage in metropolitan scale economy by conducting business with enterprises of other industrial clusters in Lahore. The mutual operation of these industrial clusters shows the sustenance of an economy through organically developed monetary flows. This confirms our finding in the earlier sections of this research that SMEs in Daroghawala purchase materials from other clusters in Lahore and sell their products to major markets in the city.

The case of Daroghawala shows its direct import and export linkages as can be seen in Table 8 which enlists the aggregated data for the last six fiscal years. Cumulatively, industries in Daroghawala imported goods worth an average of PKR 383.9 million in real terms and exported products worth PKR 1,227.6 million in real terms annually on average. These international linkages reject the dualist conception of informality for Daroghawala. Even if many enterprises in this area are not fully formal, they are by no means marginalised and separated from the formal economic sector and manufacturing. Contrarily, these enterprises purchase and sell products not only locally but also internationally.



Table 8: Monetary Linkages of Daroghawala outside Pakistan (in Millions)

Fiscal Year	Exports		Imports	
	Nominal PKR	Real PKR	Nominal PKR	Real PKR
2017-2018	363.50	346.52	221.94	211.58
2018-2019	941.64	894.25	803.41	762.98
2019-2020	1,062.82	982.28	595.87	550.71
2020-2021	1,881.25	1,699.41	224.09	202.43
2021-2022	2,518.94	2,313.07	417.75	383.61
2022-2023	1,268.76	1,130.80	215.05	191.67
Average	1339.48	1227.72	413.02	383.83

Source: Aggregated Government Data (2023).

Government payments in Table 9 show the amounts that each type of industrial unit paid in taxes. For example, primary industries paid tax worth PKR 185 million in real terms annually followed by ancillary industries which paid PKR 11.3 million in real terms and industry-supporting commerce paid PKR 1.8 million in real terms. This highlights that many Daroghawala enterprises are formal to the extent that their economic operations are documented. Moreover, it shows the economic potential of the cluster for future government interventions. According to the table, the percentage of tax paid by the primary industries (5.45%) was more than the tax paid by ancillary industries (0.26%) or the industry supporting commerce (0.28%). This is, firstly, because primary industries included large-scale industries of Daroghawala, which mostly operate more formally, thus, paying taxes. Secondly, it also depicts a possible tax evasion attitude of most ancillary industries and related commerce as they possibly do not register as a business, conducting most economic transactions on cash to avoid documented records of revenues.

Table 9: Annual Economic Linkages of Daroghawala

	Primary Metal Industry	Ancillary Industry	Industry Supporting Commerce	Export (Lahore)	Export (Punjab)	Export (Pakistan)	Export (Global)	Total
Primary Metal Industry	986.9	241.3	16.5	5,723.30	4,738.80	965	1,227.60	13,899.30
Ancillary Industry	820.2	37	26	4,452.20	1,397.10	659.8	...	7,392.30
Industry Supporting Commerce	792.1	712.1	0.8	51.9	1.5	...	...	1,558.40
Import (Lahore)	2,951.90	796.3	304.2					
Import (Punjab)	2,891.70	669.4	184.2					
Import (Pakistan)	1,498.40	706.6	387.2					
Import (Global)	383.9	...	...					
Government Payments	185	11.3	1.8					
Total	10,510.10	3,174.00	920.7					

Sources: The data was obtained from a combination of field interviews and secondary sources from the Trade Development Authority Pakistan (TDAP), the Pakistan Customs Department, and the Federal Bureau of Pakistan (FBR). All values were deflated to the 2015–16 base and are in PKR million.





## Conclusion

This section has assessed the economic flows between different industrial typologies of Daroghawala. Daroghawala's robust economic landscape, characterised by intricate interdependencies and a blend of formal and informal sectors, challenges simplistic perceptions. The mutual financial transactions among local businesses hint at the structuralist view of informality, suggesting an innate interconnectedness within capitalist structures. This perspective sees the informal economy as an integral part of capitalist growth, with formal sectors relying on the informal for cost efficiency.

Furthermore, the international economic connections of Daroghawala, evidenced by their import and export activities, refute the dualist perspective, which sees the informal sector as a marginalised entity detached from the formal economy. Instead, these international linkages underscore that even if many of Daroghawala's businesses operate outside the fully formalised frame, they are deeply embedded in the broader economic fabric, locally and internationally.

The taxation insights from Daroghawala indicate elements of the legalist and voluntarist schools. The substantial taxes paid by primary industries signal their alignment with the formal sector, while the lower contributions from ancillary industries suggest a possible preference for avoiding regulatory burdens, hinting at the intentional evasion proposed by legalist and voluntarist perspectives.

Furthermore, the emphasis on Daroghawala's transactions, particularly with the broader metropolitan economy of Lahore, resonates with the principles of the economic base theory. This theory, which focuses on external demand for a region's products as a key prosperity driver, provides a lens to assess the region's economic dynamics. While the manufacturing sector is typically deemed a 'basic industry' that exports products from the local economy, the complex interplay of monetary flows within Daroghawala, as illuminated by transaction tables, reveals a nuanced, interconnected economic environment.

In a country which is struggling economically, an industrial cluster like Daroghawala is creating jobs, and contributing to GDP. While diverse theories about the informal economy exist in the literature, our findings have shown that their perspectives are not entirely dichotomous and might offer varying focal points for examining the informal economic activities of Daroghawala. For instance, the dualist school emphasises the role of the means of production for which we find that enterprises of Daroghawala have access to these means.

Moreover, structuralists scrutinise the informal economy through the lens of large corporations' economic cost-benefit objectives. This theory underscores the importance of macro-level influencers on the formation of the informal economy, and we find merit in this explanation in the case of Daroghawala. We find many industry-to-industry economic flows hinting that the structure of economic activity in the area and Pakistan, in general, affects the business of these enterprises.

Future research in this domain could assess similar transaction flows among other industrial clusters in Lahore and Punjab. This will generate a robust industrial and economic profile to be used in economic impact analyses. The transaction table shows the amount of monetary flow generated by each type of industrial activity. If similar tables were to be constructed for other clusters, their mutual dependence could be explored to see the best points of intervention for investment and policy.

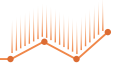


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## APPENDICES

### Appendix A: List of Variables for Which Data Was Collected through 175 Interviews

Label	Variable	Notes
DOI	Date of Interview	DD/MM (Interviews were conducted from November 2022 to June 2023)
AOB	Age of Business	Number of Years
EEY	Entrepreneur's Education Years	Number of Years
CBV	Current Business Volume	Weight of metal processed (ton/month)
IBV	Initial Business Volume	Weight of metal processed (ton/month)
HBV	Highest Business Year	Year in which the establishment reached highest level of production
HBV	Highest Business Volume	Weight of metal processed (ton/month) in the highest production year
ABV	Adjusted Business Volume	Average of CBV and HBV
RMC	Raw Material Cost	Per ton rate of the raw material (deflected to real rupees 2015-2016)
TBC	Total Business Capital	Estimated from PBR and RMC (deflated to millions of real Pakistani rupees 2015-2016)
MPB	Metals Processed in Business	Type of Metals processed by the business
TOI	Type of Industry	Type of Industry per classification of primary manufacturing, or secondary processing industries.
BCR	Business Change Ratio	A ratio of change in business capacity to the initial capacity
ACR	Annual Change Ratio	A ratio of BCR to the age of business (in %)
RSR	Retail Selling Ratio	Percentage of sales directly to the market (in %)
ISR	Industry Selling Ratio	Percentage of sales to another industry (in %)
ESR	Export Selling Ratio	Percentage of sales generated by export (in %)
MLA	Maximum Loan Availability	Self-reported average ability to secure credit during enterprise history (Deflated to millions of real Pakistani rupees 2015-2016)
CNE	Current Number of Employees	Number of persons
PIC	PERI Industry Category	PERI defines micro as firms with employees less than 5, small between 5-19, medium 20-99 and large industries above 99
SRM	Source of Raw Material	Location where raw material is purchased from
ARE	Annual Research Expenditure	Deflated to '00,000s of real Pakistani rupees 2015-2016
MEB	Monthly Electricity Bill	Deflated to '0,000s of real Pakistani rupees 2015-2016
ANC	Average Number of Clients	Self-reported average number of OEM clients a year throughout enterprise history
PCR	Permanent Client Ratio	A ratio of the permanent number of OEM clients to the average number of OEM clients in a year through enterprise history (in %age)
CPD	Change in Product Demand	An estimated change in the demand for the product in the market, exogenous to the business (in %age)
QLP	Quality Level of Product Manufactured	The self-reported quality level of the product with A being the best and C being the least quality level
SOE	Source of Energy	Type of the source that the business used for energy
BMU	Business Modification and Updates	Type of updates incorporated over the business period
ABP	Availability of Business Plan	Self-reported availability of business plan in nominal yes or no response
MME	Management Model of Enterprise	Self-reported management model of enterprise
TMP	Type of Manufacturing Process	Self-reported manufacturing process used by the enterprise (categorical variable with three possible responses: Digital, Semi Digital, and Conventional)
PBR	Percentage of Business Cost Spent on Purchasing Raw Material	%
RMC1	Raw Material Purchased from Daroghawala	%age
RMC2	Raw Material Purchased from Lahore	%age
RMC3	Raw Material Purchased from Punjab	%age



RMC4	Raw Material Purchased from Pakistan	%age
RMC5	Raw Material Imported from Abroad	%age
EPC	Equipment Purchase Cost	%age
EPC1	Equipment Purchase Purchased from Daroghawala	%age
EPC2	Equipment Purchase Purchased from Lahore	%age
EPC3	Equipment Purchase Purchased from Punjab	%age
EPC4	Equipment Purchase Purchased from Pakistan	%age
EPC5	Equipment Purchase Imported from Abroad	%age
ESC	Energy Sources Cost	%age
WSC	Wages and Salaries Cost	%age
MTC	Mobility and Transportation Cost	%age
MBC	Miscellaneous Business Cost	%age
RSI	Revenue from Selling Product to other Industries	%age
RSI1	Revenue from Selling Product to other Industries based in Daroghawala	%age
RSI2	Revenue from Selling Product to other Industries based in Lahore	%age
RSI3	Revenue from Selling Product to other Industries based in Punjab	%age
RSI4	Revenue from Selling Product to other Industries based in Pakistan	%age
RSI5	Revenue from Selling Product to other Industries based outside of Pakistan	%age
RSR	Revenue from Selling Product to the Retail Stores	%age
RSR1	Revenue from Selling Product to the Retail Stores based in Daroghawala	%age
RSR2	Revenue from Selling Product to the Retail Stores based in Lahore	%age
RSR3	Revenue from Selling Product to the Retail Stores based in Punjab	%age
RSR4	Revenue from Selling Product to the Retail Stores based in Pakistan	%age
RSR5	Revenue from Selling Product to the Retail Stores based outside Pakistan	%age



## Appendix B: Interview Protocol for SMEs in Daroghawala

STRUCTURED INTERVIEW	
RASTA CGP ID # 04-010	
Disclaimer: This structured interview is designed for the data collection from the SMEs in Daroghawala, Lahore. The data collected through the schedule will be used only for research purposes and will be kept anonymous. The interview schedule does not include any questions that could jeopardise anonymity.	
OPEN-ENDED QUESTIONS	
To be transcribed	
1.	Please describe your enterprise. What kind of work do you do and how?
2.	How would you describe the ownership pattern of your business? Is it a sole proprietorship, or a limited company, or a corporate firm, or any other?
3.	In which year did you start your factory here in Daroghawala?
4.	Before opening your factory in Daroghawala, did you have previous experience with a similar industry? Please talk about your role in that experience.
5.	What stimulated you to start your own factory in Daroghawala?
6.	Why did you choose Daroghawala as the location of your factory?
7.	Which other locations were suitable for your factory? Why didn't you locate there?
8.	In what ways has Daroghawala changed since you opened your factory here?
9.	What was the source of your initial capital?
10.	Did you rent or purchase the land for your factory?
11.	Did the property already have utility line connections for your factory to operate? Which utility connections do you have now for your factory? Electricity, Gas Supply, Water Supply, other?
12.	In what ways have your factory characteristics changed over time? 1. Factory Land Size? 2. Type of Machinery? 3. Change in Capacity? 4. Change in Location? 5. Change in building structure? 6. Change in the type of labour hired? 7. Change in type of client? 8. Any other change?
13.	Please describe if you have changed your product with time. What were those changes? Why did you make those changes?
14.	Please describe your clients in detail. Are there some permanent vendors that you continue working with? If not, then how do you keep your business intact in the face of uncertainty of clientage?
15.	How would you describe the change in your business with time? Has it grown or declined? And what are the major reasons for this change?
16.	Where do you find human resources for hiring? Which attributes do you look for when hiring your employees?
17.	If you come across a technical issue at your factory, how do you or your team find solutions to that issue?
18.	How would you describe your interaction with other factories or workshops in Daroghawala?
19.	Where (or by whom) do you usually get support when you have troubles with your business? Please explain the type of support that you get and from whom, if any.
20.	What are the major challenges/issues in your business? And what do you do to overcome those challenges?
21.	Which steps can the government take to help you expand your business?
22.	Which government policies in the past have been helpful and in what ways?
23.	Can you please refer the researcher to another person in Daroghawala to interview? Can you help the researcher in contact with that person for an appointment?
CLOSE-ENDED QUESTIONS	
Section 01	
1.	What is your current business volume in ton/month?
2.	What was your business volume (in tons/month) when you opened your industry?



3.	In which year did you have the highest ton/month business capacity?
4.	What was your highest business capacity (in ton/month)?
5.	Which metal do you work with?
6.	What is the per-ton rate of the raw material that you purchase?
7.	What is your type of industry (rolling/forging/casting)?
8.	From your current business volume, how much do you sell in Retail?
9.	From your current business volume, how much do you sell to other industries?
10.	From your current business volume, how much do you export outside Pakistan?
11.	How much maximum loan (in PKR) could you avail for your business at the current time? How much could you avail at the start of your business?
12.	What is your current number of employees?
13.	Where do you get your raw materials from?
14.	On average for the last five years, almost how much (in PKR) have you spent annually on research and training?
15.	How much (in PKR) is your average monthly electricity bill?
16.	How many different industries do you sell your product to?
17.	Out of these clients, how many are your permanent vendors? How much were your permanent vendors at the start of your business?
18.	How much has your product demand changed with time?
19.	How do you generate high temperatures for melting/heating the metal? (furnace oil, electricity induction or arc furnace, gas or LPG, coal, plastic, wood, or other)
20.	Have you done any of these innovations since you started your business? Choose all that apply: New Product; Improved Product; New Technology; Improved Process; New Market; or other
21.	Do you have a business plan for your enterprise?
22.	What is the management model for this enterprise? (Board of Decision Makers, Corporate Organizational Structure, Owner Making the Decisions)
23.	How would you describe the process used in this enterprise? (Conventional; Semi Digital; Digital)

### Section 02

1	From your total input costs, what percentage do you spend on purchasing scrap or raw materials (excluding energy supply)? Please tell the breakup of this number: from Daroghawala, from Lahore, from Punjab, from Pakistan, and from outside Pakistan
2	From your total input costs, what percentage do you spend on all equipment, machine, or technological logistics? Please tell the breakup of this number: from Daroghawala, from Lahore, from Punjab, from Pakistan, and from outside Pakistan
3	From your total input costs, what percentage do you spend on all sources of energy supply?
4	From your total input costs, what percentage do you spend on wages and salaries?
5	From your total input costs, what percentage do you spend on transportation costs?
6	From your total input costs, what percentage do you spend on miscellaneous costs like paying some fee, or other costs?
7	From your output product, what percentage of your product do you sell to other metal factories/industries? Please tell the breakup of these earnings: from Daroghawala, from Lahore, from Punjab, from Pakistan, and from outside Pakistan
8	From your output product, what percentage do you earn by selling to the retail? Please tell the breakup of these earnings: from Daroghawala, from Lahore, from Punjab, from Pakistan, and from outside Pakistan





## Appendix C: Sample Data from the First 50 Interviews

No.	DOI	AOB	EEY	CBV	IBV	HBV	HBV	ABV	RMC	TBC	MPB	TOI	BCR	AGR	RSR	ISR	ESR	MLA	CNE	PIC	SRM	ARE	MEB	ANC	PCR	CPD	QLP	SOE	BMU	ABP	MME	TMP	PBR
1	22/11	10	5	21	50	2016	100	60.5	0.52	52.43	Aluminum	Ancillary Metal Ir	0.21	2.10	0	100	0	15	7	Small	Meri Shah	0	8	15	60.00	325	Grade C	Furnace Oil	New Product, No	Owner makes Conventional	60%		
2	23/11	8	10	20	5	2017	29	24.5	0.24	14.70	Steel bar	Primary Industry	3.90	48.75	0	100	0	2.5	8	Small	Meri Shah, B	3	2.5	8	90.00	400	Grade B	Electricity (Inc Improved Pro	Yes	Owner makes Sem Digital	40%		
3	23/11	41	5	20	10	2019	30	25	0.367	11.47	Mid Steel	Primary Industry	1.50	3.66	100	0	0	3	14	Small	Daroghawala	0	3	15	50.00	100	Grade B	Electricity (Inc New Product, No	Yes	Owner makes Conventional	80%		
4	23/11	37	12	25	4	2018	60	42.5	0.24	14.57	Cast Iron	Primary Industry	9.63	26.01	0	100	0	1.5	9	Small	Branth Road,	0	4.5	15	55.00	100	Grade B	Electricity (Inc Improved Pro	Yes	Owner makes Digital	70%		
5	25/11	4	12	15	5	2018	20	17.5	0.45	9.05	Mixed	Ancillary Metal Ir	2.50	62.50	0	100	0	0.25	4	Micro	Branth Road,	1	2	100	88.00	100	Grade A	Electricity (Ma New Product, Yes	Owner makes Sem Digital	87%			
6	25/11	4	12	15	5	2018	20	31.5	0.25	11.25	Mixed	Ancillary Metal Ir	1.63	54.17	0	100	0	0.6	3	Micro	Working on la	0	2	5	50.00	200	Grade A	Electricity (Ma No any innov	Yes	Owner makes Sem Digital	70%		
7	25/11	25	0	6	20	2017	20	13	0.465	8.64	Cast Iron	Primary Industry	-0.35	-1.40	0	100	0	0.3	9	Small	Raw material	0	4	15	60.00	100	Grade A	Electricity (Inc New Product, No	Yes	Owner makes Sem Digital	70%		
8	26/11	6	12	20	8	2016	23	21.5	0.2	6.14	Jet	Ancillary Metal Ir	1.69	28.13	0	100	0	0.15	2	Micro	Clients provid	0	1.3	5	50.00	100	Grade A	Electricity (Inc New Product, No	Yes	Owner makes Sem Digital	70%		
9	26/11	21	0	15	4	2022	15	15	0.25	7.50	Iron	Primary Industry	2.75	13.10	100	0	0	0.5	8	Small	Meri Shah, B	3	10	33.00	100	Grade A	Furnace Oil, I New Product, Yes	Owner makes Conventional	50%				
10	26/11	23	8	23	4	2019	32	27.5	0.18	12.38	MS Pipe (20	Primary Industry	5.88	25.54	100	0	60	20	80	Medium	Gujranwala	30	250	250	55.00	100	Grade A	Electricity (Inc New Product, Yes	Owner makes Digital	40%			
11	26/11	13	5	3	1.5	2018	6	3.5	0.31	1.55	Zinc	Ancillary Metal Ir	1.33	10.26	5	95	0	1	5	Small	Meri Shah La	0	3	35	0.00	-50	Grade C	Electricity (Inc Improved Pro	Yes	Owner makes Conventional	70%		
12	26/11	21	10	56	5	2018	62	59	0.25	17.99	Cast Iron	Primary Industry	10.80	51.43	0	30	70	10	80	Medium	Karachi	60	200	60	22.00	-80	Grade B	Electricity (Inc New Product, Yes	Owner makes Digital	82%			
13	28/11	12	5	130	250	2021	270	200	0.26	74.29	Mixed	Primary Industry	-0.20	-3.33	0	23	77	1000	90	Medium	China , locally	100	400	500	0.00	-45	Grade C	Electricity (Inc New Product, Yes	Board of Dec Sem Digital	70%			
14	29/11	11	5	180	150	2021	190	185	0.21	59.85	Mid Steel	Ancillary Metal Ir	0.23	2.12	100	0	0	0.3	3	Micro	Karachi and f	0	1.55	30	50.00	100	Grade C	Electricity (Ma New Product, Yes	Owner makes Conventional	68%			
15	29/11	21	12	40	3	2022	40	40	0.35	22.22	Mid Steel	Ancillary Metal Ir	12.33	58.73	50	100	0	5	5	Small	Badami Bagh	3	2.5	12	89.00	50	Grade A	Electricity (Ma New Product, Yes	Owner makes Conventional	63%			
16	29/11	8	8	27	12	2020	30	28.5	0.84	59.85	Mid Steel	Ancillary Metal Ir	1.38	17.19	0	50	0	5	14	Small	Daroghawala	2.5	5	100	20.00	20	Grade B	Electricity (Inc New Product, Yes	Owner makes Digital	40%			
17	1/12	5	20	40	10	2021	60	50	0.74	17.13	Cast Iron	Primary Industry	4.00	80.00	100	0	0	25	10	Small	Tushan City (	3	5	40	96.00	100	Grade B	Electricity (Inc New Product, Yes	Owner makes Digital	80%			
18	1/12	31	5	50	15	2008	100	75	0.285	26.72	Nickel polish	Ancillary Metal Ir	4.00	12.90	0	100	0	30	9	Small	50 % Lahore,	25	3.5	20	0.00	-70	Grade B	Electricity (Inc Improved Pro	Yes	Owner makes Conventional	80%		
19	2/12	6	12	8	2	2020	12	10	0.24	8.00	Mid Steel	Ancillary Metal Ir	4.00	66.67	0	100	0	60	12	Small	30% Karachi,	5	8	17	87.00	300	Grade A	Electricity (Inc Improved Pro	Yes	Owner makes Digital	30%		
20	2/12	48	5	30	10	2017	50	40	0.28	20.36	Mixed	Ancillary Metal Ir	3.00	6.25	30	70	0	30	8	Small	Daroghawala	0	3.5	20	80.00	300	Grade B	Electricity (Inc New Product, Yes	Owner makes Conventional	55%			
21	3/12	30	5	60	40	2021	60	60	0.3	22.50	Cast Iron	Primary Industry	0.50	1.67	0	50	1000	90	Medium	Europe, Chin	100	300	200	70.00	500	Grade A	Electricity (Inc New Product, Yes	Owner makes Sem Digital	80%				
22	3/12	32	8	4	2	2015	50	27	0.19	7.33	Iron,	Primary Industry	12.50	39.06	0	100	0	5	8	Small	Karachi, Gujr	5	3.5	15	68.00	-90	Grade B	Electricity (Inc New Product, Yes	Owner makes Sem Digital	70%			
23	3/12	16	0	5	50	2010	60	32.5	0.285	13.23	Galvanized In	Primary Industry	-0.35	-2.19	20	80	0	50	30	Medium	Karachi, Lahc	2	60	30	20.00	50	Grade B	Electricity (Inc New Product, Yes	Owner makes Sem Digital	70%			
24	6/12	11	5	32	23	2017	40	36	0.3	18.00	Mixed	Ancillary Metal Ir	0.57	5.14	0	100	0	20	5	Small	People steel	2	8	7	50.00	100	Grade C	Electricity (Ma New Product, Yes	Owner makes Digital	80%			
25	7/12	9	16	22	6	2019	25	23.5	0.315	14.81	Short blast pr	Primary Industry	2.92	32.41	0	100	0	0.3	4	Micro	Lahore	0	4.5	6	65.00	300	Grade B	Electricity (Inc Improved Pro	Yes	Owner makes Conventional	50%		
26	9/12	11	12	13	4	2015	25	19	0.16	4.34	Iron	Ancillary Metal Ir	3.75	34.09	100	0	0	0.5	8	Small	Raw material	0	2.2	10	60.00	20	Grade A	Electricity (Ma New Product, Yes	Owner makes Conventional	70%			
27	9/12	26	8	45	30	2016	60	52.5	1	75.00	Aluminum	Primary Industry	0.75	2.88	100	0	0	0.5	8	Small	We don't purc	1	5	4	30.00	50	Grade B	Furnace Oil, Improved Pro	Yes	Owner makes Conventional	70%		
28	17/12	25	0	3	90	2014	150	76.5	0.315	34.43	MS	Ancillary Metal Ir	-0.15	-0.60	20	80	0	0.7	3	Micro	Branth Road,	4	2	10	0.00	-98	Grade C	Electricity (Ma New Product, Yes	Owner makes Sem Digital	60%			
29	17/12	41	5	16	6	2016	40	28	1.27	59.27	Cast Iron	Primary Industry	3.67	8.94	70	30	0	3.5	12	Small	Daroghawala	5	10	12	0.00	0	Grade B	Electricity (Inc New Product, Yes	Owner makes Conventional	70%			
30	21/12	3	12	12	8	2022	22	17	0.345	8.38	Mixed	Ancillary Metal Ir	1.13	37.50	0	100	0	0.2	2	Micro	Clients provid	0	1.3	4	65.00	0	Grade A	Electricity (Ma New Product, Yes	Owner makes Conventional	70%			
31	21/12	11	8	23	12	2016	56	39.5	0.19	10.72	Mid Steel	Ancillary Metal Ir	2.29	20.83	100	0	0	2	7	Small	Daroghawala	1.5	3.5	5	0.00	-50	Grade C	Furnace Oil, I improved Pro	Yes	Owner makes Conventional	70%		
32	29/11	12	5	15	7	2019	25	20	0.22	5.50	Mid Steel	Ancillary Metal Ir	1.86	15.48	88	12	0	1.5	6	Small	Shah Alam M	0	3.5	10	50.00	100	Grade C	Electricity (Inc Improved Pro	Yes	Owner makes Sem Digital	70%		
33	2/12	14	5	32	12	2017	54	43	0.4	24.57	Cast Iron	Primary Industry	2.58	18.45	0	100	0	0.7	6	Small	No need, we	8	5	1	70.00	5	Grade A	Electricity (Inc Improved Pro	Yes	Owner makes Sem Digital	70%		
34	5/12	6	8	12	5	2020	22	17	0.475	26.92	Cast Iron	Primary Industry	2.40	40.00	100	0	0	3	7	Small	Shah Alam M	0	5	1	20.00	40	Grade A	Furnace Oil, I improved Pro	Yes	Owner makes Sem Digital	70%		
35	6/12	2	14	2	1	2022	3	2.5	0.24	0.86	Brass	Primary Industry	1.50	75.00	100	0	0	3	9	Small	Band road, S	2.5	5	10	20.00	-20	Grade A	Furnace Oil, I New Product, No	Owner makes Conventional	70%			
36	7/12	3	5	4	3	2022	4	4	0.2	1.14	Cast Iron	Primary Industry	0.33	11.11	100	0	0	0.8	3	Micro	Clients provid	0	5	5	0.00	-40	Grade A	Electricity (Inc New Product, Yes	Owner makes Conventional	70%			
37	10/12	6	5	1	4	2018	5	3	0.15	0.75	Mid Steel am	Ancillary Metal Ir	-0.25	-4.17	100	0	0	0.5	5	Small	Shah Alam M	0	1	15	0.00	-95	Grade A	Electricity (Ma New Market, 1 Yes	Owner makes Conventional	80%			
38	26/12	8	16	14	3	2019	20	17	0.225	6.38	Cast Iron, Ste	Primary Industry	4.67	58.33	100	0	0	1.5	4	Small	Badami Bagh	0	2.5	25	20.00	0	Grade A	Electricity (Inc Improved Pro	Yes	Owner makes Conventional	60%		
39	27/12	24	14	450	30	2012	670	560	0.215	172.00	Aluminum	Primary Industry	17.67	73.61	0	100	0	0.5	5	Small	Daroghawala	0	3	2	94.00	0	Grade A	Electricity (Inc Improved Pro	Yes	Owner makes Digital	70%		
40	27/12	31	5	1	3	2007	6	3.5	0.24	1.40	Mixed	Ancillary Metal Ir	0.17	0.54	0	100	0	1	4	Micro	Meri Shah, B	2	3.8	5	0.00	-47	Grade C	Electricity (Ma Improved Pro	Yes	Owner makes Conventional	60%		
41	27/12	4	8	25	32	2019	32	28.5	0.3	14.25	Iron	Ancillary Metal Ir	-0.11	-2.73	100	0	0	2.5	12	Small	Daroghawala	2.4	10	13	0.00	10	Grade C	Electricity (Inc Improved Pro	Yes	Owner makes Conventional	60%		
42	29/12	13	12	0.2475	0.825	2021	8.25	4.24875	0.47	2.85	3 metals (Cas	Primary Industry	4.15	31.92	0	100	0	0	3	7	Small	Landa Bazar	0	6	5	20.00	-70	Grade B	Electricity (Inc New Product, Yes	Owner makes Conventional	70%		
43	30/12	25	0	12	12	2019	12	12	0.16	6.40	Mid Steel	Ancillary Metal Ir	0.00	0.00	100	0	0	0	7	Small	Meri Shah La	0	50	5	0.00	-40	Grade C	Electricity (Inc Improved Pro	Yes	Owner makes Conventional	30%		
44	30/12	30	10	74	18.5	2009	185	129.5	0.25	40.47	High Carbon	Primary Industry	6.00	20.00	20	80	0	30	30	Medium	Branth Road	30	15	30	0.00	-60	Grade C	Gas (or LPG) New Product, Yes	Corporate S/S Sem Digital	80%			
45	31/12	9	8	4.35	2.175	2019	8.7	6.525	0.165	1.44	Stainless Ste	Ancillary Metal Ir	2.00	22.22	100	0	0	0	6	Small	Momenpura L	0	4.5	4	50.00	100	Grade C	Electricity (Inc New Product, Yes	Owner makes Conventional	75%			
46	24/12	11	0	23	12	2013	30	26.5	0.21	7.95	Iron	Ancillary Metal Ir	1.21	10.98	0	100	0	0.35	2	Micro	Daroghawala	0	1.4	6	0.00	-48	Grade C	Electricity (Inc New Product, No	Owner makes Conventional	70%			
47	03/01	20	12	2.7	0.643	2015	4.5	3.6	0.22	0.99	Iron	Ancillary Metal Ir	4.60	22.99	100	0	0	11	5	Small	Daroghawala	3	3	3	50.00	-75	Grade C	Electricity (Ma Improved Pro	Yes	Owner makes Conventional	80%		
48	05/01	2	16	2.19	0.8	2022	2.19	2.19	0.2	0.88	M.S., S.S., S.T	Primary Industry	1.74	86.88	100	0	0	0.5	14	Small	Meri Shah La	0	0.8	3	30.00	0	Grade A	Electricity (Inc Improved Pro	Yes	Owner makes Digital	50%		
49	05/01	22	5	4.275	1.781	2016	6.412																										

**Appendix D: Interview Protocol for Profiling of Industrial Clusters in Lahore**

<b>INTERVIEW PROTOCOL FOR PROFILING INDUSTRIAL CLUSTERS</b>	
<b>RASTA CGP ID # 04-010</b>	
Disclaimer: This structured interview is designed to note the history and characteristics of the Industrial Clusters in Lahore. The data collected through this interview will be used only for research purposes and will be kept anonymous. The interview schedule does not include any questions that could jeopardise the anonymity.	
<b>OPEN-ENDED QUESTIONS</b>	
<b>To be transcribed</b>	
1.	Explain to the respondent why you took time to meet them, you will essentially tell them the purpose of the meeting. After that, ask them to describe what they understood of the meeting's purpose.
2.	Since which year have you (or your family) lived or worked in this industrial cluster?
3.	What was your role? Were you just living here? Did you run your own business? Was that an industry workshop or a commercial business? How closely did you observe industrial activity in this area, and for how many years?
4.	We want to understand the temporal history of this area. What are your chronological observations? Since which year has industrial activity existed in this area? Can you help us understand which year industrial activity started increasing and why?
5.	What are the types of businesses that exist in this area? Can you help us make a list?
6.	From the perspective of the 'principle and agent' approach, which businesses would you find the leaders of the industrial activity in this area?
7.	With these many industrial activities in this area, we are curious why this area was so suitable for these businesses. What factors attracted such industrial activity in this area in your opinion?
8.	What are the types of products that are manufactured and traded in this industrial cluster? Can you help us make a list?
9.	Who were the main proponents of industrial activity here? Some major industry owners? Or government? Or politicians? Or someone else?
10.	How often do you see businessmen in this area embedded in contemporary politics? Please elaborate.
11.	In what ways do businessmen in this area use support from the political power in favour of their business?
12.	The government also made planned industrial estates in Lahore. Why did people still choose to develop industrial activity in this area?
13.	Which government departments are involved in the regulation of industrial activity in this area? How do businesses deal with the government?
14.	If you have any reports or data which could help us understand industrial activity in this area, can you share that with us?
15.	We want to understand the input chain of this area. Where do businesses purchase their materials from? Can you help us make a list of the input areas along with the approximate percentage of inputs from each area?
16.	We want to understand the output chain of this area. Where do businesses sell their products? Can you help us make a list of the output areas along with the approximate percentage of outputs to each area?
17.	Is there a seasonal pattern to the clientage of different types of businesses? Please elaborate
18.	What do you think is the average age (in the number of years) of an industrial-related business in this area? How old are the oldest businesses in this area?
19.	How often do you observe businesses in this area changing their features? What are the types of changes that they do? Product change? Process change? Or other?
20.	How often have you noticed businesses in this area shifting to others or coming to this area from another one?



21.	How often do you see generational businesses (family firms) in this area? Of total businesses, how much percentage would be like that?
22.	What is the usual profile of the business owners in this area? Educational profile? Professional experience? Social profile?
23.	What are the types of usual customer-client relations in this area? Is business usually generated from similar customers or otherwise?
24.	When customers engage with businesses in this area, how do they check the quality of the product that they need, and how do they negotiate the prices? Do relationships matter in transaction values?
25.	Do businesses in this area engage in credit transactions? In such cases, what are the instruments of credibility?
26.	Of the total businesses in this area, approximately how many sell their product with their brand name?
27.	If money is needed for business, what sources do businessmen in this area use?
28.	When hiring labour and workers, what pool do businesses select people from? Family, race, caste, area, or any pattern?
29.	How do businessmen in this area remain updated about the market dynamics?
30.	How easy (or difficult) is it for a new entrepreneur to start a business in this area and to find clients?
31.	Which factors do you think contribute to the growth of a business in this area? Why do some businesses grow faster than others?
32.	What are the examples when businesspersons of this area worked together against a common outside force? For advocating for any development works? For any negotiations with the government or politicians? For protests? Etc.
33.	What are the examples of when businesspersons of this area worked together for internal organisation? For example, access provider to supply chain networks? wage-controlled labor? temporary financing? collective action? cultural engagement? and philanthropic activities?
34.	Why do you think a city-proximate location worked for these businesses? What would change if these businesses were to be located away from the big city?





## Appendix E: Comparison of Daroghawala Aggregate Production with Pakistan Large Scale Manufacturing Index (LSMI)

The index values for the Large Scale Manufacturing Index (LSMI), Iron & Steel, and Automobiles were taken from the Quantum Index of Large Scale Manufacturing Industries (QIM) published by the Pakistan Bureau of Statistics. The aggregate production of Daroghawala was calculated by a few steps on the data collected through the field surveys. The primary data was collected by the SMEs asking their year of establishment and the initial production capacity in weight (tons) of metal manufactured per month. Each SME was also asked about their highest production capacity in weight (ton) of metal the year of the highest production, and the production in weight (ton) of metal at the time of this study (2023). The capacity of each firm each year was calculated by assuming a linear capacity change from the initial year capacity, the largest capacity during the existence of the firm, and then the firm's production in 2023. The aggregate production capacity of Daroghawala, calculated in tons of metal produced per month, was then normalised to make the numbers comparable with the indices around 100. The table below shows the normalised aggregate production of Daroghawala and the indices of the large-scale industries.

*Comparison of Daroghawala Aggregate Production with Large-Scale Manufacturing Index*

	LSMI	Iron & Steel	Automobiles	Iron, Steel & Automobiles	Daroghawala ('000 tons)
November 2005	93.50	100.60	89.50	95.05	154.32
November 2006	107.50	118.90	116.20	117.55	158.78
November 2007	108.00	110.40	112.50	111.45	158.67
November 2008	105.10	72.30	68.00	70.15	153.28
November 2009	105.10	69.00	92.10	80.55	152.92
November 2010	101.90	55.50	96.30	75.90	151.32
November 2011	100.00	33.40	92.10	62.75	148.82
November 2012	107.50	45.40	84.40	64.90	149.94
November 2013	111.88	42.00	83.80	62.90	148.57
November 2014	118.16	67.50	100.40	83.95	152.31
November 2015	123.69	57.00	134.00	95.50	154.11
November 2016	132.69	68.80	149.50	109.15	156.81
November 2017	132.97	86.60	164.50	125.55	163.23
November 2018	134.54	76.50	158.70	117.60	158.23
November 2019	128.72	69.90	86.80	78.35	143.23
November 2020	146.49	72.20	124.90	98.55	141.93
November 2021	147.23	94.00	145.40	119.70	140.12

*Sources: GOP (various issues) and Field Interviews (2023)*



## Appendix F: Cross Tabulations

*Cross Tabulation of Type of Industry and the Type of Manufacturing Process*

TOI	TMP			
	Conventional	Digital	Semi Digital	Total
Ancillary Metal Industry (Die Casting Setup)	2	0	0	2
	100.00	0.00	0.00	100.00
	2.13	0.00	0.00	1.14
Ancillary Metal Industry (Electroplating Setup)	11	0	2	13
	84.62	0.00	15.38	100.00
	11.70	0.00	3.70	7.43
Ancillary Metal Industry (Fabrication Workshop)	11	1	7	19
	57.89	5.26	36.84	100.00
	11.70	3.70	12.96	10.86
Ancillary Metal Industry (Sheet Drawing Setup)	2	0	0	2
	100.00	0.00	0.00	100.00
	2.13	0.00	0.00	1.14
Ancillary Metal Industry (Workshop of Lathe Machine)	18	1	6	25
	72.00	4.00	24.00	100.00
	19.15	3.70	11.11	14.29
Ancillary Metal Industry (Workshop of Milling Machine)	5	1	4	10
	50.00	10.00	40.00	100.00
	5.32	3.70	7.41	5.71
Ancillary Metal Industry (Workshop of Thread Making Machine)	3	3	0	6
	50.00	50.00	0.00	100.00
	3.19	11.11	0.00	3.43
Ancillary Metal Industry (Workshop of CNC)	1	1	2	4
	25.00	25.00	50.00	100.00
	1.06	3.70	3.70	2.29
Primary Industry (Forging Industry)	11	2	5	18
	61.11	11.11	27.78	100.00
	11.70	7.41	9.26	10.29
Primary Industry (Foundry Workshop)	10	7	11	28
	35.71	25.00	39.29	100.00
	10.64	25.93	20.37	16.00
Primary Industry (Rolling Mill)	20	11	17	48
	41.67	22.92	35.42	100.00
	21.28	40.74	31.48	27.43
Total	94	27	54	175
	53.71	15.43	30.86	100.00
	100.00	100.00	100.00	100.00

*The first row has frequencies; the second row has row percentages and the third row has column percentages*

*Cross Tabulation of Size of Industry and Quality of Product*

PIC	QLP			
	Grade A	Grade B	Grade C	Total
Medium	9	7	1	17
	52.94	41.18	5.88	100.00
	28.12	7.95	1.82	9.71





Micro	5	19	22	46
	10.87	41.30	47.83	100.00
	15.62	21.59	40.00	26.29
Small	18	62	32	112
	16.07	55.36	28.57	100.00
	56.25	70.45	58.18	64.00
Total	32	88	55	175
	18.29	50.29	31.43	100.00
	100.00	100.00	100.00	100.00

The first row has frequencies; the second row has row percentages  
and the third row has column percentages

### Appendix G: Steps Performed in Stata

```
1 import excel "<filepath>" firstrow clear
2 graph box AOB EEY ABV TBC ACR MLA CNE ARE MEB PCR, nofill nooutsides
3 encode TMP, gen (TMPi)
4 encode TOI1, gen (TOIi)
5 asdoc ivregress 2sls ACR i.TMPi MLA ARE AOB EEY i.TOIi (PCR=CPD)
6
7
```



Appendix H: Steps for Construction of Transactions Table

STEP02: ESTIMATING POPULATION MEAN INTERVAL												
	Primary Industry		Ancillary Industry		Industry Supporting Commerce		Selling (Lahore)		Selling (Punjab)		Selling (Pakistan)	
	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est
Primary Industry	112,004.8	136,825.5	34,847.8	34,967.5	7,784.3	7,907.9	699,457.9	743,626.0	685,461.6	685,724.5	433,785.9	485,277.3
Ancillary Industry	72,093.8	134,707.3	5,339.6	5,355.1	12,199.7	12,530.9	555,656.1	566,946.5	200,199.6	204,066.0	310,293.6	318,106.7
Industry Supporting Commerce	20,539.2	179,182.4	102,342.2	103,715.5	375.3	379.9	77,303.2	79,634.9	2,590.0	2,595.6	-	-
Buying from (Lahore)	303,184.0	441,112.3	64,053.4	166,351.3	128,242.0	161,517.0						
Buying from (Punjab)	325,520.6	403,600.6	83,284.9	110,412.0	72,281.8	103,176.7						
Buying from (Pakistan)	156,130.9	221,692.9	99,737.8	104,719.6	52,570.2	316,144.5						
Import (Global)												
Government Payments												
All values are in real PKR												

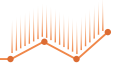
STEP03: CONVERTING TO MILLIONS OF PAKISTANI RUPEES												
	Primary Industry		Ancillary Industry		Industry Supporting Commerce		Selling (Lahore)		Selling (Punjab)		Selling (Pakistan)	
	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est
Primary Industry	0.11	0.14	0.03	0.03	0.01	0.01	0.70	0.74	0.69	0.69	0.43	0.49
Ancillary Industry	0.07	0.13	0.01	0.01	0.01	0.01	0.56	0.57	0.20	0.20	0.31	0.32
Industry Supporting Commerce	0.02	0.18	0.10	0.10	0.00	0.00	0.08	0.08	0.00	0.00	-	-
Buying from (Lahore)	0.30	0.44	0.06	0.17	0.13	0.16	-	-	-	-	-	-
Buying from (Punjab)	0.33	0.40	0.08	0.11	0.07	0.10	-	-	-	-	-	-
Buying from (Pakistan)	0.16	0.22	0.10	0.10	0.05	0.32	-	-	-	-	-	-
Import (Global)												
Government Payments												
All values are in millions of real PKR												



STEP 4: AGGREGATING										
	Primary Industry		Ancillary Industry		Industry Supporting Commerce		Selling (Lahore)		Selling (Punjab)	
	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est	Lower Est	Upper Est
Primary Industry	74	90.4	20.1	20.1	1.4	1.4	462.3	491.5	394.8	395
Ancillary Industry	47.7	89	3.1	3.1	2.1	2.2	367.3	374.8	115	
Industry Supporting Commerce	13.6	118.4	58.9	59.7	0.1	0.1	51.1			
Buying from (Lahore)	200.4	291.6	36.9	95.8	22.4	28.3				
Buying from (Punjab)	215.2	266.8	48	63.6	12.6					
Buying from (Pakistan)	103.2	146.5	57.4	60.3						
Import (Global)*	32	32	-							
Government Payments*	15.4	1								

STEP 5: AVERAGE ESTIMATES									
	Primary Industry	Ancillary Industry	Ind. Supp. Comm.	Selling (Lahore)	Selling (Punjab)	Selling (Pakistan)	Export (Global)*	Total	
Primary Industry	82.2	20.1	1.4	476.9	394.9	80.4	102.3	1,158.3	
Ancillary Industry	68.3	3.1	2.2	371.0	116.4	55.0	-	616.0	
Industry Supporting Commerce	66.0	59.3	0.1	51.9	1.5	-	-	178.8	
Buying from (Lahore)	246.0	66.4	25.4						
Buying from (Punjab)	241.0	55.8	15.4						
Buying from (Pakistan)	124.9	58.9	32.3						
Import (Global)*	32.0	-	-						
Government Payments*	15.4	0.9	0.2						
Total	875.8	264.5	76.7						
*Note: The aggregate data comes from secondary sources of the Pakistan Customs Department, Trade Development Authority, Pakistan (TDAP) and Federal Bureau of Pakistan (FBR). All values were deflated to the 2015-2016 real Pakistani rupees and are shown in millions of real rupees transacted on average per month.									

STEP 6: ANNUAL AVERAGE ESTIMATES								
	Primary Industry	Ancillary Industry	Ind. Supp. Comm.	Selling (Lahore)	Selling (Punjab)	Selling (Pakistan)	Export (Global)*	Total
Primary Industry	986.9	241.3	16.5	5,723.3	4,738.8	965.0	1,227.6	13,899.3
Ancillary Industry	820.2	37.0	26.0	4,452.2	1,397.1	659.8	-	7,392.3
Industry Supporting Commerce	792.1	712.1	0.8	51.9	1.5	-	-	1,558.4
Buying from (Lahore)	2,951.9	796.3	304.2					
Buying from (Punjab)	2,891.7	669.4	184.2					
Buying from (Pakistan)	1,498.4	706.6	387.2					
Import (Global)*	383.9	-	-					
Government Payments*	185.0	11.3	1.8					
Total	10,510.1	3,174.0	920.7					
*Note: The aggregate data comes from secondary sources of the Pakistan Customs Department, Trade Development Authority, Pakistan (TDAP) and Federal Bureau of Pakistan (FBR). All values were deflated to the 2015-2016 real Pakistani rupees and are shown in millions of real rupees transacted annually.								



## Appendix I: Glossary

**PERI definition:** The Punjab Economic Research Institute (PERI) defined the size classification of the enterprise per its number of employees. Enterprises with less than 5 employees were classified as micro, enterprises with 5-19 employees were classified as small, and enterprises with 20-99 employees were called medium enterprises (PERI, 2018).

**Core-Periphery Model:** When transportation costs (or, more generally, trade costs) are sufficiently low, Krugman (1991) has shown that all manufactures are concentrated in a single region that becomes the 'Core' of the economy, whereas the other region, called the 'Periphery', supplies only the agricultural goods.

**Diamond Model:** A model that is designed to help understand the competitive advantage that nations or groups possess due to certain factors available to them, and to explain how governments can act as catalysts to improve a country's position in a globally competitive economic environment. Porter (1990) suggested four factors in his diamond model. These four factors are firm strategy, structure, and rivalry; related supporting industries; demand conditions; and factor conditions.

**Path Dependence:** The key characteristic of a path-dependent process is its 'non-ergodicity' which is an inability to shake free of its history. Hence, this account of an economic cluster urges the researchers to consider the historical record and trajectory of the development of the cluster. Keen readers are suggested to read a detailed review of the concept in Martin & Sunley (2006).

**Mixed Methods Research:** This is a type of research in which the researchers collect both qualitative and quantitative data for the same case study.

**Remote Sensing Technologies:** When satellites use cameras to collect images of the Earth, this is called remote sensing. The use of these images can help researchers understand many details about an area. The use of the Earth imageries collected by the satellites is called remote sensing technologies.

**Land Cover Change Analysis:** When seen from a satellite's perspective, the image of Earth can generate important information about the cover of the land surface. For example, the land surface can be covered with thick and dark green colour which could denote a forest, or by green colour denoting agriculture, or by blue-greyish colour denoting water bodies, or by yellow-greyish colour denoting barren land, or by the top view of the built-up areas showing the extent of human habitation. When such information is collected for an area over several different years, researchers can note the change in the cover of the land surface over time, such as the change of agricultural land to the built-up area. This analysis is called land cover change analysis.

**Land Use Surveys:** When a researcher wants to note the type of activity for which a piece of land is used, land use surveys are conducted. Through these surveys, it is noted if the land is used for agriculture, transportation, housing, industry and so on.

**Structured Interview:** This is a type of survey in which the researcher collects the data by asking standardised questions in a set manner from each respondent. The purpose of the structured interviews is to get a response on the same variables from all the respondents.

**Quantum Index of Large-Scale Manufacturing Industries (QIM):** The Pakistan Bureau of Statistics has been publishing an index of the large-scale manufacturing of different sectors in the country by setting the production in 2005-06 as the base year. The index value above 100 represents the production more than that was made in the year 2005-2006; the production less than 100 represents lower production than that made in 2005-06.



**Cross-sectional Research:** A type of research which analyzes a particular phenomenon at a certain point in time. Hence, the variables studied in this type of research are observed without affecting them.

**Stratified Random Sampling:** Amongst the random sampling techniques, this technique takes the proportionate number of random samples from each stratum of the population. For example, for this study, the population was the number of metal manufacturing small and medium enterprises in Daroghawala. These enterprises used different manufacturing processes, hence the stratum which was used for sampling.

As can be seen in Table 2, there were 661 primary industries and 576 ancillary industries in Daroghawala. There were other industries supporting commerce land uses and non-metal industries in the area, but they were not used as part of the population for the sample calculation. Therefore, a population of  $661+576 = 1,237$  SME units was used for sample calculation.

**Real Currency:** When data on the currency is collected on the current (also called nominal) rates, it needs to be adjusted to a standardised base year for suitable comparison between currency data collected in different years. The nominal currency values always remain dynamic, while deflated value (per base year) helps standardise them. The nominal currency, when deflated per base year, is called real currency. The real currency can be found using the following formula:

$$\text{Real Currency} = \text{Nominal Currency} \times \text{deflator}_{\text{base}} / \text{deflator}_{\text{current}}$$

**Consumer Price Index:** CPI is a standardised index that is used to measure the change of market prices over time to understand the inflation in each market (which is usually a national or a regional scale market). In other words, CPI helps in measuring the purchasing power of a currency over time. The base year value is usually set at 100, and the index value for each following year is calculated. When the index is above 100, it hints at inflation and, thus, a decrease in the purchasing power of the currency; and vice versa. CPI for Pakistan is annually reported by the State Bank of Pakistan on the base year of the 2015–16 fiscal year, available at <https://www.sbp.org.pk/ecodata/index2.asp>; retrieved on Feb 11<sup>th</sup>, 2023. The real 2022-2023 currency was calculated per the 2015–16 base year using the following formula:

$$\text{Real Currency} = \text{Nominal Currency} \times 100 / 112.2$$

**Data Triangulation:** This is a type of research method in which a variety of data sources are consulted to develop an apprehension or conclusion about the study question. While each data source can offer a particular perspective, their corroboration can yield more valid and reliable findings for the research.

**Multiplier Effect:** The multiplier in an economic base model is  $1/(1-\alpha)$  where  $\alpha$  is the propensity to spend locally. Hence, the total economy of a region is calculated by its multiple with the basic economy. Any currency or employment can be used for this estimation.

**Stochastic:** This statistical term elaborates on a phenomenon that has a random probability of determination, distribution, or pattern. As such, this model can be analyzed but cannot be predicted in advance.

**Transactions Table:** The concept of transactions table hails from the early works of economists Leontief and Fisher in the 1930s and 1940s. Transaction tables represent the monetary value of the flow of goods and services between different sectors of an economy.





## **BUILDING-UP POLICY FRAMEWORK FOR BUSINESS INCUBATION ECOSYSTEM IN PAKISTAN**

Abdul Wahid and Gulfam Khan Khalid Baghoor

### **ABSTRACT**

The entrepreneurial activity among Pakistani graduates remains remarkably low, standing at less than one per cent, which is significantly lower than other countries in Asia, such as China and India, where the rates are 10 per cent and 6.2 per cent, respectively. Surprisingly, access to finance, ranked sixth among determinants affecting start-up sustainability, was not a major hurdle for entrepreneurial growth, as revealed by survey results. Despite several public sector initiatives, no significant breakthroughs have been achieved that would establish any city or university as a prominent entrepreneurial hub. A comprehensive cost-benefit analysis of 26 BICs, three NICs, and Plan 9 sponsored by PITB was conducted. The research findings indicate that a total of 560 start-ups were produced by BICs in public sector universities, while an additional 235 start-ups were established by BICs in the private sector. Furthermore, under Plan 9 sponsored by PITB, 240 start-ups were generated. The NICs located in Islamabad, Lahore, and Peshawar reportedly produced 660 start-ups.

The study discovered that the reported numbers of graduating start-ups from these centres were exaggerated by 85-90 per cent. The actual number of start-ups fell considerably below the projected figures, highlighting a substantial gap between anticipated and actual outcomes. Secondly, concerns have been raised regarding the true nature of NICs as incubation centres, as successful business ideas and innovative products developed by start-ups are often acquired, with the original owners losing control. These incubation centres seem to be focused on showcasing numbers rather than achieving substantial growth.

Although physical space and facilities are available for start-ups in all streams, providing these amenities alone does not guarantee success. The allocation of funds towards operational matters depletes a significant portion of the funds provided by HEC and the Ministry, leaving little room for innovation and growth. Moreover, incubation managers lack the necessary experience with start-ups, and mentors often lack connections to the international start-up community, resulting in inadequate support at the initial stages.

Start-ups require substantial funding for scaling up their operations, but it has seen only three IPOs issued on the Growth Enterprise Market (GEM) board of the Pakistan Stock Exchange (PSX), and no start-ups from these streams have been listed. In contrast, the UK's Alternative Investment Market (AIM) has witnessed thousands of IPOs issued by start-ups produced by universities.

Factors such as weak IT infrastructure, entrepreneurial attitude, lack of necessary skills among graduates, regulatory policies, labour and tax laws, and a foreign policy that lacks a strong emphasis on business contribute to the struggle faced by start-ups in scaling up. The prevailing "Seth" culture, where investors seize control and replace start-up owners as CEOs, further hampers the growth of start-ups. To tap into Pakistan's potential in the IT sector and achieve substantial growth, a conducive ecosystem is needed, not just for tech start-ups but also for general businesses.



## 1. INTRODUCTION

### Background

Start-ups are often seen as riskier than traditional businesses and can have a higher chance of failure, but have the potential to be incredibly successful. In academia, especially in Pakistan, the notion of traditional businesses and start-ups are used simultaneously but both are different from each other. An established business is a business that has been around for some time, while a start-up is a new business that is just in the beginning phase (Nabila et al. 2020; Sutter, Bruton, & Chen, 2019). Established businesses typically have more resources, capital, and experience than start-ups. Start-ups usually require more risk, have more potential for growth, and involve a group of entrepreneurs who are looking to create something new, often with the intention of making money.

The story behind the success of start-ups is access to finance, however, the data analysed by the Social Innovation Lab (SIL) highlights that access to finance comes at number six, which is the last one among the top reasons for the success of start-ups in Pakistan. On the other hand, while exploring the reasons for the failure of start-ups, Krishna et al. (2016) found that on average 9 out of 10 business start-ups fail to meet industry standards. They estimated that 20 per cent of start-ups meet their demise in their inaugural year, 30 per cent succumb in the second year, and 50 per cent fail between the third and fifth years. Worldwide, the success rate is at its highest, reaching 10 per cent, depending on factors such as industry, product and service nature, and the prevailing business ecosystem in each country (Hurst & Pugsley, 2011).

To foster an entrepreneurial culture in Pakistan, the Higher Education Commission (HEC) has established business incubation centres in nearly 38 universities. Additionally, the Ministry of Information Technology (MoIT) initiated the Ignite project, establishing National Incubation Centres (NICs) in four major cities, with plans to expand to other regions. The Information Technology Boards of Punjab, Khyber-Pakhtunkhwa (KPK) and other private incubations have also set up their incubation centres. These centres have reported a significant number of graduated start-ups on their websites, reports, and blogs with success rates even surpassing those in Asia and China, standing at 6.2 per cent and 10 per cent, respectively. However, the actual number of start-ups on the ground remains quite low.

In contrast, the Global Entrepreneurship Index (GEI) evaluates the entrepreneurial landscape on a national level. Pakistan's rank of 108 out of 137 countries highlights the presence of a considerable number of graduates interested in starting their own ventures. However, less than 1 per cent actively pursue entrepreneurship. This study aims to assess the performance of these incubation centres by examining the reported and actual numbers of incubated and graduated start-ups. It also aims to identify the socioeconomic challenges faced by these start-ups and determine the facilities and services necessary for a conducive start-up ecosystem. The study evaluates the availability of these resources in the current incubation centres and identifies any missing components.

### Problem Statement

Entrepreneurial activity among Pakistani graduates is significantly lower than in China and India. Although access to finance is a major hurdle, there is no breakthrough in establishing prominent entrepreneurial hubs. Reported start-up figures are overstated, highlighting a gap between expectations and reality. Physical space alone does not guarantee success. Funds are mainly used for operational matters, leaving little room for innovation. Incubation managers lack experience and mentors lack international connections, resulting in inadequate support. Pakistan's challenging business ecosystem with minimal ease of doing business poses obstacles for start-ups. Tech start-ups face fewer hurdles, while general start-ups struggle with permits, approvals, and established monopolies. This highlights the need to identify and address the start-up ecosystem in Pakistan.



## Research Objectives

The primary objective is an in-depth exploration of the incubation ecosystem in Pakistan, guided by the following dimensions:

- a) A comprehensive understanding of the current state of the start-up ecosystem, facilitating nuanced insights into its inner workings and dynamics.
- b) Understanding and identifying strengths, significant gaps, and latent potentials of start-ups to identify the key areas of focus for further development and growth.
- c) Offering tailored policy measures and regulatory incentives that are both germane and apt, serving as catalysts for fostering a conducive environment for innovation and entrepreneurial endeavours within the incubation ecosystem of Pakistan.

These research objectives aim to provide an understanding of the start-up landscape in Pakistan, evaluate the accuracy of reported data, compare the entrepreneurial ecosystem with other countries, and assess the effectiveness of incubation centres in providing necessary resources and support to start-ups.

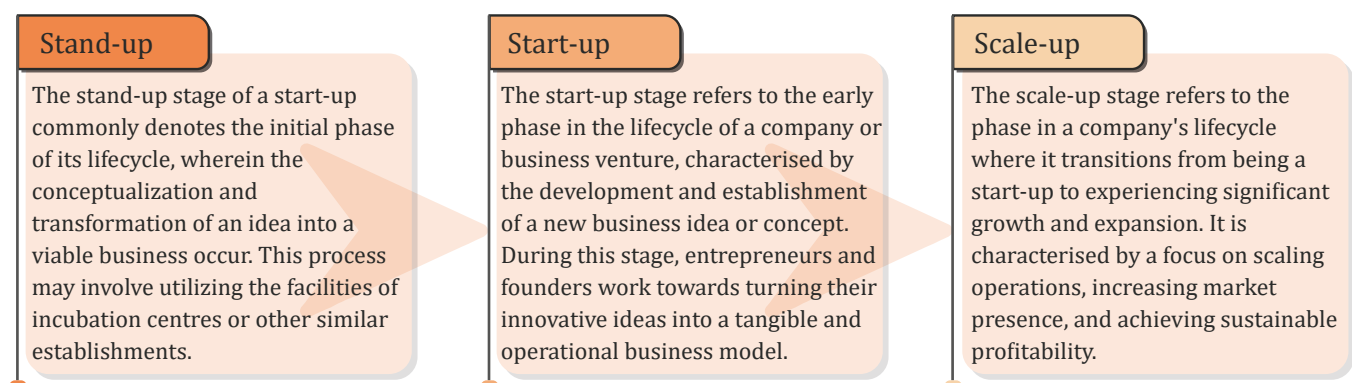
## 2. LITERATURE REVIEW

### Start-ups and Stages

In academia and policymaking, there exists a misconception regarding the understanding of start-ups and general business. Many consider every idea as a start-up, but, in reality, a start-up is a business initiated with a unique idea, product, and services that address the genuine needs and demands of society with a simple and cost-effective solution. To achieve this, entrepreneurs must conduct a comprehensive assessment of both local and international markets. Examples such as Uber, Careem, Daraz, OLX, and Zameen.com demonstrate the success of start-ups in shaping industries.

Furthermore, there are three common stages in the entrepreneurial cycle, namely, stand-up, start-up, and scale-up. Unfortunately, these stages are also misunderstood by academia in Pakistan. Moreover, in Pakistan, the establishment of a business incubation centre is not merely about providing spaces and training for entrepreneurs. It represents an entire ecosystem that nurtures start-ups and enables their transition into sustainable businesses. In the following section, we provide a detailed explanation of the phases of entrepreneurship and the ecosystem involved as shown in Figure 1.

*Figure 1: Stages of Entrepreneurial Lifecycle*



*Source: Authors' illustrations.*



### ***Stand-up***

The "stand-up" phase represents a pivotal stage in the entrepreneurial journey, commencing with the conception of an idea and the formulation of a comprehensive business plan. During this phase, the entrepreneur takes a proactive stance in launching a business venture that offers a distinctive product or service. This enterprise is built upon a thorough and authentic evaluation of market needs and demands. The incubation centre serves as the platform for this stage, wherein individuals, such as students, faculty, or other aspiring entrepreneurs register their innovative ideas along with a well-crafted business plan to initiate a new business endeavour. In Pakistan, this phase is referred to as "incubated" denoting the successful registration and acceptance of the idea by an incubation centre, which subsequently enrolls it in an upcoming cohort. While this stage may not necessitate a significant allocation of resources or extensive support, it does require comprehensive guidance and mentorship to steer the business in the right direction.

### ***Start-up***

The start-up stage is a pivotal phase in the entrepreneurial journey, where the visionary entrepreneur endeavours to transform their unique product or service idea into a fully-fledged business entity. During this critical stage, entrepreneurs require substantial support in various domains such as product and service launch, marketing, finance, and team-building. It is worth noting that a staggering 90 per cent of ideas fail to materialise into successful businesses at this juncture.

Herein lies the significance of incubation centres, which assume a vital role in the start-up ecosystem. Incubation centres offer invaluable assistance to entrepreneurs by providing them with cost-free office spaces, meeting rooms, and other essential infrastructure. Moreover, they facilitate the identification of talented teams and establish crucial connections with both upstream and downstream supply chains. Additionally, incubation centres offer complimentary accounting, auditing, legal, and IT services, thus alleviating financial burdens and administrative complexities for start-ups.

In Pakistan, there exists a prevalent misconception among incubation centres and academia regarding the definition of start-ups. Often, these entities associate the term "start-up" solely with those ventures that have "graduated" from their incubation programmes, regardless of whether they have successfully launched their businesses or not.

### ***Scale-up***

The scale-up stage in the life cycle of a start-up marks a crucial juncture wherein the venture gains the potential to expand its business operations or diversify its product line. This phase often necessitates securing financial support from banks through loans or issuing initial public offerings (IPOs) on the stock market. It is sometimes regarded that a start-up has reached the scale-up stage when it meets the necessary criteria to be listed on the GEM (Growth Enterprise Market) board at the Pakistan Stock Exchange (PSX). These criteria include having a minimum post-issuance paid-up capital of PKR 25 million and being registered with the Securities and Exchange Commission of Pakistan (SECP) as a public limited company. Furthermore, the start-up must have a functioning website that provides essential business information, and it is imperative for the company to prepare periodic financial statements that are duly audited by a QCR (Quality Control Review) rated chartered accountant.

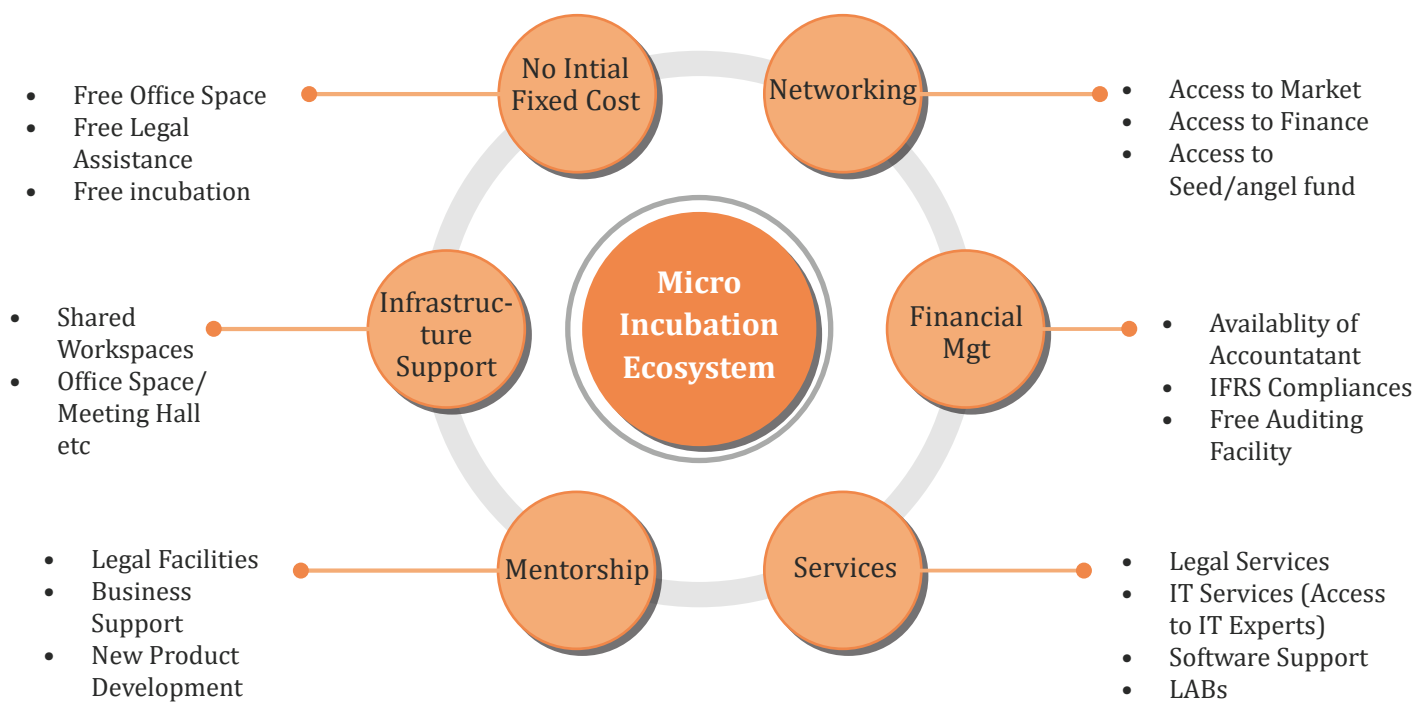
### **Micro-Business Ecosystem**

A micro-business ecosystem is a network of businesses, organisations, and individuals supporting micro-enterprises. These small businesses, often operated by a single person with fewer than five employees, are vital for local economies, creating jobs and driving economic growth. The ecosystem involves suppliers,



customers, investors, government agencies, and support organisations such as incubators and chambers of commerce. Each stakeholder contributes to the success and expansion of micro-enterprises. Suppliers provide materials, customers create demand, investors offer capital, and government agencies provide grants or loans. Support organisations provide training, mentorship, and resources. By fostering a supportive environment, communities stimulate economic growth and opportunities. While the macro-business ecosystem can impact micro-businesses, it maintains some autonomy and can shape the broader environment through innovation and entrepreneurship. Pakistan has a diverse micro-business ecosystem comprising small shops, street vendors, manufacturers, and service providers. Business incubation centres – private or public – play a crucial role in supporting this ecosystem. They generate employment, develop small enterprises, and promote innovation. The global conducive start-up ecosystem is shown in Figure 2.

Figure 2: Micro Entrepreneurial Ecosystem



Source: Authors' illustrations.

### Infrastructure Support

Infrastructure support is critical for start-ups because it can significantly impact their ability to grow and succeed. It is important to note that infrastructure support is essential for start-ups as it can help them access resources, save costs, improve productivity, enhance credibility, and increase visibility. This support can be the difference between a start-up's success and failure (Lalkaka & Abetti, 1999). Infrastructure support provides start-ups with access to resources such as funding, mentorship, networking opportunities, and shared workspaces. These resources can help start-ups overcome common challenges and accelerate their growth (Dubini, 1989). This can also help start-ups save costs associated with setting up and maintaining their infrastructure. For example, shared workspaces can provide start-ups with access to office space, utilities, and other facilities at a fraction of the cost of setting up their own office (Wright et al., 2017). With access to modern infrastructure, such as high-speed internet, advanced communication tools, and other technology resources, start-ups can improve their productivity and work more efficiently (Bergmann & Utikal, 2021). Infrastructure support can help start-ups enhance their credibility and reputation. For example, being associated with a





reputable incubation centre or accelerator programme can lend legitimacy to a start-up and make it more attractive to investors, customers, and potential partners (Prashantham & Kumar, 2019). Infrastructure support can help start-ups increase their visibility and exposure to potential customers and investors. Incubation centres and accelerator programmes often host events and provide opportunities for start-ups to showcase their products or services to a wider audience (Samaeemofrad et al., 2016).

### ***Services***

Services provide a range of non-tangible benefits that can help start-ups overcome challenges and achieve success. These benefits include access to expertise, mentoring and coaching, networking opportunities, and business development support. The management of a start-up can use the services provided by the incubator once it becomes a tenant. The management issues that plague new start-ups are not helped by shared service providers such as photocopiers, parties, and personal computers (Reynolds, 1987). According to one research (Allen & Hendrickson-Smith, 1986), local business-assistance providers work with incubators to gain access to new clients and professional advisors who are in charge of the incubator where start-ups are charged lower rates than other non-incubated firms. Such incubated start-ups need more services to gain sustainability in their business. Office space and resources are just a part of the equation. Technology-intensive companies have limited chances of survival because of their lack of business experience and marketing skills. Business incubators play a vital role in supporting the start-ups in their network by providing quality services to incubates (Smilor & Gill, 1986). It can be inferred from the literature that services play a crucial role in business incubation networks by providing start-ups with the support and resources they need to succeed. By offering a range of services tailored to the unique needs of start-ups, business incubation networks can help foster innovation, entrepreneurship, and economic growth (Pettersen et al., 2015).

### ***Business Support***

The management skills and experience needed to cope with sudden and rapidly changing environments are often missing from start-up businesses. New companies often change their behaviour and establish new practices through the process of learning. Procedures and policies are the foundation for the construction and operation of an organisation, especially start-ups. This process becomes speedy when start-ups are provided business support by incubation centres (Smilor & Gill, 1986). Experiential learning is a slow and gradual process for developing the daily life and abilities of any business entity. This is only possible when start-ups are provided a roadmap to pursue their goals effectively through the help of business experts (Dosi et al., 2000). On the other hand, absence of the business support systems can lead start-up firms to failure in the early stages (Freeman et al., 1983).

Imperfect knowledge is a common challenge that start-ups and entrepreneurs face. This means that they may not have a complete understanding of all the skills, knowledge, and expertise required to build and grow a successful business. As a result, identifying and hiring the relevant expertise can be a difficult task. Active coaching can be a valuable addition to training for founders and entrepreneurs. Coaching can provide personalised guidance, feedback, and support to help founders develop the skills and knowledge they need to succeed. Coaching can also help entrepreneurs identify blind spots or areas where they may need to improve (Clarysse & Bruneel, 2007; Kirwan et al., 2006). The process of trial and error can be avoided with the help of the incubating enterprises. These new enterprises must be able to make better decisions. The strategy adopted by start-ups will ultimately improve enterprise performance when it is given proper training and guidance to formulate and implement it (Colombo & Delmastro, 2002; Davidsson & Honig, 2003; Eisenhardt, 1989). All in all, providing business support through proper training and mentoring is part and parcel of the growth of business start-ups when they are incubated in incubation centres.



## ***Networking***

Knowledge and legitimacy can be obtained through access to external resources which can be provided by the business incubation centres. Networking opportunities provided by business incubations to start-ups can be very helpful in gaining access to potential customers, suppliers, technology partners and investors (Scillitoe & Chakrabarti, 2010). There is no doubt that the ability to access external networks simplifies access to resources. Learning opportunities for new companies to establish legitimacy faster can be provided by expertise. New start-ups can overcome inherent resource shortages, as well as inadequate financial capital, experienced management, and capabilities if they are provided network connectivity by business incubators. Research shows that firms, especially in their early days, can overcome their resource constraints through networking (Zhao & Aram, 1995). The network is used by start-ups to get resources beyond their financial capabilities, according to the researcher (Larson, 1992).

Establishing networks with early-stage investors, such as business angel networks and venture capital investors, reduces the search costs of tenant companies. In addition to providing funds, venture capital investors have an important significance in the specialization of venture capital. It can make a difference by making investment opportunities more accessible to start-up firms (Gorman & Sahlman, 1989). Venture investors usually have a control function that supports the development of their portfolio companies while overseeing company activities to protect their investments. Venture investors contribute to the company's development by meeting their financial needs as well as specialised organisational structures and management procedures (Hellmann & Puri, 2002). Likewise, it is almost impossible for a new company to engage professional consultants on technology development topics through contacts with academic institutions, strategic consultants, or patent lawyers (Lee & Osteryoung, 2004; Rice, 2002; Schwartz & Hornyh, 2010). For example, the economic means to pay high consulting fees may not be enough for companies seeking professional advice on specific areas of intellectual property expertise.

## ***Access to Finance***

Business incubators aim to promote the development and success of new businesses through a range of business support services and resources, to create financially viable businesses, as they are seen worldwide as tools for economic development (Day & Jones, 2004). In addition to providing basic services and resources for start-ups, incubators often also serve as an important network connecting talent, technology, and capital to accelerate the development of new businesses (Smilor & Gill, 1986). Hansen et al. (2023) argue that incubators that provide only office space and basic services are different from those that provide priority access to organised or corporate networks.

Unlike most developing countries that have transitioned from a chain of command to a market system, Pakistan lacks the commercial infrastructure, resources, and capabilities needed to promote the development of entrepreneurial companies. The problem of developing enterprises in an inappropriate business environment is made worse by the limited financial resources available for new enterprises (Lalkaka, 2003). The structure of financial markets and the availability of capital are important factors in determining the growth of emerging enterprises (Bhide, 2000).

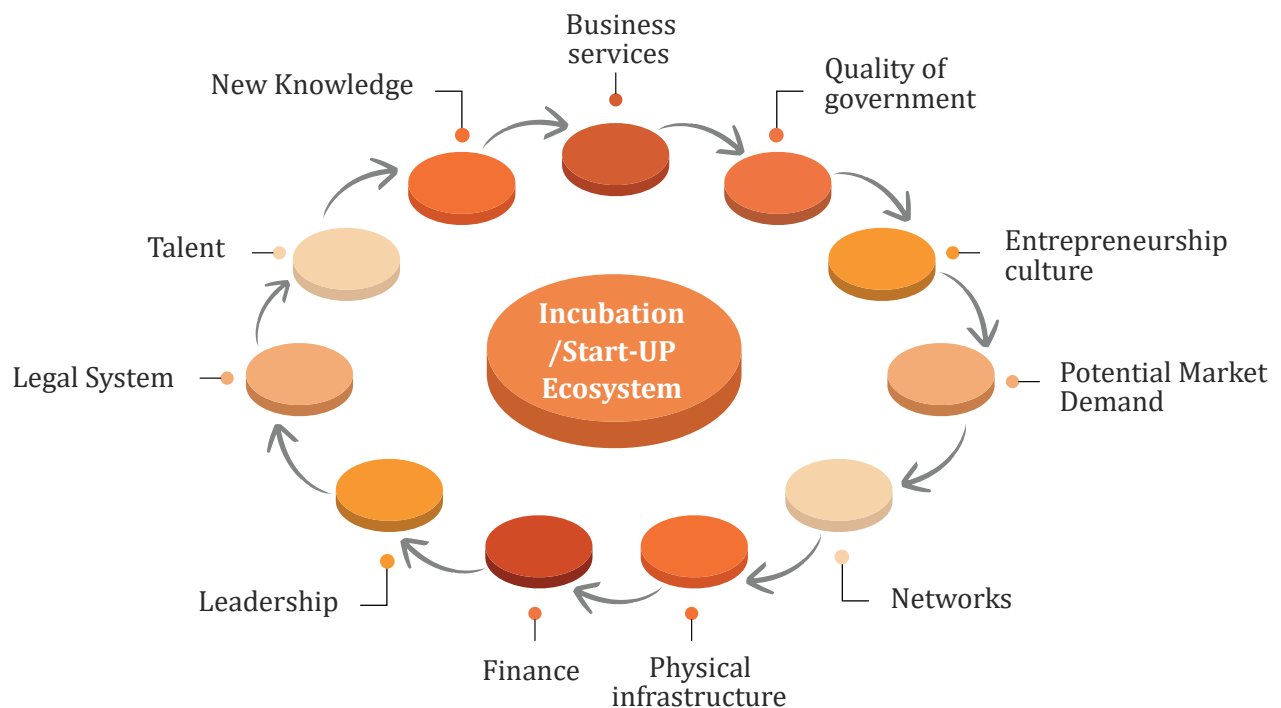
Depending on the different sources of funds, the financial services provided by incubators can be divided into external and internal sources. External sources of funds are defined as incubator funds from outside. If an incubator helps a client company get government funding, it is considered an external source of funding for incubator support. Internal sources of funds are funds that originate from the incubator and go towards funding the incubation. Business incubations can provide start-ups with access to finance through various means such as connecting them with investors, providing training on fundraising and financial management, or offering microloan programmes. This support can help early-stage businesses overcome financial barriers and accelerate their growth (Cohen, 2013).

## Macro Incubation Ecosystem

Entrepreneurial ecosystem (EE) can be defined as “the dynamic and institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures.” It is a growing system based on a holistic approach to examining the variation and contrast of entrepreneurship (Isenberg 2010; Feld 2012; Acs et al. 2014; Malecki 2018). Recently, in a rush to promote entrepreneurship, the EE approach has grabbed more research attention among European policymakers than other approaches, such as holistic approaches, which include entrepreneurial system, entrepreneurial environment, and entrepreneurial infrastructure (Autio et al. 2014; Malecki 2018; Spiegel & Harrison, 2018).

The EE approach started getting attention, both among academics and practitioners, since the development of influential frameworks by Isenberg (2010) and Feld (2012) to study an entrepreneurial ecosystem. World Economic Forum (2013) demonstrated a model which pinpoints eight significant characteristics of an EE. Mason and Brown (2014) presented an EE taxonomy, which demonstrates the central characteristics of an EE. Stangler and Bell-Masterson (2015) proposed compactness, liquidity, congruence, and heterogeneity as the four main characteristics of a thriving EE. Stam (2015) presented the maiden EE framework that delineates the elements of an EE and that of output. He affirmed that the systemic (talent, finance, web, guidance, cognition, and support services) and the circumstances of a framework (physical infrastructure, formal institutions, culture, and demand) make up the EE elements. The EE elements make up the business activities that he names the product of EE. Moreover, the product of EE results in the aggregated value creation in the form of an economy which, in fact, is the result of the EE.

Figure 3: Macro Entrepreneurial Ecosystem



Source: Authors' illustrations.

The approach presented by Stam (2015, 2018) gained more attention because of its advantages over other approaches to studying EE. Stam identified the causal paths which one can follow to understand the systemic dynamics of an EE to devise suitable policy measures for promoting entrepreneurship. Based on the Stam's framework to measure an EE, the largest entrepreneurship research forum, Global Entrepreneurship Monitor



(GEM) has launched a project in which the EE of a substantial number of cities from all over the world will be studied to check the readiness of the cities for entrepreneurship. The framework presented by Stam is demonstrated in Figure 1. Moreover, the World's leading entrepreneurship authors such as David B. Audretsch, Zoltan Acs, and Erik Stam seem to agree that a city is the best geographic division to identify and study an EE. Overall, Stam's framework has provided a valuable tool for researchers and policymakers to study and promote entrepreneurship at the city level.

### ***Regulatory Framework***

The regulatory framework in Pakistan related to start-ups and freelancing is very cumbersome and cautious. There are many related laws which require amendments to make a start-up-friendly legal system. In cases of legal blockages, most of the start-ups require to hire private law firms having expertise in this specific field which might be too expensive for the start-ups. The regulatory regime, thus, requires an overhaul to make things easier for the start-ups rather than creating hurdles. This requires a major effort, including reviewing the relevant laws and an empirical study regarding the effect of the identified laws. Furthermore, a comparative study is also required highlighting the legal regime in countries having a start-up-friendly legal system. The present study is one such attempt.

Key regulatory authorities relevant to the issue include the Securities and Exchange Commission of Pakistan (SECP), the Federal Board of Revenue (FBR), the Punjab Revenue Authority (PRA), the Pakistan Telecommunication Authority (PTA), and the State Bank of Pakistan (SBP). In addition to these regulatory authorities, the primary legislation regarding intellectual property, income tax, companies act (including merger and bankruptcy laws) and competition laws are also relevant to the start-ups and their survival. In addition, IPO laws and intellectual property laws are the cornerstone of innovation. There is a need to strengthen the laws to protect innovative ideas and discourage brain drain. It requires an effort in collaboration with the Intellectual Property Organization (IPO) to identify the gaps within the relevant legal framework. Similarly, the bankruptcy Laws are also cumbersome to follow for small businesses.

The fact that start-ups face elevated risk and ventures have a high failure rate, coupled with the fact that there are no bankruptcy-related laws in Pakistan, act as major deterrents for investors. In context of the H.L.A. Hart's concept of laws, the primary and secondary rules related to start-ups and freelancing need to be identified to remove the ambiguities within the legal system. The more hidden the laws, the more they tend to fail in providing justice and facilitating the common person.

### **Framework to Identify Financial Barriers in the Ecosystem**

In Pakistan, around 100 million adults do not have access to formal financial services, which represents 5 per cent unbanked population of the world.<sup>1</sup> This situation excludes almost half of Pakistan's population from getting and investing via formal and regulated channels. There are several reasons, policy-level and institutional, for reluctance to use formal lending, such as high lending rates, collateral guarantees, and complex procedures for getting loans and other services from financial institutions. In Pakistan, among the 3.2 million SMEs, only 188,000 SMEs are on banks' books, showing a substantial chasm between the private sector and the formal financial sector<sup>2</sup>. On the other hand, since 2010, only 720 start-ups have been established (67 per cent still active) with 100 successfully raising funding. These SMEs/incubations/start-ups are facing several serious issues when it comes to determining the risk that an entity has. Since the majority of SMEs/incubations are excluded from the formal network, financial institutions find it hard to study and examine them.

### ***SMEs/Incubations' Difficulties in Accessing Finance***

SMEs/incubations face a more complicated situation in terms of raising money as compared to large firms. Large



enterprises get access to finance relatively easily from banks, while SMEs/incubations do not have this privilege as the large enterprises have a lower risk of default and are financially stable. On the other hand, SMEs/incubations are vulnerable from the view of lenders and also do not have information related to accounting (Madanchian et al., 2015; Nabila et al., 2020).

### ***Inadequate Information Infrastructure for Start-ups***

There is an issue of asymmetric information between financial institutions and SMEs/incubations. Information infrastructure is, therefore, important to fix this problem. Many large enterprises enlist their shares on stock markets and trade in securities in bond markets. This information can be used to estimate the creditworthiness of large enterprises (Business Recorder, n.d.). On the other hand, most SMEs/incubations do not have any sort of relation with capital markets. Since financial institutions observe borrowers in depth, it is expensive to do for small loan borrowers. The dearth of information infrastructure for SMEs/incubations aggravates the asymmetric information issue. In situations like this, efficient and low credit risk assessment instruments are mandatory for the financing of SMEs, especially for transaction-based lending (Siddik, 2017).

### ***Lack of Credit Guarantee Schemes***

Start-ups usually face some serious difficulties in raising finances. The insufficient supply of credit to SMEs/incubations is due to asymmetric information and the higher risk of default. Furthermore, SMEs/incubations face more problems in gauging finance as compared to larger enterprises. Thus, lending institutions favour larger enterprises. To tackle these risks, there are credit guarantee schemes available worldwide, but there is no such scheme in Pakistan.

### ***Lack of Credit Rating Mechanism***

Credit ratings reflect the ongoing financial creditworthiness of issuers like governments, firms, and financial institutions. Usually, the rating agencies, for example, Moody's, Fitch Ratings, and Standard and Poor's confer these ratings which can be accounted as an in-depth examination of the issuer's capability to meet the financial commitment fully and on time. Agencies use a wide range of financial and non-financial information to conduct rating assessments of big corporations, including experts' expectations (Nabila et al., 2020). Rating agencies normally share some general guidelines related to their rating process but they do not share the detailed methodology, the criteria of rating, and the factors related to the rating.

### ***Alternative Investment Market***

After the emergence of globalisation, large-scale firms have come to dominate financial and capital markets, reducing the financial opportunities for SMEs/incubators. To match capital markets with SMEs/incubators, the London Stock Exchange (LSE) launched a sub-market within its primary market, which is called Alternative Investment Market (AIM) for SMEs/incubators to provide them with a platform for raising funds from the capital market (Colombelli, 2010). During the last two decades, only 21.9 per cent of new issues were on the LSE-main market, while 78.1 per cent were listed on AIM (Amini, 2013). In Pakistan, there are more than 3 million SMEs/incubators, making up almost 90 per cent of all the businesses. However, in Pakistan, there are very few avenues for them to raise funds from the capital and financial markets. Although the GEM board has been recently launched on the PSX, it is still not functional and vibrant.





### 3. METHODOLOGY

#### Sampling

The total population of National Incubation Centres (NICs) is 4 from which 3 NICs were selected as representatives of NICs. Similarly, 19 Business Incubation Centres (BICs) were chosen as representatives of 34 BICs registered with the Higher Education Commission (HEC). Among the selected population of incubation centres, there is also a category of other established incubations. Thus, we also selected Plan 9 of the Punjab Information Technology Board.

#### Data Collection and Statistical Analysis

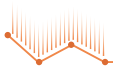
The data was collected from various available online and offline sources. Among major sources of data collection were files available on higher education regarding their registered business incubators. Moreover, data on business incubation centres (BICs) was collected from the reports issued by the HEC, while data on national incubation centres (NICs) was collected from their respective websites. Data on other established incubators was collected similarly. Furthermore, we physically visited the selected incubation centres and collected information through one-on-one meetings and interactions with the officials. In addition to this, we extracted data by visiting the incubated/graduated start-ups from the selected incubators.

To ascertain the support of the start-ups by business incubation centres and the start-ups' physical existence, a three-fold investigative approach was employed. Firstly, we examined their online presence by looking at the availability and operational status of their websites. Secondly, we conducted a thorough assessment of their physical office or business setup, verifying their existence within the country. Thirdly, we analysed the nature of the products and services offered by these start-ups. If these criteria were met, it indicated that the start-up was operational and viable. Conversely, if these conditions were not met, it suggested that the start-up was merely documented on incubation websites, reports, and blogs.

In addition, we conducted a comprehensive evaluation of the operational expenditures associated with these incubation centres. For National Incubation Centres (NICs) and Plan 9, we acquired data from the relevant ministry, given their sponsorship by governmental entities. However, Business Incubation Centres (BICs) were autonomously managed by universities. Consequently, we calculated operational data for BICs by identifying the total number of staff members employed, their respective salaries, and other operational costs, including utilities, training expenses, seminar costs, and mentor workshop expenditures. Subsequently, we divided the total annual operational cost by the total number of start-ups supported during that year, thus yielding the cost per incubatee.

We collected data from websites, visits, and interviews with 10 experts/mentors and 20 incubators. The major focus of the interviews was on the role of incubators in the coming years and the kind of opportunities and challenges they might face. Moreover, experts were asked about the primary benefits of incubators for early-stage ventures. In the interviews, the selection criteria for incubators were thoroughly discussed to understand the incubation model being applied. The process after the selection of incubators was also discussed. Incubators were also asked about the challenges being faced in supporting early-stage ventures and how their challenges are being addressed. Additionally, they were asked about their way of staying up to date on trends and changes in the industry and how these changes are being incorporated into working with new ventures.

Our study employed a mixed-method research design, combining interviews and focus group discussions (FGDs) with quantitative data. The integration of these two methods allowed for a comprehensive understanding of the start-up ecosystem in Pakistan. Through interviews and FGDs, we delved into the rich narratives and perspectives of participants, capturing nuanced insights and experiences. On the other hand, quantitative data enabled us to summarise and interpret key statistics, providing a holistic view of the phenomenon under investigation.



## 4. FINDINGS AND ANALYSIS

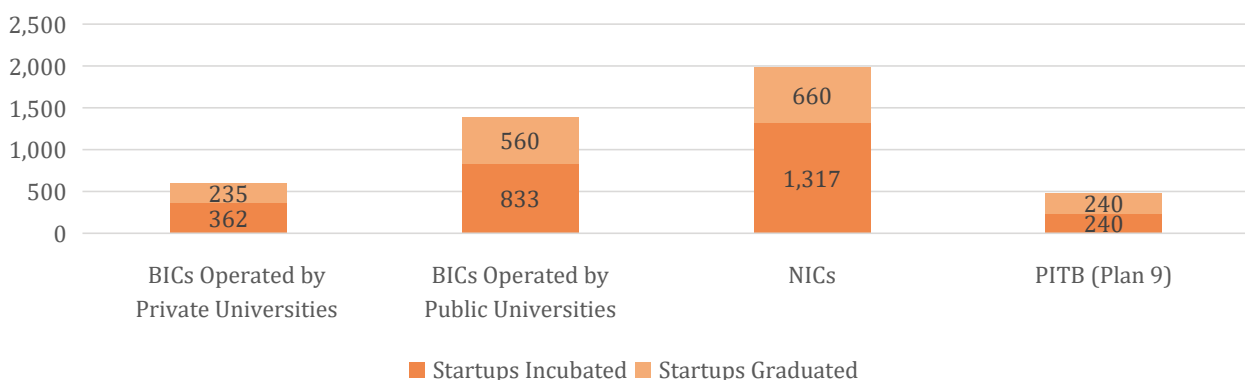
### Start-up Landscape

In this study, we conducted a comprehensive analysis of three distinct streams of start-up incubation centres in Pakistan, specifically focusing on the BICs sponsored by the HEC, NICs sponsored by Ignite, and Plan 9 by the Punjab Information Technology Board (PITB). The obtained data from reports, scorecards and websites indicated that a total of 560 start-ups were established by BICs in public sector universities, while an additional 235 start-ups were established by BICs in the private sector. Furthermore, under Plan 9 of the PITB, 240 start-ups were created. The NICs located in Islamabad, Lahore, and Peshawar have reportedly produced 660 start-ups, but claims of graduated start-ups are also exaggerated, and many of the start-ups were pre-existing as shown in Figure 4.

Concerns have been raised about the true nature of NICs as incubation centres, as successful business ideas and innovative products developed by start-ups, are often acquired, with the original owners losing control. These incubation centres seem to be focused on showcasing numbers rather than achieving substantial growth. The achievement rate claimed by BICs and NICs exceeds 50 per cent, an exceptional statistic. Furthermore, Plan 9 has attained a perfect 100 per cent success rate, which is exceedingly uncommon.

When considering the global scenario, where success rates are typically below 10 per cent, one must ponder how Pakistan manages to surpass the 50 per cent threshold despite grappling with numerous obstacles. Pakistan faces significant hindrances in the form of a low ease of doing business, cost-push inflation, and a multitude of socio-political challenges. The study discovered that the reported numbers of graduating start-ups from these centres were exaggerated by 85-90 per cent. The actual number of successful start-ups fell considerably below the projected figures, highlighting a substantial gap between anticipated and actual outcomes.

Figure 4: Start-Up Landscape in Pakistan



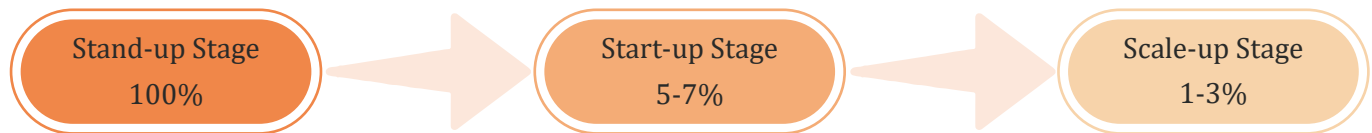
Source: Source: Authors' computations based on data available on scorecards, websites and reports of BICs, NICs and PITB.

First of all, we want to dispel the misunderstanding about incubated and graduated start-ups. There is confusion among the incubation centres regarding the categorisation of start-ups as either "incubated" or "graduated." Within these centres, "incubated start-ups" denote those who have enlisted their ideas with the incubation centre. However, according to global standards, this classification corresponds to the preliminary phase of the entrepreneurial journey, commonly known as the "stand-up stage." The subsequent stage is referred to as the "start-up" phase, wherein these ideas are metamorphosed into feasible products and services, and the business is initiated. Regrettably, the incubation centres do not accord priority to this stage.



On the contrary, "graduated start-ups" encompass individuals who have either fulfilled their cohort or session within the incubation centre or have acquired a degree from their respective institute. This terminology underscores the completion of a specific programme or educational curriculum. To tackle this predicament and illuminate the success rates at each stage, this study has computed the accomplishments and advancement of start-ups within the incubation centres as shown below.

*Figure 5: Accomplishments and Advancement off Start-ups within the Incubation Centres*



*Source: Authors' computations.*

Our calculations are based on a comprehensive process of verification, employing a selected sample from various BICs, NICs, and Plan 9 of the PITB. The primary focus of our study lies within the NICs, which primarily cater to individuals who have already established their businesses. Within the NICs, the term "incubated start-ups" encompasses ventures that have already gained a firm foothold in the market, utilizing the NIC platform to facilitate their official launch.

Conversely, both BICs and the PITB (Plan 9 PITB) are predominantly targeted at the stand-up stage, with the aim of transforming fledgling start-ups into successful ventures. However, when considering success rates, BICs demonstrate a significantly lower performance, with a success ratio of less than 5 per cent. In contrast, the PITB showcases a more favourable outcome, boasting a success ratio exceeding 5 per cent. By examining these statistics, it becomes evident that the PITB exhibits a higher level of effectiveness in nurturing start-ups towards success, while BICs struggle to achieve comparable results.

## Start-up Ecosystem in BICs

### *Induction Process Adopted by BICs*

BICs do not employ any distinct method that sets them apart; instead, they adhere to the same standards as others. Participation in BICs is limited solely to students and faculty, excluding all others. The induction process adopted by business incubation centres in Pakistan is as follows:

Interested entrepreneurs submit an application form to the incubation centre, usually online. The application includes information about the entrepreneur, the business idea, and the intended use of the incubation facilities.

After assessing the applications, the incubation centre selects the most promising business ideas and entrepreneurs.

The incubation centre provides support to the selected entrepreneurs, such as mentorship, guidance, access to resources, and access to networks.

Through the incubation process, the entrepreneurs can grow and develop their businesses. Once the businesses are ready to stand on their own, the incubation centre helps them to exit from the incubation programme and set up independently.

Furthermore, the process and requirements of BICs are the ones established by the HEC in collaboration with the



universities. The main requirement is a business idea or proposal and students, alumni, faculty, and staff are eligible. There is no strictly defined qualification requirement and any university-level qualification is acceptable. All the incubation centres have almost the same criteria for acceptance based on HEC guidelines. The incubation centres do not require any fee or investment. Only a condition of the set criterion is applied.

### *Socioeconomic Costs of BICs*

Table 1 illustrates a comparative analysis of public and private universities' BICs. The data is taken from the BIC scorecards submitted to the HEC. According to the table, the average number of start-ups incubated and graduated in private sector universities was 91 and 59 incubators per BIC, respectively. Furthermore, the average number of direct and indirect jobs created by start-ups in the private sector universities were 463 and 452, respectively. In addition, the average cost of a BIC is PKR 6 million as an establishment cost which is an average of PKR 91,349 for each incubator. Similarly, each private sector university spent almost PKR 200,000–233,000 per incubator as the operational cost, which includes salaries, utilities, and other expenses.

Contrary to the aforementioned statistics, start-ups incubated and graduated by public sector universities were reported to be 38 and 25, respectively. Direct and indirect jobs created by start-ups in the public sector universities were 140 and 157, respectively. Moreover, the establishment cost for private university start-ups was PKR 7 million, which translates to PKR 224,260.724 per incubator. Similarly, universities spent almost PKR 230,000–284,000 annually per incubator as the operational cost, which includes salaries, utilities, and other expenses.

*Table 1: Socio-Economic Costs of BICs*

BIC	Indicator	Outcome
Private Sector University BICs	Number of Start-ups Incubated	91
	Number of Start-ups Graduated	59
	Direct Jobs Created by Start-ups	463
	Indirect Jobs Created by Start-ups	453
	Establishment Cost (PKR Million)	6
	Annual Operational Cost (PKR Million)	4.7
	Operational Cost/Incubator (PKR)	200,000–233,000
	Establishment Cost/Incubator (PKR)	91,349
Public Sector University BICs	Number of Start-ups Incubated	38
	Number of Start-ups Graduated	25
	Direct Jobs Created by Start-ups	140
	Indirect Jobs Created by Start-ups	158
	Establishment Cost (PKR Million)	7
	Annual Operational Cost (PKR Million)	5.3
	Operational Cost/Incubator (PKR)	230k-284k
	Establishment Cost/Incubator (PKR)	224,261

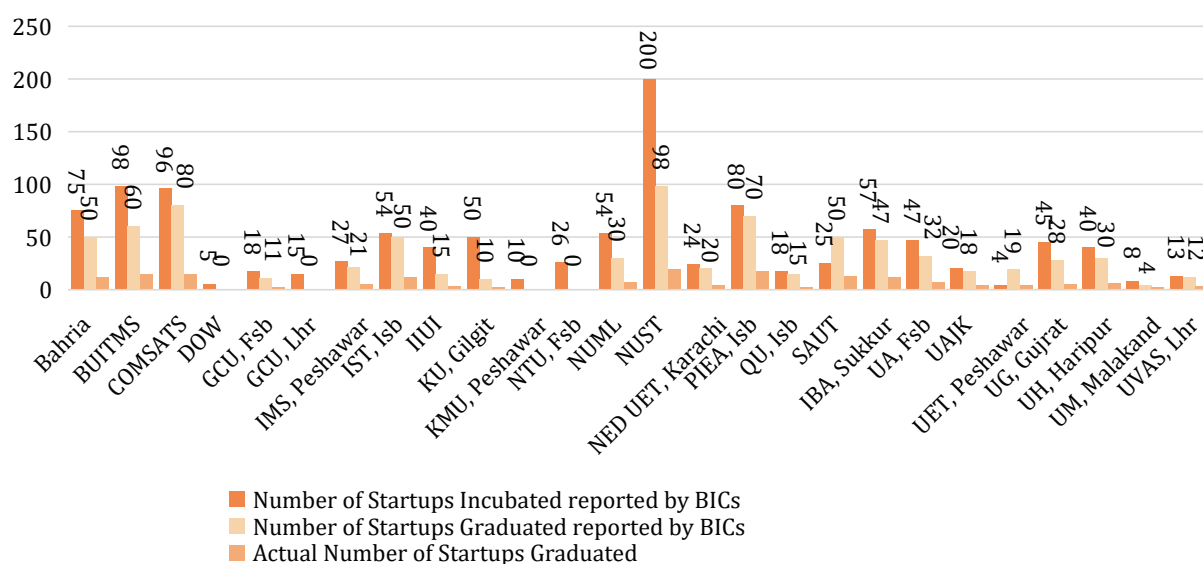
*Note: Data submitted to the HEC by BICs till June 2022 in the form of scorecards and reports.*

*Source: Authors' computations.*



The aforementioned values are taken from the reports submitted by the public sector universities but these values and statistics are misleading. Incubation centres inflate the number of successful start-ups they have helped to launch. The lack of reliable data and accurate reporting means that it is not possible to know the exact number of incubated start-ups in Pakistan. However, there is some evidence to suggest that the number of incubated start-ups is much lower than what the incubation centres in Pakistan claim. To figure out the real numbers, we conducted an in-depth field survey and analysis of these BICs and compared the collected information with figures from published reports. Figure 6 shows the comparison.

Figure 6: Graduated Incubators by BICs: Actual vs Reported



Note: Data submitted to the HEC till March 2021 by BICs.  
Source: Authors' computations.

## Financial Outcomes of BICs

In terms of revenue generated by start-ups within their respective BICs, the start-ups housed within NUST BICs collectively generated a sum of PKR 2,800 million. Furthermore, these start-ups managed to secure substantial investments, with a total of PKR 350 million and PKR 1250 million dedicated to their ventures.

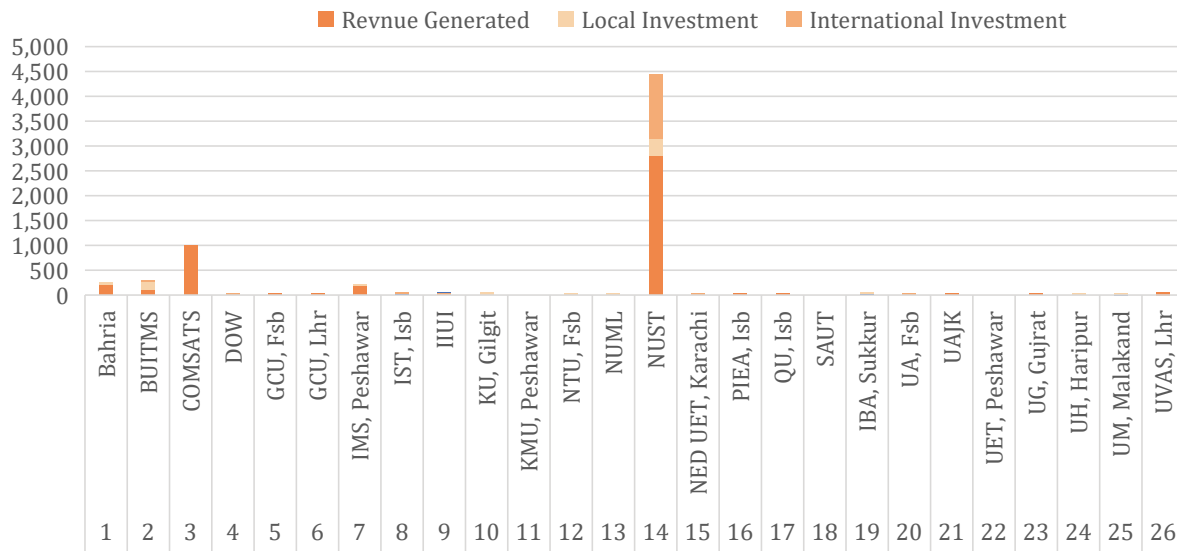
The start-ups in COMSAT's BICs generated an impressive revenue of PKR 1,000 million. BUITEMS and Bahria University also generated sizeable revenues through their start-ups, amassing revenues of PKR 117 million and PKR 200 million, respectively. The results are shown in Figure 7. The figure shows that the incubation centres other than those mentioned above, made only nominal contributions to the overall revenue generated by start-ups.

It is essential to exercise caution when interpreting these figures as our assessment suggests that these figures may be somewhat inflated and the actual numbers may be significantly lower than the reported figures.





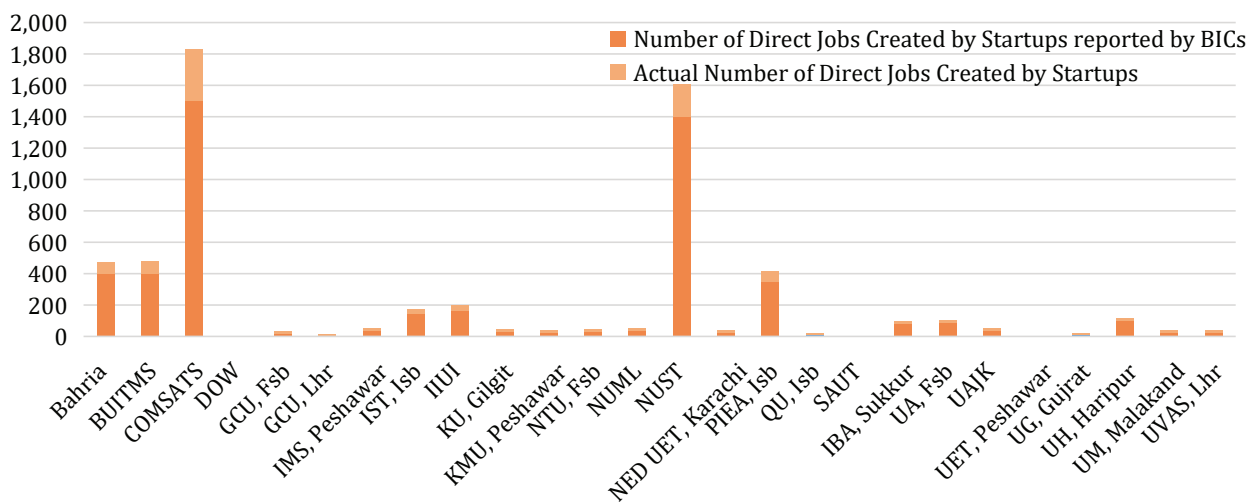
Figure 7: Financial Outcomes of BICs



Source: Authors' computations.

According to the BICs' data, COMSATS, NUST, BUITEMS, and Bahria University generated an impressive number of direct jobs. The institutes' data show that COMSATS, NUST, BUITEMS, and Bahria University created 1,500, 1,400, 402, and 400 employment opportunities, respectively as shown in Figure 8.

Figure 8: Actual vs Reported Jobs created by BICs



Note: Data submitted to HEC till June 2022 by BICs.

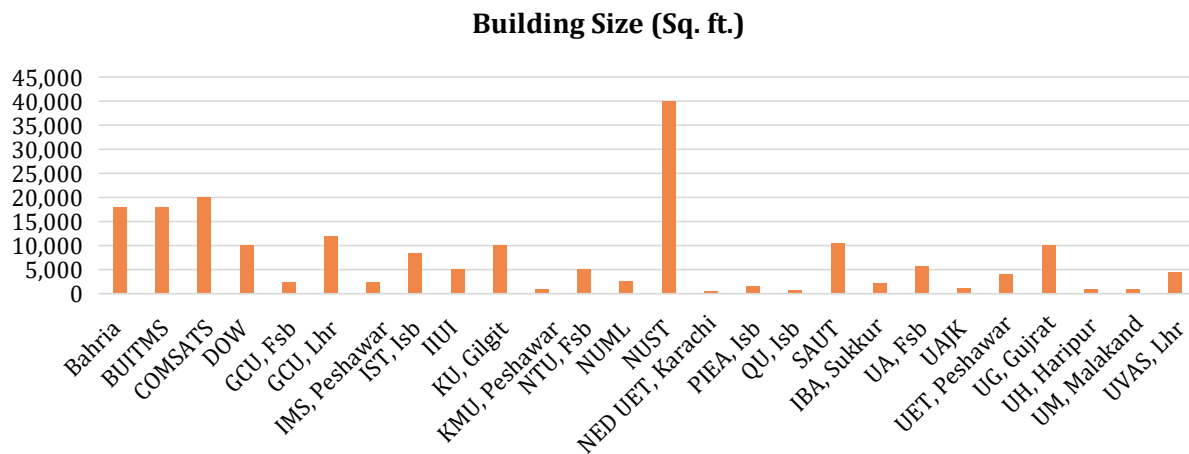
Source: Authors' computations.



## Facilities and Spaces

The facilities in the BICs are shown in Figure 9 below.

Figure 9: Spaces available to BICs



Source: Authors' computations.

All BICs have the same infrastructure support and services, such as offices and meeting rooms. Furthermore, the services provided by the BICs across different universities are similar in every university but are different from the services provided by the NIC. The BICs provide services such as regular training, financial services, IT solutions, counselling/ mentorship, and funds/grants. Nevertheless, their services do not include company formation which is the common point between the NIC and BICs.

## Start-up Ecosystem in NICs

### Induction Process

The induction criteria of incubation centres mainly include qualification and investment fees. According to the NIC's criteria, every individual is eligible for it and there are no other strict requirements. As far as the qualification is concerned, there is no defined qualification level and qualification of any level is eligible. However, the requirement is that one needs to have a business proposal or idea and there is no investment and fee for it and it provides all the facilities free of cost if the business proposal is accepted. Furthermore, the NIC, Islamabad, has certain conditions such as if the business idea or proposal qualifies the said criteria then induction takes place. Moreover, the NIC, Lahore, and the NIC, Peshawar, have the same criteria. There is no significant difference among the criteria of the NICs of Islamabad, Lahore, and Peshawar.

These centres provide support to start-ups in terms of seed funding, mentorship, technical advice, and access to networks. The NICs are the projects of Ignite (formerly the National Technology Fund). They are the largest and most active incubators in Pakistan and provide start-ups with seed funding, mentorship, and technical advice. The selection process by the centres is more rigorous to ensure that only the most promising start-ups are chosen for incubation. However, these centres neither provide greater access to international networks nor have better access to funding sources for helping start-ups in their scale-up phase. A critique of the NICs is that these centres select already-established start-ups instead of newly established ones. The selection criteria for the NICs are often vague and difficult to interpret. This makes it difficult for entrepreneurs to understand the criteria and tailor their applications accordingly.

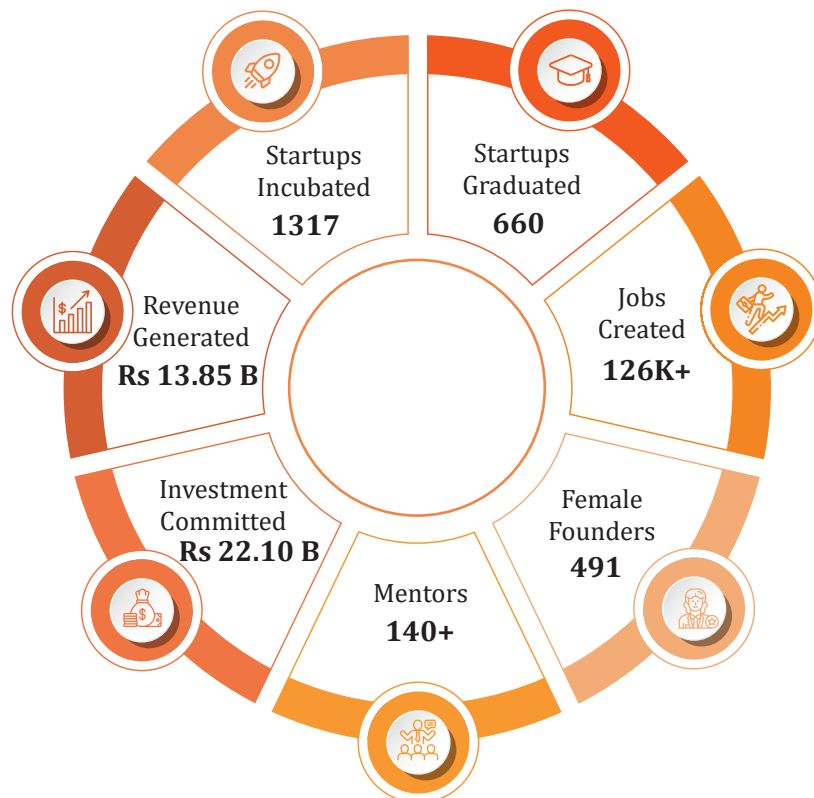
### ***Socioeconomic Costs of NICs***

According to the data provided by Ignite, as shown in Figure 10, it appears that the NICs have played a pivotal role in nurturing a remarkable sum of 1,317 start-ups, out of which 660 have successfully transitioned to actual business. This commendable achievement implies a staggering success ratio of nearly 50 per cent. Moreover, the collective efforts of these NICs have resulted in the creation of over 126,000 employment opportunities.

Furthermore, the NICs have succeeded in attracting an impressive influx of investment, amounting to a remarkable USD 22.10 million, which has been directed toward the support and growth of these start-ups. In turn, these entrepreneurial endeavours have contributed a handsome revenue of PKR 13.85 million.

While these figures undeniably paint an encouraging picture of the NICs and their accomplishments, the reality perhaps is a little different. A closer examination reveals somewhat overstated statistics, with an overstatement of approximately 50-60%.

*Figure 10: Performance of National Incubation Centers*



*Source: Authors' computations based on data available on NICs websites.*

The data presented in Table 2 reveals that a total of 293, 248, and 170 start-ups have been incubated thus far in NIC Islamabad, Lahore, and Peshawar, respectively. Moreover, the data indicates that 173, 136, and 49 start-ups have successfully graduated from NIC Islamabad, Lahore, and Peshawar, respectively. However, on-site visits to the NICs provided us with contrasting insights. It was found that nearly 80-90 per cent of the start-ups reported as graduates were, in fact, existing businesses that did not require incubation. These businesses were included on the NICs' lists of incubated start-ups to inflate the numbers and exaggerate the impact of the incubation model.



being implemented. To be more precise, it would be more accurate to classify these listed businesses as scale-ups rather than start-ups.

Additionally, the data provided by the Islamabad NIC indicates that the start-ups incubated under their programme generated a total of 17,189 jobs, comprising 2,900 direct jobs and 14,289 indirect jobs. The Lahore NIC claimed that their incubated start-ups created approximately 1,000 direct jobs with no mention of any indirect job creation. Similarly, the NIC, Peshawar claimed to have created 10,986 direct jobs and 1,790 indirect jobs through their incubated start-ups. However, a closer examination shows that the actual numbers do not match the figures reported by the NICs. Our analysis shows that the figures on the number of start-ups incubated and jobs created both appear to be inflated.

NICs receive annual funding from Ignite-National Technology Fund between PKR 70-100 million as operational cost per annum. This substantial investment has the potential to generate impressive returns if allocated and utilised effectively. However, the actual returns produced by start-ups within the NICs, as indicated by the available data, are not as remarkable as they may appear. This highlights the ambiguity surrounding the utilization and reporting of funds.

*Table 2: Socioeconomic Effects of NICs*

NICs	Elements	Performance
NIC Islamabad	Number of Start-ups Incubated	293
	Number of Start-ups Graduated	173
	Direct Jobs Created by Start-ups	2900
	Indirect Jobs Created by Start-ups	14289
	Annual Operational Costs (PKR)	Almost 80 million
	Annual Operational Costs/Incubatee (PKR)	1.6 million
NIC Lahore	Number of Start-ups Incubated	248
	Number of Start-ups Graduated	136
	Direct Jobs Created by Start-ups	1000
	Indirect Jobs Created by Start-ups	0
	Annual Operational Costs (PKR)	Almost 100 million
	Annual Operational Costs/Incubatee (PKR)	2 million
NIC Peshawar	Number of Start-ups Incubated	170
	Number of Start-ups Graduated	49
	Direct Jobs Created by Start-ups	10,986
	Indirect Jobs Created by Start-ups	1,790
	Annual Operational Costs (PKR)	Almost 70 million
	Annual Operational Costs/Incubatee (PKR)	1.4 million

*Source: Authors' computations based on data available on NICs websites.*



The operational costs per incubatee are reported at 1 million per incubator in each NIC. In the context of Pakistan's current economic situation, characterised by financial crises and rampant inflation affecting the general price level of goods and services, this cost seems relatively very high as compared to operational costs per incubator in BICs.

### ***Facilities Provided by NICs***

NICs have the infrastructure support for coworking and offices, but they do not have meeting rooms or cafeterias. These are the basic infrastructure support that every incubation centre needs to have as these are necessary for the business to operate. The NIC, Lahore has all these facilities except for the meeting rooms. Other than physical infrastructure, the services provided by the NICs include regular training, financial services, IT solutions, counselling/mentorship, funds/grants, and company formation. The NIC, Islamabad Islamabad provides the services of regular training, financial services, and counselling/mentorship, but it does not have the services of IT solutions, funds/grants, and company formation. On the other hand, the NIC, Lahore only provides regular training; it does not have the services of IT solutions, funds/grants, and company formation.

### **Start-up Ecosystem in Plan 9 (PITB)**

#### ***Induction Process***

The process of induction in Plan 9 is simple. Teams from different regions of Pakistan are invited to apply. Once chosen, these teams are asked to relocate to Lahore where they undergo a transformative experience lasting six months. The applicant must be a citizen of Pakistan and at least 18 years old. There is no prerequisite for minimum educational qualification because the primary focus is on the possession of a novel and distinctive business idea, complemented by a meticulously devised business plan. The team must have a minimum of two members to apply but there can be a maximum of five members. The facilities of the Pakistan Information Technology Board (Plan 9) are accessible in key urban centres, including Lahore, Karachi, Faisalabad, Multan, and Islamabad.

#### ***Socioeconomic Costs of Plan 9***

Plan 9, with its unwavering commitment to fostering the growth of early-stage technology start-ups, has successfully launched 14 cohorts of budding enterprises. Within this period, an impressive total of nearly 240 start-ups have emerged under its auspices. These nascent ventures have collectively garnered a staggering valuation of USD 77.1 million, signalling their potential for transformative impact.

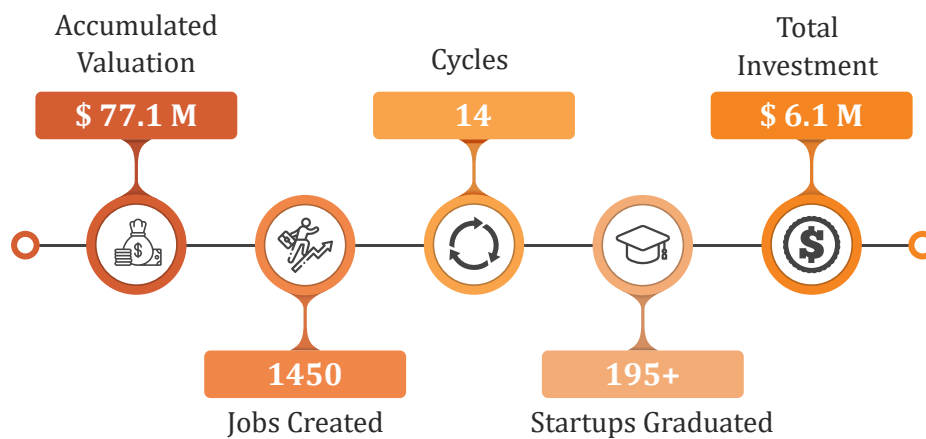
Furthermore, Plan 9 start-ups have generated over 1,450 gainful employments. Moreover, the innovative ideas birthed within this nurturing ecosystem have attracted substantial investments amounting to more than USD 6.1 million from both domestic and international angel investors and benefactors. It is crucial to recognise that Plan9's success because of its well-structured framework. By providing the necessary support and resources, this organisation has cultivated an environment conducive to the thriving and sustainable development of business ideas.

In conclusion, Plan 9's achievements, characterised by the launch of 14 cohorts, the emergence of 240 start-ups, a cumulative worth of USD 77.1 million, and the creation of over 1,450 jobs, show the Plan's pivotal role in fostering the growth of early-stage technology enterprises. By attracting substantial investments and providing an enabling environment, Plan 9 has proven its worth in nurturing and propelling the transformation of innovative ideas into prosperous businesses.





Figure 11: Plan 9's Achievements



Source: PITB (n.d.).

### Services and Facilities in Plan 9

Plan 9 offers various facilities and services, which include complimentary office space at Arfa Tower for six months complete with essential amenities such as uninterrupted power supply and high-speed internet connectivity. Moreover, Plan 9 facilitates targeted networking prospects tailored to specific domains to enable entrepreneurs to establish valuable connections both nationally and internationally.

To nurture and enhance the capabilities of start-ups, the Plan 9 team offers their services for consultation and provides guidance. Additionally, in collaboration with Plan 9's extensive network of accomplished alumni and actively engaged board members, the Plan organises training sessions and workshops. These initiatives aim to equip entrepreneurs with the necessary knowledge and skills essential for success.

Following a thorough evaluation of the start-ups' potential, the Plan9 team lends comprehensive assistance in devising business strategies that align with their unique propositions. This support encompasses crucial areas such as product development, bookkeeping, sales and marketing, securing investments, and legal counsel.

### Start-up Ecosystem and Missing Links

In this section, BICs, NICs, and Plan 9 are juxtaposed with the prevailing start-up ecosystem in developed economies. The analysis reveals that the fundamental infrastructure of these incubation centres meets the required standards as they provide well-equipped spaces, offices, meeting rooms, and free internet access, along with other essential amenities. Moreover, they conduct regular training programmes. However, the content and quality of these training sessions fail to meet the desired level. Furthermore, the trainers lack substantial industry and business experience with only NICs boasting professional trainers, albeit with unsatisfactory business acumen.

All of these incubation centres do not have documentary resources such as indigenous literature related to the start-up ecosystem and relevant case studies. Moreover, there is no material available related to successful ventures in Pakistan, particularly in the Urdu language. While LUMS possesses case studies focusing on local matters, the majority are centred around job dynamics and the job market. The research conducted by the faculty predominantly assumes a philosophical nature, devoid of relevance to the dynamics of the local entrepreneurial landscape. Surprisingly, even surveys regarding customer needs and market demands are absent. Furthermore, these incubation centres lack specialisation in any particular field. Although agriculture universities possess core competencies in the agricultural domain, their start-up initiatives and setups fail to concentrate on agri-businesses.



The incubation centres currently face a notable deficiency in establishing robust networks and linkages. This deficiency primarily manifests in the absence of meaningful partnerships with local and international industries. By forging such alliances, these centres could significantly enhance their potential to facilitate transactions for their incubators, resulting in increased opportunities for growth and success.

Furthermore, the incubation centres are lacking in their efforts to equip their incubators with essential skills required for obtaining loans from financial institutions or issuing initial public offerings (IPOs) on the Growth Enterprise Market (GEM) Board. This gap poses a significant hindrance to the incubators' ability to access vital financial resources that are pivotal for scaling up their ventures and realising their full potential.

Addressing these critical weaknesses would demand a strategic focus on cultivating strong partnerships with industry players. Such collaborations could yield valuable resources, mentorship, and market access for the incubatees. Additionally, implementing comprehensive training programmes aimed at enhancing financial literacy and entrepreneurial acumen would empower incubatees to navigate the complexities of securing loans and potentially going public through IPOs.

Lastly, crucial business support facilities, such as legal assistance, are absent in BICs, while Plan 9 and NICs offer this service to a certain extent. IT experts and technicians specialising in various fields are unavailable to aid incubatees in developing prototypes for their products, services, and websites. Although NICs and Plan 9 provide accounting and auditing services, BICs lack such provisions.

Table 3: Start-up Ecosystem and Missing Links

Elements	Global Ecosystem	NICs	BICs	Plan 9
<b>Basic Infrastructure</b>	Free office space	✓	✓	✓
	Free meeting rooms	✓	✓	✓
	Ideas rooms and discussion centres	✓	✓	✓
	Free internet	✓	✓	✓
	No Utility Charges	✓	✓	✓
<b>Training and Capacity Building</b>	Ongoing training programmes	✓	✓	✓
	Mentors from professional bodies	✓	×	×
	Mentors from industry and business	×	×	×
<b>Knowledge Support System</b>	Local case studies & models (literature)	×	×	×
	Specialised & core competencies in a specific field	×	×	×
	Researches & surveys on local market dynamics	×	×	×
	Ideas contests	✓	✓	✓
<b>Funding and Investment Opportunities</b>	Dedicated angel investors and donors	×	×	×
	Investment available in incubation centre	×	×	×
	Linkages with local and international networks	×/✓	×/✓	×/✓
	Services available for loans/IPOs and other funds	×/✓	×	×
<b>Business Development Services</b>	Legal services	×/✓	×/✓	×/✓
	IT experts and technical staff for prototype development	×	×	×
	Accounting & auditing services	×/✓	×	×/✓
	Backward and forward supply chain network	×	×	×

Note: (✓= available, ×=not available and ×/✓= partially available)

Source: Authors' computations.



## Why Tech-Start-ups Are More Successful

Pakistan's presence in global IT services exports is small but has seen significant growth, increasing from 0.17 per cent in 2017 to 0.30 per cent in 2021. Pakistan's overall IT export volume surged by 37.7 per cent from 2006 to 2022. Ireland holds the top spot with over 28 per cent, followed by India with over 11 per cent, and China with over 7 per cent. Similarly, in 2021, Pakistani start-ups gained global recognition, attracting investors and raising around USD 375 million in funding. Most of these start-ups were focused on technology-driven enterprises, and Pakistan is experiencing a steady rise in such ventures.

Approximately 500 technology-based start-ups have emerged establishing their businesses, products, and services effectively. The rise in tech start-ups can be attributed, in part, to the remarkable growth of the IT sector. By January 2023, Pakistan boasted an impressive 71.70 million social media users and 191.8 million active cellular mobile connections, which accounted for a significant 80.5 per cent of the total population. To understand the journey of entrepreneurs, it is important to know the different stages start-ups go through. The first stage is called the "stand-up" phase, where ideas are conceived, business plans are developed, and prototypes are created.

During this phase, they require careful nurturing and mentorship. To address this need, the HEC has established 38 business incubation centres, while Ignite (a project of the Ministry of Information

Technology) has set up four NICs, alongside PITB Plan 9 and other incubation centres, e.g., P@SHA, Enabler, Extreme Commerce, etc. Transitioning from this stage to the subsequent phase, the "start-up" stage, entrepreneurs launch their businesses, products, and services. While the success rate for general businesses during this transition is a mere 5-7 per cent, tech start-ups surpass this figure with success rates exceeding 10 per cent.

The primary reason for the difference is the burdensome business ecosystem prevailing in Pakistan characterised by minimal ease of doing business. However, since tech-based start-ups experience minimal engagement with the physical market, they tend to be more successful compared to general start-ups. On the other hand, general start-ups have to interact with local authorities and acquire numerous permits, and approvals. Additionally, they also have to compete with the informal sector, which is supported by influential interest groups.

For instance, if the owners of Bykea desire to initiate physical operations, they must amass substantial funds for bike procurement or outsourcing and then compete against well-established business magnates. These tycoons hold significant sway over both the public and administrative spheres. Consequently, these educated, young graduates find it difficult to sustain themselves within this challenging business environment. Consequently, Pakistan's ranking has remained persistently low, fluctuating between the 85th and 148th positions from 2010 to 2020.

Tech-start-ups thrive because of the existing expertise, technological prowess, and effective marketing strategies, often managed by owners who are already IT virtuosos. Conversely, general start-ups necessitate robust research and development efforts encompassing market needs assessment, local sourcing of materials, and forging robust connections within the local value chain. Unfortunately, avenues for comprehensive market evaluation remain scant, with a dearth of dedicated newspapers catering to local market dynamics, impeding the identification of issues, market demands, and supply dynamics. Similarly, research on local challenges, viable solutions, products, and services remains lacking.

Pakistan has 207 business schools but lacks publications like Harvard Business Review and similar magazines that provide insights into local obstacles. Although the HEC has allocated billions of rupees of funds for research on local challenges, the findings are not widely accessible. Technological grants often lead to products with limited commercial success. The absence of local case studies hinders inspiration and guidance for start-ups. Surprisingly, individuals with limited education excel in real estate ventures, yet universities lack specialised



programmes in real estate investment and finance despite it being a thriving market worth USD 400 billion in Pakistan.

Conversely, although tech start-ups boast a higher success rate, they struggle to achieve substantial growth within Pakistan. These start-ups encounter obstacles in scaling up their business by issuing IPOs on the PSX Main and the GEM Board, as well as attaining prominent positions in the global market. Various factors contribute to this anomaly at the third stage, i.e., scale-up, with the prevalent "Seth" culture emerging as the most significant. A majority of angel investors and seed funders do not adhere to an entrepreneurial culture, and even within NICs, successful tech start-up products often result in investors seizing control and appointing the start-up owners as mere CEOs, thereby eradicating the entrepreneurial culture.

Scaling-up happens because of several factors, but Pakistan's IT infrastructure is weak and university graduates lack the necessary skills. Additionally, internet blockages, protests, and strikes pose further obstacles. Moreover, regulatory policies of the State Bank of Pakistan and other governing bodies do not encourage FDI in the tech industry. Secondly, labour and tax laws primarily cater to traditional industries, causing issues for IT firms. Furthermore, the foreign policy lacks a strong emphasis on business, despite strong ties with China. Unfortunately, we have been unable to align our IT sector with China's and reap its benefits, whereas the US and India have established joint task forces for advanced telecommunications, focusing on Open RAN and 5G/6G tech research and development.

The ICT services industry in Pakistan reached USD 2.6 billion in 2022, with the potential to reach USD 10 billion by 2025. However, substantial support at the market and governmental levels is necessary to achieve this potential. The mere establishment of a special investment facilitation council cannot augment the FDI. Pakistan must go beyond and create a conducive ecosystem, not only for the tech industry but also for general businesses.

## **5. CONCLUSION**

The primary purpose of incubation centres in Pakistan is to support the growth and scalability of start-ups by providing them with resources, mentorship, and access to investors and customers. In conclusion, Pakistan's entrepreneurial activity among graduates remains strikingly low compared to other Asian countries. Access to finance is not the only major hindrance to entrepreneurial growth, but efforts to strengthen the entrepreneurial ecosystem also have not resulted in significant breakthroughs. The reported numbers of graduating start-ups from various centres are exaggerated, indicating a substantial gap between projected and actual outcomes. Concerns have been raised about the true nature of incubation centres, as they seem more focused on showcasing numbers than achieving substantial growth.

Furthermore, the allocation of funds and lack of experienced managers and mentors pose challenges for start-ups. The limited number of IPOs and the absence of market research hinder business growth and innovation. Weak IT infrastructure, regulatory policies, and a dominant "Seth" culture further impede the scaling up of start-ups. To tap into Pakistan's potential and foster substantial growth, a conducive ecosystem is needed for both tech start-ups and general businesses. The challenging business environment in Pakistan, characterised by limited ease of doing business, presents significant obstacles, particularly for general start-ups. Tech start-ups show higher resilience but face hindrances in scaling within the country. Addressing these issues is crucial to enable educated graduates to sustain themselves and drive entrepreneurship in Pakistan.



## 6. POLICY RECOMMENDATIONS AND SUGGESTIONS

Based on the findings and analysis of the study, the following recommendations are proposed for each stakeholder:

### **Sponsored Agencies (HEC, Ministry, Technology Board):**

- Although data and reports are currently collected from incubation centres, it is essential to supplement them with independent evaluations. Third-party assessments can unveil the true performance and conduct a cost-benefit analysis of these centres.
- Financial resources should be directed towards supporting start-ups rather than solely focusing on the operational and establishment aspects of incubation centres.
- Invest in enhancing the business acumen, marketing expertise, and product development skills of entrepreneurs.
- Organise dedicated news and publish, views, journals, and case studies that feature local and international case studies (especially in Urdu) on start-ups accompanied by video documentaries. This platform will provide aspiring entrepreneurs with insights into the opportunities, challenges and issues prevalent in the business world.

### **Incubation Centres**

- Develop on-site IT support facilities exclusively for start-ups, focusing on prototype and technology-based product and service development.
- Offer complimentary accountancy, auditing, and legal services to reduce initial costs for start-ups.
- Incubation centres should concentrate their efforts on a specialised field aligned with their core competencies. For example, NUML should focus on language solutions, agriculture universities on agri-business, and NUST on technology rather than dispersing their focus across multiple dimensions.
- Create a network that fosters collaboration between universities and industries, particularly for backward and forward supply chain purposes. This network will benefit start-ups by providing access to affordable raw materials and efficient distribution channels.

### **Government**

- Introduce financial opportunities for start-ups that have innovative and distinct products or services. The government should extend the offer of zero-interest or nominal interest rate seed funds, ranging from PKR 1.5 to 5 million. This funding initiative should be for those promising ventures that have crucial initial financial requirements.
- To be eligible for this funding, start-ups must demonstrate their unique and groundbreaking ideas. The allocation of this loan will be subject to approval from the incubation centre, following their thorough assessment and endorsement of the respective business plans.
- The government, in collaboration with HEC and Ignite, should implement a strategic approach to optimise the effectiveness of BICs and PITB Incubation Centres. These centres should primarily focus on





incubating early-stage entrepreneurs, providing them with specialised training and support during the stand-up phase of their ventures.

- On the other hand, the scope of NICs should be targeted at nurturing start-ups that have progressed beyond the incubation stage and are in the accelerator stage.
- To facilitate this segregation, the selection of entrepreneurs for NICs should be conducted through an ideas competition, wherein the most promising candidates from BICs and PITBs will be chosen to join the accelerator programme at NICs.
- This strategic alignment will enable both streams to operate within their respective areas of expertise and specialisation.
- BICs and PITBs, situated in peripheral as well as mainstream cities, will concentrate on cultivating new start-ups, while NICs located in major cities, will foster the growth of more advanced start-ups.
- By implementing this approach, the pace of entrepreneurship in Pakistan is expected to accelerate significantly, resulting in more productive and successful outcomes for the entrepreneurial ecosystem.

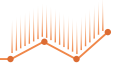


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## **ENHANCING GOAT PRODUCTIVITY AND THE ASSOCIATED BUSINESS VALUE CHAIN IN DISTRICT LASBELA, BALOCHISTAN**

Hazrat Yousaf, Atiq ur Rehman, and Azhar Iqbal

### **ABSTRACT**

This project investigated goat-rearing systems that exist in District Lasbela along with the channels of marketing with the main objective of enhancing goat production and associated business activities. To gain an in-depth understanding, the project focused on nomadic, sedentary, and local farmers because these are the primary goat-rearing systems in practice, and the marketing of goats is also in practice in Lasbela District. The objectives of the study included profiling nomads, transhumant, and sedentary households' livestock farming. The second objective was to know the farmers' friendly goat production system. The third objective was to gain a better understanding of the goat business value chain and associated constraints, and opportunities. Lastly, a regression analysis was performed for factors affecting herd size. A field survey was conducted from August to December 2022 & from January to February 2023 involving 265 farmers on a pretested questionnaire, out of which 98 sedentary, 89 transhumant, and 78 nomad farmers were interviewed. For the goat business value chain, 120 traders were randomly selected from the District Lasbela goat market.





## 1. INTRODUCTION

### Livestock from a Global Perspective

Livestock is one of the most important agricultural subsectors, which contributes significantly to agricultural exports and serves as a primary source of income and employment for rural populations (Jamal et al., 2022; Namonje-Kapembwa et al., 2022). Livestock production is a critical structural component of the agricultural sector around the world. It ensures the availability of a wide range of commodities and services from a wide range of animal species and resources in different agroecological and socio-economic conditions (Faraz et al., 2021; Godoi et al., 2021; Thornton, 2010). Rural populations' livelihoods are linked to various livestock channels, for example, animal rearing, feeding, grazing, and management. Marketing is one of the channels through which this sector employs approximately one billion people worldwide (FAO, 2018; Jamal et al., 2022; Salmon et al., 2018). Not only does this sector employ billions of people, it also produces draught power, milk, meat, hides and skins, and manure for fodder and cash crop production (Faraz et al., 2021; Wodajo et al., 2020). Thus, livestock plays an important role in ensuring food security and reducing hunger and poverty (Staal, 2015; Wodajo et al., 2020). Besides this, in the event of crop failure, livestock serves as a source of risk mitigation, a means of savings and investment, and many other socioeconomic and cultural functions, such as dowry for marriage, education and health payment, and social disputes (Namonje-Kapembwa et al., 2022; Onzima et al., 2018; Namonje-Kapembwa et al., 2019).

More than 18 per cent of the world's population is associated with animal husbandry, livestock processing, and marketing of livestock. This sector accounts for five of the world's top six most valuable commodities, and it accounts for 40 per cent of developing countries' agricultural GDP, making it the fastest-growing agricultural subsector (Staal, 2015). One billion livestock owners in Sub-Saharan Africa and South Asia (Staal, 2015) rely on livestock practices for a living, food, income, social disputes, religious events, social status building, and risk management against crop losses due to unfavourable climate change (Neupane et al., 2018; Staal, 2015).

Small ruminants, particularly goats and sheep, contribute significantly to total livestock production (Neupane et al., 2018). When small animal keepers are landless (nomadic), live, and rear their small animals in deserts and rangeland (Lodhi et al., 2002; Wodajo et al., 2020), arid and semi-arid areas (Laouadi et al., 2018), where they have fewer opportunities for income generation from traditional field crops, small livestock rearing plays a more significant role in their social lives, income generation, and nutrition security (Lodhi et al., 2002; Namonje-Kapembwa et al., 2022; Neupane et al., 2018; Namonje-Kapembwa et al., 2019). Algerian goat keepers, for example, raise their animals using low-input farming systems primarily in arid and semi-arid areas (Laouadi et al., 2018). Similarly, in Pakistan, out of 79.61 million hectares of land, approximately 49.5 million hectares are rangelands where small ruminants raise their animals, and it is the largest provider of natural vegetation (Lodhi et al., 2002). In a similar vein, one of the crucial livestock activities in the hilly region of western Nepal is goat farming (Panth et al., 2021), while smallholder farmers in Ethiopia commonly rear small ruminants in lowland regions with too little rainfall and mixed crop and livestock farming methods (Wodajo et al., 2020). Small ruminants sometimes can provide opportunities for subsistence farmers to purchase agricultural inputs such as seeds, fertilisers, and pesticides for cash crop production in exchange for selling goats and their value-added products, economic benefit and food security (Adams et al., 2021; Faraz et al., 2021; Wodajo et al., 2020).

Small ruminants are rearing animals under different rearing systems. For instance, Ethiopia's production of small ruminants is largely sedentary (crop-livestock), with small animal rearing being practised in both the highlands and lowlands (Wodajo et al., 2020). In Balochistan, sedentary, transhumant, and nomadic small ruminant production techniques, are frequently used (Lodhi et al., 2002). Nomads are mostly migrating pastoralists who migrate throughout the year due to natural factors such as cold winter, hot summer, water shortage, and a lack of forage (Dostain et al., 2018; Lodhi et al., 2002; Teitelbaum & Mueller, 2019). They mostly travel on foot, while camels or donkeys carry tents and luggage. Apart from trivial nomads who engage in rain-fed agriculture, they

mostly live in small tents or camps and keep livestock for livelihood. They migrate from the uplands to the lowlands in the winter and back again in the summer (Dostain et al., 2018; Lodhi et al., 2002). Their travel is predetermined in the direction and seasonal (Lenz et al., 2015; Teitelbaum & Mueller, 2019), while it is based on a contract with local communities, and local communities provide them with grazing facilities and animal feeding (Lodhi et al., 2002). In return, they sell animals and their products as well as provide labour services (Lodhi et al., 2002). Thus, the term nomadic refers to a group of people whose migration is influenced by the variability of natural factors. Transhumanists, as defined by Lodhi et al. (2002), are mostly landowners, with only a few being landless. They are similar to sedentary people but differ from nomads in that they own land and migrate when feed and water are scarce. They migrate during the winter from their homeland to a warmer climate with a large flock of cattle and a mix of sheep and goats. They mostly used trucks as a mode of transportation while fulfilling their basic needs by engaging in animal husbandry and agricultural activities in the areas where they migrate (Lodhi et al., 2002; Namgay et al., 2021). They do, however, raise livestock for a variety of purposes (Ayantunde et al., 2014) as livestock is their source of income (Lodhi et al., 2002), informal household insurance and financing, and savings and nutrition security in the form of milk consumption, (de Glanville et al., 2020; Gentle & Thwaites, 2016). They migrate to the lowlands with their flock in the winter and return home in the summer (Dostain et al., 2018; Lodhi et al., 2002). Transhumant is the migration of pastoralists and their livestock in response to variability of environmental and ecological resources, such as scarcity of water, fodder, and seasonal variability (Motta et al., 2018). Sedentary flock owners are those who have lived in the same area their entire lives and engage in irrigated agriculture and livestock activities for their families' livelihood and emergency expenses as well as to improve farm productivity. In the literature, various studies have examined patterns of livestock ownership as well as factors affecting livestock production practices.<sup>1</sup> The findings show that small animals are reared under nomadic, transhumant, and sedentary systems.

As far as the marketing of small ruminants is concerned, smallholders primarily use informal channels for the marketing of small ruminants, which are dominated by small-scale farmers and traders (Namonje-Kapembwa et al., 2022; Togarepi et al., 2016). Three main channels are used by farmers and smallholders to market their animals (Namonje-Kapembwa et al., 2022; Panth et al., 2021). The first channel is a direct channel where farmers (producers) sell their live or slaughtered animals directly to town residents and other households without the participation of traders or commission agents (Godoi et al., 2021; Namonje-Kapembwa et al., 2022). The second channel is the involvement of small animal traders, commission brokers, and beoparis in the purchase of animals at farm gate prices from farmers in various villages (Namonje-Kapembwa et al., 2022; Namonje-Kapembwa et al., 2019; Weber et al., 2018). These participants then sell either the animal directly to customers in the market or to other big traders and processors. The third channel is where farmers sell their animals to big traders other than local traders through beoparis and commission agents. The big traders then transport animals in trans district and province markets as well as sell to large butcheries and processing companies who later sell to consumers at retail prices (Weber et al., 2018). The main participants in the informal market channels are producers, traders, brokers, and consumers (Alemayehu et al., 2022; Bashir & Venkatachalapathy, 2017). However, informal marketing channels have some limitations. For instance, there are no standardised prices, and prices are determined primarily by an animal's weight, health, and age (Barua et al., 2021; Weber et al., 2018). Various studies have examined goat marketing channels, constraints, and opportunities for goat business commercialisation, such as Malusi et al. (2021) and Mataveia et al. (2021) for South Africa; Adams & Ohene-Yankyera (2014) for Ghana; Marius et al. (2021) and Togarepi et al. (2018) for Namibia; and Srinivas et al.,

<sup>1</sup> See, for example, Jamal et al., (2022) Lodhi et al. (2002), Namonje-Kapembwa et al. (2022). Hatami et al. (2022) for Iran; Ahmed (2022) for the western Himalayas; Shivakumara & Kiran (2019) for Karnataka; Weber et al. (2018) for Mizapur, India; Dogra et al. (2018) for Himachal Pradesh, India; Sharma et al., (2022) for Himalaya; Nafti et al. (2021) for arid oases of Tunisia; Siasiou et al. (2021) and (Ragkos et al., 2019) for Greece; Nwachukwu & Berekwu, (2020) for Nigeria; Sapkota et al., (2020) for Nepal; Fernández-Giménez & Ritten (2020) for the central Spain; Al-Khaza'leh (2018) for Jordan; Karagöl & Keskin (2018) for Turkey; Srinivas et al. (2013) and Tavva et al. (2016) for Afghanistan; Merkle (2013) for inner Mongolia (China); Taruvinga et al. (2022) for South Africa; Shahbaz et al. (2022) Jamal et al. (2022), Farooq et al. (2009), Ashraf et al. (2013), Raziq et al. (2010), Shafiq (2008), and (Lodhi et al., 2002) for Pakistan.



(2013) for Afghanistan. Other relevant studies examined small ruminants' marketing channels in Ethiopia (Belay et al., 2021), Kenya (Yego & Siah, 2018), and India (Kumar, 2010).

The world's total production of goat meat was 6.39 million tonnes in 2021, with Asia and Africa contributing the most. In terms of the production of goat meat, Asia contributed 4.7 million tonnes, while Africa contributed 1.4 million tonnes (The Science Agriculture, 2024). In 2021, Pakistan produced 0.518 million tonnes of meat, making it the third-largest meat-producing nation in the world after China and India, which produced 2.519 and 0.547 million tonnes, respectively. China, which consumes 2.4 million tonnes of meat annually, is the greatest meat-consuming nation in Asia. China is followed in goat meat consumption by India, which consumes 0.502 million tonnes annually and Pakistan, which consumes 0.352 million tonnes annually.

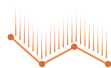
Goat meat consumption from 2007 to 2019 increased by 2.8 per cent per year (The Science Agriculture, 2024). Livestock is one of the major contributors to the agricultural sector in Pakistan, and a significant source of government revenue and export earnings. Employment and income in rural areas are closely related to this sector (Faraz et al., 2019; Faraz et al., 2021). Most of the current farming practices centre on raising livestock, which is the main source of income for most households (Faraz et al., 2021). The livestock sector has recorded growth of 3.26 per cent in 2021–22 compared to 2.38 per cent in the previous year, contributing 61.89 per cent to the agricultural sector and 14.04 per cent to Pakistan's GDP (GOP, 2022).

Livestock (animal husbandry) is the primary source of income for those who live in Pakistan's rural areas as more than 8 million rural families are involved in this sector (GOP, 2022). In Pakistan's rural areas, the sale of live animals and their products is the only way to generate cash income and buy agricultural inputs (Faraz et al., 2021). Around 35–40 per cent of rural families get their income from this sector (GOP, 2022). The estimated livestock population has been growing over the past three years (see Table 2), with each family having an average of 3–5 cattle or buffaloes and 4–6 goats or sheep as their main sources of nutrition security and income (Kakar et al., 2013; GOP, 2022). In terms of the population of small animals, in Pakistan, the highest number is that of goats at roughly 82.5 million, followed by sheep at 31.9 million. With 26.7 million goats (GOP, 2022), the Punjab province has the highest goat population, followed by Sindh (16.61 million) and Balochistan (15.88 million. In Pakistan, 6.8 million farmers raise and care for goats. Thus, this industry plays a significant role in the livelihood of goat farmers (Siddiky, 2017).

*Table 1: World's Top 10 Goat Meat-Producing Countries in 2021*

Rank	Countries	Production of goat meat (in million tonnes)
1	China	2.519
2	India	0.547
3	Pakistan	0.518
4	Nigeria	0.257
5	Bangladesh	0.229
6	Ethiopia	0.154
7	Chad	0.140
8	Sudan	0.119
9	Mongolia	0.096
10	Turkey	0.095

*Source: The Science Agriculture (2024).*

*Table 2: Estimated Livestock Population (Millions)*

Species	2019-20a	2020-21a	2021-22a
Cattle	49.6	51.5	53.4
Buffalo	41.2	42.4	43.7
Sheep	31.2	31.6	31.9
Goat	78.2	80.3	82.5
Camels	1.1	1.1	1.1
Horses	0.4	0.4	0.4
Asses	5.5	5.6	5.7
Mules	0.2	0.2	0.2

*\*: Estimated figure based on inter-census growth rate of Livestock Census 1996 & 2006  
Source: GOP (2022).*

Balochistan has abundant livestock and mineral resources, and about 40 per cent of Pakistan's cattle population comes from the province's livestock sector (The Express Tribune, 2019). Although Balochistan is the largest province in terms of area in Pakistan, the existence of the province's rural population depends mostly on livestock farming, which also provides the only reliable source of milk and dairy products for rural communities. However, this sector has received little attention in terms of investment from both the private and public sectors. Balochistan's livestock sector has the potential to provide jobs and opportunities for local populations and national and local businesses by processing and exporting meat.

In Balochistan, raising livestock (goats and sheep) is crucial for the livelihood and nutritional security of those who reside in rural areas (Shafiq, 2013). Balochistan primarily consists of dry and semi-arid areas with a hyper-arid climate (desert) and mountainous nature (Lodhi et al., 2002; Raziq et al., 2010). With a landmass of 348,189 km<sup>2</sup>, it is Pakistan's largest province. The annual rainfall varies depending on the time of year, the season, the topography, and the ecological zones. Rainfall in the province ranges from 50 mm at the coast and in the Chagai district to 400 mm in the region's northeast. Small ruminant (goat/sheep) rearing with three channels is practised in Balochistan (Lodhi et al., 2002). These channels are sedentary, transhumant, and nomadic. The sedentary people reside in villages where agriculture is the main source of employment. They do not migrate and have land. They raise animals for milk consumption as well as a secondary source of income by selling goats and sheep in times of need. Transhumant flock owners own land, while a few of them are landless (Lodhi et al., 2002). However, their primary source of income is based upon agricultural activities where rainfed and irrigated are the main sources for agriculture practices. Transhumant people typically lease land for 6 months to 5 years in regions where the weather is moderate and suitable for agricultural practices. They migrate to the lowlands with their flocks where they do agricultural work on their leased land and raise animals to produce manure, milk, and meat for consumption. Nomadic flock owners rear animals as their primary source of income, and they migrate with their flock year-round (Lodhi et al., 2002). The availability of water and animal forages determines when they migrate. Their migration is also influenced by seasonal variations, for instance, in the winter, they move with their flocks to areas with moderate temperatures, and in the summer, they return to those areas when the weather there is beneficial for health, forage and water is available for their flocks.

Over the past decade, there has been a sharp increase in global goat production where the estimated population is more than 1 billion animals. The estimated share of developing countries in Asia and Africa of goat population is 0.96 billion goats (Mataveia et al., 2021). China, India, and Pakistan are the top three meat goat-producing countries Worldwide (The Science Agriculture, 2024). Therefore, Asia is often called the home of goats (Liang &



Paengkoum, 2019). However, in the case of Pakistan and particularly in Balochistan, the rearing of small ruminants is in the hands of small-scale farmers. Therefore, small-scale farmers rely on the informal market of goats/sheep (Shafiq & Kakar, 2006) as a source of revenue to support their way of life, as a way to settle social conflicts, to maintain social status, and as a way to consume milk, meat, and other dairy products that contribute to ensuring nutrition security.

Studies in Balochistan focused on the health, feeding, and grazing of goats as well as the management of goats and sheep. The market behaviour of small ruminants has also been studied. Lodhi et al., (2002), for example, investigated the small animal (goat/sheep) practices under nomadic, transhumant, and sedentary systems, where they focused on selection, breeding, grazing, and healthcare practices. They used a questionnaire to gather information from 120 respondents in the upland Balochistan districts of Quetta, Chagai, Loralai, Pishin, Mastung, Kalat, and Khuzdar. Similarly, Shafiq & Kakar (2006) reviewed livestock marketing for the objective of economic development of Balochistan in the short run. Rodriguez et al., (1993) evaluated the sale of goat and sheep skins in highland Balochistan using a questionnaire, while Afzal et al., (2011) examined factors affecting small ruminants' prices in the Quetta animal market. Furthermore, Ali et al. (2013) examined sheep and goat production patterns in terms of rearing and keeping for District Qila Abdullah. Along the lines of analysis in Shafiq et al. (2017) investigated constraints associated with livestock health particularly targeted small ruminants. Using the cases of Qalat, Mastung, and Quetta, Jehan et al., (2021) used a questionnaire to evaluate the management and production system of Balochi sheep.

The previous literature, however, has not considered the enhancement of goat production and its associated business value chain in the district of Lasbela, Balochistan. To fill this gap and to contribute to the existing literature as well as to analyse how can goat rearing help achieve the SDGs, the following objectives have been set:

### **Purpose and Scope of the Study**

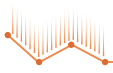
The study's purpose and scope are to develop linkages between small-scale producers and the market to meet the following objectives.

1. To profile nomads, transhumant, and sedentary households' livestock farming in District Lasbela. This objective covers livestock ownership and the composition of households/farmers.
2. To know farmer's friendly goat production system in district Lasbela. This objective covers goat farming, milk, and meat production in District Lasbela as well as selection and breeding, feeding, grazing, and health management systems. The constraints associated with goat farming are also examined. The role of gender in the production of livestock, particularly the role of women in goat farming, is also covered. It will help to assess women's empowerment through participating in livestock/goat farming as well as examining factors that enhance goat production.
3. To gain a better understanding of the goat business value chain, associated constraints, and opportunities.

### **Relevance to Public Policy**

This initiative is relevant to public policy for food security, food sufficiency, and making livestock farming more accessible and efficient to achieve SDG 1 (end hunger), SDG 2 (eliminate poverty); SDG 5 (gender equality and empower of all women and girls) and goal 3 and 10 good health and well-being and reduce inequality).





## 2. LITERATURE REVIEW

The literature is divided into the following sections.

### **Livestock Production System in Developed and Developing Countries**

Most of the estimated 1.3 billion poor people in the world reside in developing nations and depend on livestock either directly or indirectly for their livelihood (FAO, 2009; World Bank, 2007). Globally, livestock provides about 40 per cent of the agricultural gross domestic product (GDP) and forms about 30 per cent of the agricultural GDP in poor countries (World Bank, 2007). The significant contribution of livestock to sustainable agricultural development is highlighted by these estimates. The livelihood of people in developing societies, especially the impoverished, depend on livestock in many ways. They provide environmental sustainability as well as food and nutrition, employment, and economic and social standing. Additionally, livestock offers a safety net in times of need by way of liquid assets and a diversification approach for food production (FAO, 2008).

Over a billion people are thought to be involved in the livestock industry globally, from input supply to production, processing, sales, and marketing, and at least half of these, including some of the world's poorest people, completely depend on the industry (ILRI, 2011). In Ethiopia, livestock plays a significant role in small-holder farmers' livelihoods. They are a significant source of both cash income and other goods including draught power, milk, meat, manure, and hides and skins. Thus, livestock is crucial to guaranteeing food security and reducing poverty (Ehui et al., 2002).

Over the past ten years, there has been a significant rise in the goat population globally, which is now thought to number more than 1 billion animals. Goats used for meat make up about 96 per cent of these animals, which are in underdeveloped nations in Asia and Africa. Following the global trend, the number of goats in Africa has expanded over the past five years to account for 41 per cent of all the goats worldwide and is now close to 423 million. The population of these goats in Southern Africa is estimated to be 35 million (FAO, 2016; Onzima et al., 2018).

Khan & Iqbal (2010) carried out a study in Aligarh, a micro-geographic area from the Upper Ganga Plain of Uttar Pradesh. According to the study, the region had an increase in animal husbandry with a few species between 1993–1994 and 2003–2004. Buffalo and goat populations improved because of rising urban consumer demand for milk and meat, agribusiness deregulation, and shifting dietary preferences throughout time.

Between emerging and established nations, there is a contradiction in the world's livestock industry. Between 1980 and 2002, the amount of meat produced in the developing world increased three times from 45 to 134 million tons (World Bank, 2007). The main drivers of this growth—poultry and pigs—were centred in nations that saw fast economic expansion, especially in East Asia. On the other hand, although being at high levels, output and consumption of animal products are currently only rising slowly or stagnant in industrialised countries. However, 53 per cent of the agricultural GDP in industrialised nations is accounted for by the production and sale of cattle (World Bank, 2007).

Nandi et al., (2011) did a study in the north-eastern Indian state of Tripura on the "Performance of developing Black Bengal Goats under different management techniques of Rearing." Black Bengal goats reared under an extensive management system performed better in terms of body weight gain, body measurements, and biochemical profiles than goats reared under semi-intensive and intensive systems, according to the study. Thirty female Black Bengal kids were randomly chosen at the age of two months and divided equally into three groups with ten kids in each group.

In Low and Middle-Income Countries (LMICs), livestock production is crucial for enhancing human populations'



livelihoods and chances of survival (FAO, 2009). According to estimates, livestock supports up to one billion smallholders worldwide, while the market chains for the industry employ millions more people. Production of livestock is complicated. The sector offers crucial services and resources to the human populations of LMICs, such as nourishment, assistance with daily living, and ecosystem services (FAO, 2016). However, there is also a widespread understanding that livestock farming contributes significantly to adverse environmental effects caused by humans (such as greenhouse gas emissions, water pollution and depletion, altered land use, and biodiversity).

Kumar (2007) used primary data from 18 commercial goat farms located in several states to examine the status, economics, and potential for commercialisation of goat production in India. The study showed that several influential and large farmers, businesspeople, and manufacturers had embraced commercial goat rearing. Due to the decreasing availability of resources for broad grazing, the commercialisation and intensification of the goat industry have been noted as being significant. Commercialisation could help close the supply-demand imbalance and boost goat production.

The Sub-Saharan African (SSA) region has a substantial livestock sector. Ten per cent of the population in SSA receives direct livelihood from it and another 58 per cent is indirectly dependent on cattle. Similarly, Zambia's livestock industry provides raw materials to agricultural industries, which account for 35 per cent of the nation's industrial value-added and contributes 28 per cent of the country's agricultural GDP (Otte & Knips, 2005)

The production of agricultural goods depends heavily on the availability of livestock resources. In Bangladesh, in 2016-17, the livestock sector accounted for around 1.60 per cent of the country's GDP, and its annual growth rate was 3.32 per cent. There are currently expected to be 23.935 million cattle, 1.478 million buffaloes, 25.931 million goats, 3.41 million sheep, 275.083 million poultry, and 54.016 million ducks in Bangladesh's livestock population (GOB, 2019). Except for meat, livestock goods like milk and eggs are severely lacking in Bangladesh. 5.582 million metric tonnes of milk and 2,008.5 million eggs are in low supply. However, there is a 0.019 million metric tonnes surplus of beef. One of Bangladesh's most significant and vital agricultural industries is the production of goats (Alam et al., 2017)

Around 30 per cent of jobs worldwide were in the livestock sector. Additionally, the livestock industry included long well-organised supply chains that served 1.3 billion people globally and improved livelihood alternatives for 600 million small-scale farmers in emerging nations (Thornton, 2010). However, in this context, the cattle industry is a key component of the global agriculture industry. In general, domestic animals provide most of the food needed by humans, particularly in poor nations where they provide most of the fat, fibre, milk, eggs, leather clothing, meat, and other dairy products.

Livestock is one of the major contributors to the agriculture sector both in developed and developing countries. It is a source of foreign exchange earnings, an income and employment source for rural families, a contributor to overall exports, and a key sector for improving human livelihood and survival (Kakar et al., 2013; GOP, 2019; Salmon et al., 2018). The livelihoods and survival of the rural population of low- and middle-income countries are positively associated with different channels of livestock (Salmon et al., 2018). These channels include rearing, selling, and purchasing livestock production in local and international markets where are engaged by about one billion smallholders are engaged worldwide (FAO, 2009; Salmon et al., 2018).

Similarly, the increasing trend of population, economic growth, and urbanisation has increased the demand for meat, and according to the projection of the Food and Agriculture Organization (FAO), the demand for meat in 2023 will increase by 80 per cent and more than 200 per cent by 2050 (FAO, 2018). The literature demonstrates the significance of livestock in a country or community's development. For example, it is more convenient for women to get employment by acquiring livestock (Kristjanson et al., 2014).

The factors that influence livestock production and value chains were studied in depth. For example, Godoi et al.



(2021), based on survey data, found that there are two major livestock farming systems in Punjabi and Sindhi villages, namely, mixed and small ruminant farming systems. Mixed livestock farming relates to sedentary households, where the owner has land ranging from three to five acres and cut-and-carry feeding is commonly used. Animals are reared mostly by women within the household walls. The stock of animals is small supplementing income from dairy products. Small ruminant livestock farming is defined as having less than an acre of land or being landless, and relying on livestock farming as their primary source of income.

Transhumant is a term used to describe a livestock farming method in which animals are reared for four to eight hours on communal property near their dwelling. The duration of rearing is extended whenever animal feed is scarce. The herd size ranges from 20 to 50 animals. Transhumant usually travels with animals for 3 to 6 months a year when feed becomes scarce or unavailable (Godoi et al., 2021; Lodhi et al., 2002).

Wodajo et al. (2020) used primary data from a household survey and focus group discussions to find that men in Ethiopia prefer cattle rearing over sheep because of the higher profit margins when selling milk and meat products. Women are given preference in sheep rearing due to the ease of management and the ease of selling them locally to satisfy household expenses. The combined data result, however, revealed that 97.8 per cent of Ethiopian households had one or more livestock species, including goats, sheep, cattle, and poultry. The management strategy of livestock showed that small farmers have 1 to 25 livestock. The reason for the smaller livestock population is easier management and better rearing control. The study findings further showed that households with small ruminants prefer to keep sheep and goats over cattle because they are easier to rear for women and children. Similarly, from focus group discussions and key informant interviews, Namonje-Kapembwa et al. (2022) found that goat husbandry in Zambia by smallholder farmers is usually a semi-intensive system in which farmers keep animals in night shelters which graze in the nearby area during the day. Most goat production is reliant on natural pastures and crop leftovers. Smallholder farmers raise goats for a variety of reasons, including milk production, food and nutritional security, emergency expenses, social events such as weddings and traditional ceremonies, dowry payments, and rural disputes. Instead of profit-making, goats are raised to achieve goals. As a result, the goat market for smallholder farmers is informal as they sell goats whenever there is a need for cash.

According to Wodajo et al., (2020), households in Ethiopia keep sheep and goats to meet basic needs, such as school fees, medicine, and food. Under the conditions of drought and low-value foods, small ruminant keepers choose goats and sheep for milk production over cattle production (Tulich, 2013). According to Dossa et al., (2008), goats and sheep are kept by small ruminant households to sell to purchase basic essential food and clothing as well as to pay for children's education. They also raise goats and sheep to obtain enough food in the event of crop failure due to drought or disease. Small ruminants are the major source of income for landless people, and because goats are more tolerant of hard surroundings than sheep, they are frequently seen as being more profitable than sheep in terms of escaping poverty.

### **Household Members and Their Contribution to Goat Farming**

Another study conducted in Uganda discovered that in addition to providing for household needs, goats, sheep, and chickens were crucial sources of income for purchasing cereals, paying medical bills for sick family members, and paying school fees, while cows and pigs were raised primarily to make money. Due to the goat's significant economic contribution to the poor, it has earned the nickname "poor man's cow" (Panth et al., 2021; Siddiki, 2017). This not only provides healthy and easily digestible milk but also continuously provides marginal or impoverished farmers with additional cash.

Various farming systems used in Bangladesh have traditionally included goat husbandry as an essential component. Goats are kept to increase income and improve food security, making them an essential component in households' livelihood plans, particularly at the level of marginal farmers. Since goats are small animals, they



are easier for women and kids to handle. Feeding, milking, and caring for goats is neither labour-intensive nor requires a lot of equipment. Thus, feeding expenses and capital investment are both relatively modest. The primary way that rural women in Bangladesh may meaningfully meet the financial needs of their families is through the care of goats, which plays a vital part in rural family life. Goat farming is also the best way for women to support their families while they are at home. The status of women and the socioeconomic advancement of any nation are closely related (Barua et al., 2021).

Through a structured survey, Malusi et al. (2021) ascertained the influence of cattle herd dynamics on the commercialisation of cattle among beneficiaries of the Nguni Cattle Project in the Eastern Cape, South Africa. Out of the 180 beneficiaries, who were still actively engaged in cattle farming, questionnaires were given to 120 of the Nguni Cattle Project's beneficiaries. The study's findings showed that the Nguni Project, which enabled cattle ranchers in the Eastern Cape, South Africa, to keep Nguni breed cattle in their herds, had been successfully launched. The survey also revealed that the majority of Nguni Project recipients chose to sell their livestock privately, specifically to other farmers, without taking into account the animal's history, including weight, carcass traits, and branding mark. It was discovered that community farmers' cattle productivity and marketing were significantly impacted by livestock training.

Hossain et al. (2017) conducted a study to investigate how goat rearing in Bangladesh's Mymensingh district improved income and livelihood. The study was carried out in three unions of Haluaghat Upazila in the Mymensingh district, i.e., unions of Gazirvita, Koichapur, and Norail. The farmer's families were among the most impoverished and illiterate. Black Bengal goat production had an annual total cost of Tk. 2,154, while the average household's net and gross returns were each Tk. 4,296 and Tk. 2,142, respectively. Goat rearing in the study area boosted educational status, employment for both men and women, social dignity, and social acceptance. The outcome demonstrates unequivocally that raising goats significantly improves livelihood in the studied area.

Shafiq (2008) analysed the role of women in livestock production in Balochistan, Pakistan. The objectives of the study were to document the role of women, determine the constraints that women in Balochistan were facing in livestock, and provide recommendations for policymakers in Balochistan. The study collected primary data is collected through a survey. The results showed that although livestock is an upright family business, women living in both belts face tremendous difficulties in working with livestock, which needs the special attention of policymakers. Women's performance is extremely noticeable and needs to be acknowledged. The study suggested that women's participation can be further encouraged by the development of the livestock industry.

Hayat et al. (2017) evaluated various socioeconomic factors to investigate the limitations and issues that the cattle sector is now facing. 2,000 randomly chosen livestock farmers from five tehsils in the district were interviewed using a structured interview schedule. The study determined that around 40 per cent of the respondents lacked literacy and only a small fraction (5.2%) of literate respondents had completed at least ten years of formal education, while only 3.5 per cent had completed more than ten years of education. The livelihood strategies of the majority (42.0%) of respondents were both crop and livestock farming. More than half (55.7%) of respondents had adopted livestock farming on a semi-commercial basis.

Dixit et al. (2017) tried to investigate the role of small ruminant rearing in the nutritional and economic security of millions of landless, marginal, and small farmers. After cattle, goats are the second most common livestock species in terms of population. Goats and sheep make up 67.5 per cent (135.17 million) and 32.5 per cent (65.07 million) of the 200 million small ruminant animals in the nation, respectively, making up 10 per cent of all small ruminant animals worldwide. The goal of the study was to examine the productivity of Black Bengal goats and the livelihood created by goat farming in the Bangladeshi district of Mymensingh. The study found that housewives owned most of the goats. One goat produced an annual net profit of Tk 754, on average. Due to an increase in their revenue from goat farming, farmers had to spend more on food, health care, education, clothing, housing conditions, and social standing.



Baidoo et al. (2016) examined the impact of smallholder livestock production on farm households' income in northern Ghana. In contrast to distance to market and dependency ratio, they discovered that smallholder livestock production and farm size boost revenue. They advised that measures to encourage smallholder livestock production be implemented to improve income based on evidence of the positive association between livestock production and household income in this research. The poor rural people in Ghana's northern regions stand to benefit from this by having better livelihoods and experiencing less poverty.

To understand the breeding and performance characteristics of Black Bengal goats in the four Upazilas of the Mymensingh district, Islam et al., (2016) conducted a study. The average number of does and bucks per family in the Mymensingh district was found to be 3.56 (90.61%) and 1.77 (9.39%), respectively. Because of the unpleasant stench and challenging handling, it was discovered that most farmers castrate their male children. Most farmers rely on natural mating to serve their does by travelling a considerable distance. The average service charge was determined to be Tk 70.901.77, and there were significant differences ( $P < 0.05$ ) between the four Upazilas. This study showed that there was a severe shortage of Black Bengal breeding bucks in rural areas, which probably represented the overall situation of the country.

Since Nepal's inception, goats have been a crucial component of the country's mixed farming system. Goats are important sources of income and act as a safety net and liquid asset during difficult times for small farmers with limited resources, especially women (Neupane et al., 2018; Sapkota et al., 2017). Additionally, they significantly improve people's quality of life by serving as a source of meat, manure, leather, and pack use. Due to the great value of goats' meat, milk, and other dairy products, goat farming remains a significant stakeholder in the production of animal meat in Nepal, where crop-livestock mixed farming systems are common (Joshi et al., 2018). In Ethiopia, food instability and malnutrition are significant problems. Goat milk consumption is more widespread than sheep milk consumption, and it is thought to offer medical benefits. Children, sick persons, and the elderly are the most frequent consumers (Fikru & Gebeyew, 2015).

### **Factors Affecting the Business Value Chain of Goat Marketing**

Staal (2015) studied livestock marketing and supply chain management of livestock products. Livestock and livestock products are sold in some of the most active markets in South Asia and the rest of the world. The increase in purchasing power is partly responsible for this, although there are other forces at play as well. These markets are overwhelmingly domestic, do not cross international borders, and are primarily driven by regional demand. The complexity of handling and regulating highly perishable products, which occasionally also present greater risks to human health than crop products, must be addressed to manage these supply chains.

Market opportunities for the underprivileged differ by location and cattle industry. Smallholders are more competitive in ruminant agriculture than monogastric output. However, some obstacles must be overcome to improve the market success of smallholder agriculture on the input side. The obstacles include difficulties in finding technical inputs like feeds, expensive and low-quality inputs, and the necessary knowledge and experience. On the output side, organisational farm-to-market connections and overall infrastructure investment are poor due to deficient policy and regulatory settings that facilitate smallholder market access (Herrero et al., 2010).

The value chain concept has been used to evaluate prospective interventions from a development perspective in both the crop and livestock sectors (Rich & Perry, 2011). Beyond supply chain analysis, the value chain idea provides a more rigorous evaluation of performance and competitive advantage in a changing environment, particularly in terms of organisational prospects. This also applies to their capacity to innovate in response to shifts in supply and demand.





Ramesh et al. (2012) investigated the small ruminant marketing system in three distinct agro-climatic zones of Karnataka, India. The study's findings showed that small ruminant marketing is haphazard throughout the studied areas. Most respondents (85%) sold their animals when they required money for personal use, with debt repayment (28.3%) coming in second. In addition to local marketplaces and village collectors, family and friends were significant marketing avenues.

Ayele et al. (2012) for many smallholder farmers in emerging nations, a lack of fodder is a recurring issue. Even though fodder innovation is only one component of the value chains for livestock, it is sustainably improved when combined with other innovations and activities focused on the market to maximise productivity advantages. Smallholder farmers must organise in groups to take advantage of possibilities and confront systemic barriers to accessing markets.

Khatun et al. (2012) investigated the elements that affect how different types of farmers' market goats at various ages and weights. Landless and marginal farmers sold 58.81 per cent of their goats at six months, small farmers sold 42.94 per cent at ten months, and medium farmers sold 50 per cent at fifteen months. At the age of 15.5 months, the potential market weight of goats was found to be 17.10 kg. Approximately 84 per cent of farmers across all categories sold their goats to make money, 15 per cent because of rearing issues, and 1 per cent because of healthcare needs.

Pakistan's meat sector has a lot of promise. Because of the high demand for halal meat, exporters are unable to meet it. Exports rose by 31 per cent from July 2011 to July 2012, and have been on an upward trend for the past ten years. The demand for meat and milk is predicted to double by the year 2050, which is a very encouraging sign for the future of the world. Pakistan's population is projected to increase to 335 million people during this time. According to Bradfield & Ismail (2012), now is the ideal time to grow and invest in the livestock industry

### **Factors Affecting an Increase in Goat Production**

In Sub-Saharan Africa, several problems result in low productivity and limit the production of livestock, particularly cattle in communal areas. These include a lack of wholesome livestock feed during the dry season, high rates of sickness and mortality, and a lack of wholesome water or access to it (Mutibvu et al. 2012). There are times when water sources are few, which increases the likelihood of disease transmission and soil damage. Inadequate housing, insufficient soil fertility for forage production, inadequate veterinary health services, and weakened supply systems for livestock and animal products are further contributing concerns (Mutibvu et al., 2012). Floods and droughts, as well as other extreme weather events, were also included by Kapimbi & Teweldemedhin (2012). They found that extreme climate conditions, such as floods and droughts, and manmade factors, such as livestock theft and careless starting of fires, contributed to low productivity.

Using the primary survey data of Ethiopia, Wodajo et al., (2020) obtained differences in households' preferences toward livestock rearing. They divided the data into highland, midland, and lowland households and found that households belonging to highland preferred sheep rearing, lowland households preferred goats, while cattle were the most important preference of households belonging to midlands. Shiimi et al. (2012) conducted a study on the factors influencing the decision to sell cattle through formal or informal markets. They found that improved productivity and access to market-related information had a significant impact on the farmer's choice of whether to sell through formal markets or not. Additionally, the findings indicated that households with access to commodity pricing data were more inclined to sell to traders than to other families. The findings also demonstrated that the choice of marketing channel was influenced by the current goat prices in the districts. Every unit rise in the price of goats inside the district reduced the likelihood of selling to small-scale traders by 0.26 percentage points. Farmers noted high illness prevalence, lack of production skills, lack of access to market information, high cost of transportation, lack of access to credit, and lack of market infrastructure as the constraints in the goat chain.

### 3. DATA AND METHODS

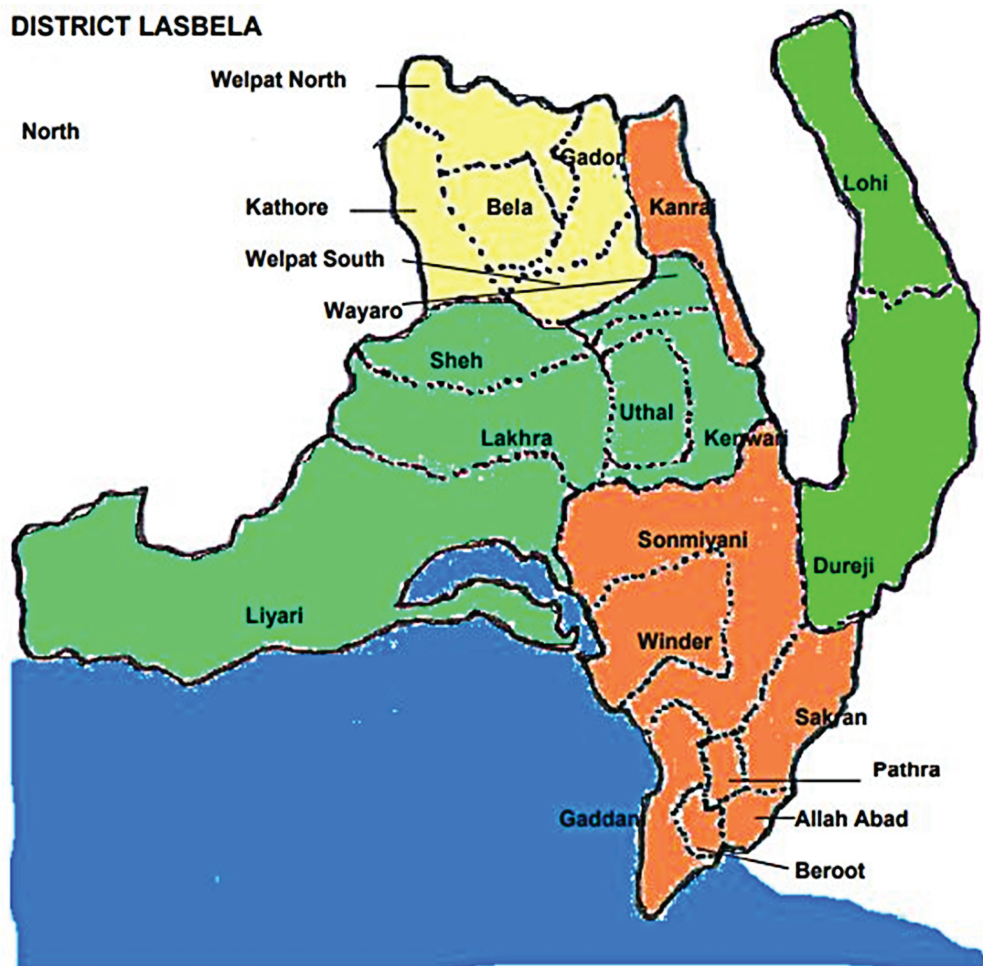
#### Sample Design

Enhancing goat productivity and its associated business value chain in Lasbela district, Balochistan, is the primary goal of this study. The livestock production of sedentary, transhumant, and nomadic households is profiled in this study. Then the study concentrates on learning about farmer-friendly goat production systems. Goat farming, milk production, meat production, breeding, feeding, grazing, and health management systems are all included in the farmer-friendly goat production system. The role of genders in goat production, as well as opportunities and constraints related to goat production, are also examined similarly. The study also looks at the goat-related business value chain scenario, including its constraints and opportunities.

#### Study Site

Lasbela, a former princely state of India, takes its name from two words, "las," which means "plain," and "bela," which means "jungle." On June 30, 1954, Lasbela was notified as a district. The district is situated on the Balochistan border. Lasbela borders with Khuzdar district in the north, Dadu district in the east, Karachi East and Karachi West districts in Sindh, the Arabian Sea in the south, and Gwadar and Awaran districts in the west (IUCN, 2011).

Map 1: District Lasbela



Source: IUCN (2011).



The current study was conducted in the Lasbela district because it is well-known for livestock production, particularly goat farming. This district is divided into three regions and most of the residents are engaged in livestock production. In the coastal region of Lasbela, grazing plans and rainwater are the primary sources of livestock rearing. Tehsil Lakhra and Tehsil Liari are located on the coast. In the mountainous region, on the other hand, livestock raising is mostly supported by rivers. This region consists of Tehsil Bela and the surrounding area (Tiyro, Ismalani, Kundy, Wallpat, Kathor). The forest region of Lasbela covers Hub (Sakran), Dureji, Tehsil Uthal, and Winder. The sample villages/ghots of the regions were chosen after consultation with the locals, officials from the livestock department, animal husbandry department, and local NGOs.

To achieve the study's goals, respondents were chosen utilising the chance meeting approach. With this approach, a local person from a village/Goht was initially approached to obtain information about the households that are engaged in livestock rearing. After that, the pretested questionnaire was completed from the households.

A field survey was conducted involving 265 farmers on a pretested questionnaire,<sup>2</sup> out of which 98 sedentary, 89 transhumant, and 78 nomad farmers were interviewed. During this time, information was also gathered from livestock market traders/mandi (in the local language Pidri). For the goat business value chain, 120 traders were randomly selected, and the descriptive statistic and graphical approach were adopted for the analysis. In addition, an econometrics exercise was performed to investigate factors affecting herd size. Namonje-Kapembwa et al. (2022) was followed as the framework for empirical modelling.

Previous theoretical and empirical studies have focused on how a farmer's/household's herd size is determined by socioeconomic, cultural, climatic, institutional, political, administrative, financial, and geographic factors. The consensus regarding households' decisions regarding livelihood activities is that since households that have lesser control over land have lower agricultural crop productivity, they are expected to follow different strategies for livelihood (Barrett et al., 2001; Dorward, 1999; Dossa et al., 2008).

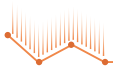
In rural areas, where there is less control over the size of the land for agricultural crop yield, households rear small ruminants. Therefore, households' decision to rear/keep small ruminants is directly linked to the inverse nexus between farm size and agricultural crop productivity (Dorward, 1999; Dossa et al., 2008). Furthermore, in mostly rural areas, the financial intuitions/markets, savings, credits, and insurance either do not exist or households' access is limited to financial markets, which hinders rural households' ability to enhance the flock size of small animals. With limited control over the land size and limited or inadequate access to financial markets, rural households rear small animals as a primary source of income. These factors also keep household members' illiterate, and most of them rear animals (Barrett et al., 2001; Binswanger & Rosenzweig, 1986; de Janvry et al., 1991; Feder, 1985; Rosenzweig & Wolpin, 1993). Some studies have found that it is conceivable for the herd size to positively correlate with both illiteracy and rearing experience (Dossa et al., 2008; Icoutchika et al., 2022; Namonje-Kapembwa et al., 2022; Taruvinga et al., 2022). Households/farmers keep small ruminants to satisfy family expenses (Monau et al., 2017); serve as wealth/saving in times of emergency and festivals (Mataveia et al., 2021); for nutrition security as milk consumption (Icoutchika et al., 2022); sometimes for market participation as business motive (Panth et al., 2021). Therefore, the hypothesis is that these factors have a direct influence on herd size.

This study utilised the framework of Namonje-Kapembwa et al. (2022) by augmenting herd size as a dependent variable. The model is as follows:

$$Y_{it} = \beta_0 + \beta_1 X_i + \varepsilon_i \quad (1)$$

Where  $Y_i$  is the herd size of  $i$ th farmer,  $X_i$  is the vector of dependent variables,  $\varepsilon_i$  is the error term, and  $\beta_0$  and  $\beta_1$  are the intercept and slope coefficients, respectively. The herd size as a dependent variable was augmented with

<sup>2</sup> The total sample size was 300, while we excluded 35 questionnaires because the respondents refused to fill up the questionnaire.



price and animal loss, support family expenses, diseases, and lack of feeding in Model 1 to test the hypothesis that these factors can influence herd size:

#### Model 1:

$$\begin{aligned} \text{Herd size} = & \beta_0 + \beta_1 \text{Price of goat/sheep}_i \\ & + \beta_2 \text{Support family exp}_i + \beta_3 \text{Animal loss}_i + \beta_4 \text{Diseases}_i + \beta_5 \text{Lack of feeding}_i \\ & + \varepsilon_i \end{aligned} \quad (2)$$

## 4. RESULTS AND DISCUSSION

### Livestock Compositions and Ownership (Sedentary, Transhumant and Nomad)

Cattle raised in a sedentary system dominated other livestock, as seen in Table 3. As a result, the average size of cattle in a sedentary system was 18 cattle, whereas it was 19 cattle and 10 cattle in transhumant and nomadic systems, respectively. Farmers/households in the three systems had a variety of cattle, but cow and young stock dominated in sedentary and transhumant systems, while nomadic systems kept donkey and mule populations. However, when it comes to small flock size ownership, the results seem to be very different. The field survey report from various areas of Lasbela shows that sedentary households had 11 sheep and 80 goats, transhumant households had 99 sheep and 123 goats, and nomadic households had 115 sheep and 90 goats, confirming that nomad and transhuman small flock sizes are larger than sedentary households. Due to the changing seasons, they are ideal for maintaining small flocks in large quantities via three systems in Lasbela. Secondly, they raised little ruminants to sell during emergencies and special occasions as well as for home milk and meat consumption.

Transhumant farmers had smaller flock sizes than those kept by the other two systems because Lasbela has different seasons that are most suitable for transhumant. Moreover, sedentary people live in agricultural villages where they raise small ruminants (goats) for domestic milk and meat consumption as well as for sale during emergencies and festivals. However, as reported during the field survey, the trend is changing, with sedentary households now attempting to increase the flock size. Similarly, nomads and transhumants use donkeys and mules as modes of transportation to transport tents, luggage, water, and firewood. At the same time, sedentary households keep camels for firewood and for milk consumption to satisfy their family members' nutrition intake. These findings are in line with Lodhi et al., (2002); Kakar et al., (2013); Raziq et al. (2010); and Shafiq et al., (2017) for Balochistan where they reported that a substantially large population rear small ruminants where camels, horses, and mules, donkeys, and other livestock are also rare. Nomads keep horses, mules, and donkeys as modes of transportation as obtained by Lodhi et al., (2002).

Table 3. Livestock Composition

Particulars	Sedentary	Transhumant	Nomad
<b>Average Livestock Size</b>			
Total cattle	18	19	10
cow	10	9	4
Bulls	2	2	1
Young stock	10	7	5
Buffalo	4	2	0



Camels	8	2	2
Donkeys	4	3	6
Mules	1	5	7
<b>Small flock size</b>	<b>91</b>	<b>222</b>	<b>205</b>
Sheep	11	99	115
Goats	80	123	90

*Source: Authors' calculations based on the field survey.*

To investigate the hypothesis that there was no significant difference in average livestock size across the three systems, mean differences in the compositions of the animals were calculated (cattle, camels, goats/sheep, donkeys/mules, and so forth), which are presented in Table 4. The result reveals that mean difference values between sedentary and nomadic cattle, and between transhumant and nomadic cattle, are statistically significant. As was the case with cattle, households that are sedentary or transhumant tended to have more cattle than those that are nomadic. Sedentary and transhumant people kept cattle on average more than nomadic people did. The statistically significant negative mean difference for donkeys and mules, as well as for goats and sheep, indicates that nomads retained these animals more than sedentary and transhumant people. However, sedentary households kept more camels than nomad and transhumant households did. The findings of Lodhi et al. (2002); Shafiq et al. (2017); Aryal et al. (2018); Sapkota et al. (2020); and Adams & Ohene-Yankyera (2014) are also similar to this study in the case of the composition of animals.

*Table 4: Average Mean Difference of Livestock Compositions*

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.
Cattle	Sedentary/local	Transhumant	-.485	1.31	.927
		Nomadic	8.585*	1.36	.000
	Transhumant	Nomadic	9.070*	1.39	.000
Donkey/Mules	Sedentary/local	Transhumant	-4.475*	0.48	.000
		Nomadic	-9.514*	0.50	.000
	Transhumant	Nomadic	-5.039*	0.51	.000
Goat/sheep	Sedentary/local	Transhumant	-132.698*	9.64	.000
		Nomadic	-114.133*	9.99	.000
	Transhumant	Nomadic	18.56	10.21	.166
Camel	Sedentary/local	Transhumant	4.334*	0.48	.000
		Nomadic	4.482*	0.49	.000
	Transhumant	Nomadic	.148	0.51	.954

*Source: Authors' calculation based on the field survey.*

*\* The mean difference is significant at the 0.05 level.*





The results show that sedentary people owned self-purchased cattle, whereas transhumant and nomadic people also owned self-purchased cattle but also received cattle as gifts. The results also show that 92.6 percent of nomads and 70 percent of transhumant people reported receiving livestock as a gift. On the other hand, 54 percent of sedentary respondents said they purchased cows, while 38.5 percent claimed they received them as gifts. The respondents stated livestock received at the time of marriage were counted as gifts. The respondents said that gifts could include money as well as cattle at the time of marriage. These findings are similar to those of Ahmed et al. (2022), Adams et al., (2021), and Lodhi et al., (2002) in the case of the nomad and transhumant findings. The Chi-square test used in the study shows a significant difference between group membership and ownership of the cattle (see Table 5).

Table 5: Cattle Ownership

Cattle ownership * Type of household		Type of HH		
		Sedentary/local	Transhumant	Nomadic
Cattle ownership	gift	37(38.5)	4(4.5)	1(1.3)
	self-purchased	54(54.5)	2(3.5)	5(5.1)
	gift& self-purchased	4(4.2)	83(92.0)	70(92.6)
<b>Chi-Square Test</b>				
		Value	df	Asymp.Sig. (2-sided)
Pearson Chi-Square		149.368 <sup>a</sup>	4	.000

Source: Authors' calculation based on the field survey.

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 9.34 and the figures in parentheses are percentages.

Table 6 depicts the principal reasons for keeping livestock. The results show that 13.3 percent of sedentary individuals reared cattle for milk production or consumption, while 72.1 percent kept the cattle for milk, calves for sale, and manure. On the other hand, 53.8 percent of nomads had cattle for milk production and 32 percent for milk, selling calves, and manure, while 89.9 percent of the transhumant households reared livestock for milk, selling young livestock, and manure. Livestock keepers who participated in the field study stated that milk production had a significant impact on family members' livelihoods and health. They sold some share of their milk production to earn money, and the rest was consumed by family members to meet their nutritional needs (as a source of nutrition intake). These findings are in line with the findings of Al-Khaza'leh (2018), Adams et al. (2021), and Wodajo et al., (2020), who reported that small ruminants were kept by farmers for nutritional intake, offspring and to satisfy family expenses by selling the animals. The study's Chi-square test reveals a substantial difference between small ruminants and the principal motives for keeping livestock.



Table 6: Principal Motives for Keeping Livestock

Principal Motives of Keeping Livestock According to the Type of Household				
Principal Motives of Keeping Livestock		Sedentary/local	Transhumant	Nomadic
	Milk production	13(13.3)	3(3.4)	42(53.8)
	Offspring for selling	4(4.1)	6(6.7)	7(9.0)
	Milk and offspring for selling, manure	34(72.1)	30(89.8)	20(32.0)
Chi-Square Tests				
	Value	df	Asymp. Sig. (2-sided)	
Pearson Chi-Square	91.771	8	.000	

Source: Authors' calculation based on the field survey.

\*Figures in parentheses are percentages.

According to Table 7, almost all transhumants and nomads preferred male animals over females. However, the sedentary reported that they raised small animals for a variety of reasons, including easy management, easy conversion to cash in times of emergency, and cultural factors. The transhumant and nomad households reported that they preferred small animals because they require less capital than large animals do, they are easier to manage for family members, they are easy to convert to cash in an emergency, and the most important reason was cultural factors. Taruvinga et al. (2022); Adams et al. (2021); Wodajo et al. (2020); Weber et al. (2018); Namonje-Kapembwa et al., 2019) also came up with similar findings. The study's Chi-square test reveals a substantial difference between small ruminants and the principal reasons for keeping small flocks.

Table 7: Composition of Flock Size and Principal Reasons for Rearing

Particulars	Sedentary	Transhumant	Nomad
Average Livestock Size			
<b>Small flock size</b>	<b>91</b>	<b>222</b>	<b>205</b>
<b>Sheep</b>	15	106	110
Male sheep	4	30	34
Female Sheep	3	14	12
<b>Goats</b>	56	124	95
Male goats	15	45	26
Female goats	14	21	12



Principal Reasons for Keeping Small Flock According to the Type of Household					
			Sedentary/local	Transhumant	Nomadic
Principal reasons for keeping a small flock	1.	Easy management, easy conversion, and cultural factors	71 (72.4)	3 (3.4)	3 (3.8)
	2.	Less capital, easy management, easy conversion, and cultural factors	27 (27.6)	86 (96.6)	75 (96.2)
Chi-Square Test					
		Value	df	Asymp. Sig. (2-sided)	
Pearson Chi-Square		142.049	2	.000	

Source: Authors' calculation based on the field survey.  
\*Figures in parentheses are percentages.

According to Table 8, sedentary people acquired small animal flocks both from their own and shared sources. They also reported that small animal ownership sharing takes many forms depending on the negotiation between partners. For example, sometimes farmers demand cash monthly from the small animal giver for feeding and grazing, and sometimes farmers negotiate with the animal giver that he/she will get either one-to-one or one-to-two animals. The transhumant and nomad received small animals either as gifts or were self-purchased. They reported receiving an animal as a gift during a mirage from the bride's family and because of this cultural factor, transhumant and nomadic people raise many goats and sheep. The Chi-square results indicate that there is a significant difference between received as... and group, as small flock size ownership of sedentary households is self-purchased and shared, whereas transhumant and nomad ownership is self-purchased and gift.

Table 8: Small Flock Size Ownership

Received as... * Type of Household				
		Sedentary/local	Transhumant	Nomadic
Received as...	self-purchased	33(33.3)		
	gift& self-purchased	38(38.8)	89(100)	78(100)
	purchased & sharing basis	27(27.6)		
Pearson Chi-Square	Value	df	Asymp. Sig. (2-sided)	
	200.000	6	.000	

Source: Authors' calculation based on the field survey.  
\*Figures in parentheses are percentages.



Table 9 shows that sedentary, transhumant, and nomad flocks experienced average flock losses of 13 percent, 25 percent, and 23 percent, respectively. Small animal losses in transhumant systems were higher than in sedentary and nomadic systems. 41.8 percent of sedentary persons said that inadequate nutrition, ongoing droughts, and disease incidence were the main reasons for losses in small flock size, and 58 percent of sedentary people said that disease incidence was to reason. According to the transhumant households, 24.7 percent of diseases occurred incidentally, 16 percent were caused by poor nutrition and droughts, and 59.6 percent were caused by disease incidence caused by poor nutrition and droughts. According to the nomads, their livestock suffered various diseases. The data shows that 43.6 percent of diseases occurred incidentally, 15.5 percent were caused by poor nutrition and droughts, and 41 percent were caused by disease incidence combined with poor nutrition and droughts. Overall, they all experienced different diseases but diseases due to poor nutrition and droughts occurred in all the districts at different times. These findings are similar to those found in Kumar et al. (2020), Ayantunde et al. (2014), Al-Khaza'leh (2018), and Dixit et al. (2017).

Table 9: Average Losses and Reasons for Small Flock Losses

	Sedentary	Transhumant	Nomad
Average Small Flock Size	91	222	205
Average Loss of Small Flock	(13)	(25)	(23)
Value (PKR)	25,000	42,000	40,000
<b>Factors</b>			
Disease Incidence	57 (58.2)	22 (24.7)	34 (43.6)
Poor Nutrition and Prevailing Droughts	14 (14.3)	14 (15.7)	12 (15.5)
Disease Incidence, Poor Nutrition and Prevailing Droughts	27 (27.5)	53 (59.6)	32 (41.0)

Source: Authors' calculation based on the field survey.

\*Figures in parentheses are percentages.

During the survey, farmers were asked about the main reasons for keeping camels. According to them, the main reasons for keeping camels were milk consumption and wood collection. 90.2 percent, 85.7 percent, and 77.8 percent of sedentary, transhumant, and nomad respondents, respectively, kept camels for milk consumption and wood collection. The respondents said that camel milk consumption was strongly attributed to the nutrition of their family members.

Table 10: Principal Motives for Keeping Camels

Principal Motives to Keep Camel According to the Type of Household				
		Sedentary/local	Transhumant	Nomadic
Motives	Milk consumption	6 (9.8)	4 (14.3)	4 (22.2)
	Milk consumption, wood collection, etc.	56 (90.2)	24 (85.7)	14 (77.8)

Source: Authors' calculation based on the field survey.

\*Figures in parentheses are percentages.



According to Table 11, sedentary, transhumant, and nomadic people kept donkeys and mules for different reasons. The results suggest that 85.7 percent of sedentary people kept donkeys or mules to gather wood and water compared to 92.1 percent of transhumant households and 93.7 percent of nomads who used them for transportation, gathering wood, and water. Almost all the transhumant and nomadic people preferred donkeys and mules to move tents and luggage. The Chi-square result reveals a considerable difference between the main motivations and the groupings.

Table11: Principal Motives for Keeping Donkeys/Mules

Principal Motives To Keep Donkeys/Mules According to the Type of Household				
		Type of HH		
		Sedentary/local	Transhumant	Nomadic
Motives	Wood collection	7 (12.5)		
	Transportation, wood collection, drinking water		82 (92.1)	73 (93.7)
	Wood collection, transporting drinking water	48 (85.7)	2 (4.0)	
	Transporting drinking water	1 (1.8)		
Pearson Chi-Square	Value	df	Asymp. Sig. (2-sided)	
	53.635 <sup>a</sup>	4	.000	

Source: Authors' calculation based on the field survey.

\*Figures in parentheses are percentages.

## Farmer-Friendly Goat Production System in the District of Lasbela

This section discusses goat farming, milk production, and meat production in the Lasbela district, as well as selection and breeding, feeding, grazing, and health management systems. The selection and breed practices were found in all production systems (i.e., sedentary, transhumant, and nomadic). It was discovered that almost all small animal keepers from sedentary, transhumant, and nomadic systems preferred male animals over female animals (see Table 12). According to respondents in the field survey, the selling motive of market demand and reasonable market price were the male selection preferences.

Table 12: Breed Selection in the Study Area

		Sedentary (Percent)	Transhumant (Percent)	Nomad (Percent)
Species	Sex			
Goat	Female	33 (33.7)	8 (6.0)	12 (15.4)
	Male	65 (66.3)	81 (91.0)	66(84.6)





<b>Sheep</b>	<b>Female</b>	24 (24.5)	11 (12.4)	9 (11.5)
	<b>Male</b>	74 (75.5)	78 (87.6)	69 (88.5)

Source: Authors' calculation based on the field survey.

\*Figures in parentheses are percentages.

The findings reported in Table 13 show that respondents from the three production systems raised animals through grazing, stall-feeding, or both. 55.1 percent of sedentary, 76.4 percent of transhumant, and 73.1 percent of nomad small-flock owners depended on grazing. Farmers reported during the field survey that due to the drought in Lasbela, there was a lack of fodder in various areas, so they were willing to adopt tethering but faced stall-feeding and monetary constraints. Since a sedentary lifestyle includes agricultural activities and animal rearing, they preferred stall-feeding to feed their animals. They proposed that access to supplementary stall-feeding from government offices (such as the livestock department) would encourage farmers to increase the size of their animal herds. Chi-square statistics confirm a considerable difference between the dependence on grazing and stall feeding among the three systems.

Table 13: Dependence on Grazing and Stall Feeding

	Sedentary (Percent)	Transhumant (Percent)	Nomad (Percent)
Grazing	54 (55.1)	68 (76.4)	57 (73.1)
Stall-feeding	36 (36.7)	8 (9.0)	9 (11.5)
Razing and stall-feeding	8 (8.2)	13 (14.6)	12 (15.4)
<b>Pearson Chi-Square</b>	value 55.885 <sup>a</sup>	Df. 4	Asymp. Sig. (2-sided) .000

Source: Authors' calculations based on the field survey.

The figures in parentheses are percentages. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 7.25.

Table 14 provides details on various sources of feed. The sedentary farmers either self-grew the fodder (16.3 percent), gathered from various locations (55.1 percent), or used a mix of three sources, i.e., as the payment for work, collected from various locations, and bought from markets (28.6 percent). On the other hand, 60.6 percent of the transhumant farmers either paid for the fodder for small flocks, collected from various sources, or purchased, while the remaining 28 percent sourced the fodder from other sources. The nomadic small-flock owners sourced fodder from a mix of the sources of fodder.

Table 14: Source of Fodder

Source	Sedentary	Transhumant	Nomad
Self-grown	16 (16.3)	-	-
Collected from different areas	54 (55.1)	19 (18)	29 (36.3)



As the payment for work	-	16 (20)	10 (12.8)
Self-grown; purchased	8 (8.2)	-	-
Self-grown, collected from different areas	3 (3.1)	-	-
As the payment, collected from different areas, purchased	17 (17.3)	55 (60.6)	39 (50.0)

*Source: Authors' calculations based on the field survey.  
The figures in parentheses are percentages.*

The results in Table 15 represent the behaviour of respondents' livestock health coverage. The 66 percent of sedentary, 62.9 percent of transhumant, and 70 percent of nomadic farmers responded that they cared for their livestock's health on their own. This means that most respondents used self-healthcare facilities for their livestock. For the health of their livestock, however, 30.9 percent of sedentary, 34.8 percent of transhumant, and 29.9 percent of nomadic households used both self-care and veterinarian services. The respondents stated that they primarily used self-healthcare because they were unable to afford healthcare services for their animals and also because there were not enough veterinarian visits to the farm.

84.7 percent, 77.5 percent, and 82.1 percent of sedentary, transhumant, and nomadic household respondents, respectively, claimed that veterinarians did not visit farms. During the survey, they proposed that veterinary department mobile health services minimise losses in small flock size. 66 percent of sedentary, 62.9 percent of transhumant, and 70 percent of nomadic respondents stated that they cared for their livestock on their own. For the health of their livestock, however, 30.9 percent of sedentary, 34.8 percent of transhumant, and 29.9 percent of nomadic people used both self-care and veterinarian services. Respondents to the field survey stated that they primarily used self-health insurance because they were unable to afford sufficient care for their animals or that there were not enough veterinarian visits to the farm. 84.7 percent, 77.5 percent, and 82.1 percent of sedentary, transhumant, and nomadic respondents, respectively, claimed that veterinarians did not visit their farms. During the survey, they proposed that veterinary department mobile health services minimise losses in small flock size.

*Table 15: Behaviour regarding Health Cover*

		Sedentary	Transhumant	Nomadic
<b>Health</b>	Veterinarian	3 (3.1)	2 (2.2)	-
	Self	64 (66.0)	55 (62.9)	54 (70)
	Both	31 (30.9)	31 (34.8)	24 (29.9)
<b>Veterinarian visits to the farm</b>	<b>Yes</b>	15 (15.3)	20 (22.5)	14 (17.9)
	<b>No</b>	83 (84.7)	69 (77.5)	64 (82.1)

*Source: Authors' calculations based on the field survey.  
The figures in parentheses are percentages.*

Table 16 represents the goat management system. The results show that the tethering system was used by 42.9 percent of sedentary and 57.1 percent of semi-active people (house plus outside). This means that most of the sedentary management system was semi-intensive. 77.5 percent of transhumant respondents reported that their



management system was semi-intensive and outdoor. According to the nomads, 100 percent of the goat management system was semi-intensive. Farmers reported that due to the drought in Lasbela, there was a lack of fodder in various areas, so they were willing to adopt tethering but faced stall-feeding and monetary constraints. They reported that access to supplementary stall-feeding from government offices (such as the livestock department) would encourage farmers to increase the size of their animals' herds.

*Table16: Management System*

		<b>Sedentary</b>	<b>Transhumant</b>	<b>Nomad</b>
Management system of goats by farmer	Tethering (at house)	42 (42.9)	3 (3.4)	-
	Semi-intensive (house+outside)	56 (57.1)	69 (77.5)	-
	Outdoor	-	17 (19.1)	78 (100)

*Source: Authors' calculations based on the field survey.  
The figures in parentheses are percentages.*

Table 17 summarises the main reasons for keeping small flocks. Based on field survey data, farmers were asked about the primary motives for keeping small animals. It was found that farmers had five principal motives for keeping the size of the flock small. 80.6 percent of sedentary, all transhumant, and 98.7 percent of nomadic farmers kept small animals (goats/sheep) to support their family expenses, and rearing small animals contributed significantly to their livelihood.

Second, farmers kept animals for milk consumption, with 87.8 percent of sedentary, 97.8 percent of transhumant farmers, and all nomadic respondents kept small animals for milk consumption. They reported that their family members consumed animal milk because they lived mostly in villages. As a result, an increase in the number of animals leads to an increase in the nutritional intake of their family member.

Third, 72.4 percent of sedentary, 96.9 percent of transhumant, and 98.7 percent of nomadic respondents said they kept animals to cover emergency expenses, citing the fact that, in contrast to large animals, the goat market was quite liquid and goats were easy to sell. Farmers explained that in the absence of formal financial and insurance institutions, goats were an asset that could be easily sold for cash to meet family needs. During the field survey, farmers suggested that community-based goat farming from the livestock department, with women involved, would increase the number, yield, and income of goat farmers.

Respondents were asked about their business motives, and only a few sedentary kept animals for the business value chain. Only 18.4 percent of sedentary, 71.9 percent of transhumant, and 74.4 percent of nomadic respondents said they kept animals for business reasons. All the transhumant and nomadic respondents reported that they kept animals to make dairy products, with some of them self-consumed and some sold in the market to generate income to pay for their basic needs.

In the case of small flock rearing, the findings of the present study are similar to the findings of Ahmed et al. (2022) for the Western Himalayas in India; Adams et al. (2021) for Ghana; Godoi et al. (2021) for Sindh and Punjab; Marius et al. (2021) and Togarepi et al., (2018) for Namibia; Shivakumara & Kiran (2019) for Mandya and Mysuru districts of Karnataka; Sapkota et al. (2020) for Nepal; Bashir & Venkatachalapathy (2017) for the northern part of Kerala; Dixit et al. (2017) for Karnataka; and Lodhi et al. (2002) for upland ranges of Balochistan, Pakistan.



Table 17: Principal Motives for Small Flock Keeping

			Sedentary	Transhumant	Nomadic
To support family expenses	No		19(19.4)	-	1(1.3)
	Yes		79(80.6)	89(100)	77(98.7)
			Sedentary	Transhumant	Nomadic
For business motives	No		80(81.8)	25(28.1)	20(25.6)
	Yes		18(18.4)	64(71.9)	58(74.4)
			Sedentary	Transhumant	Nomadic
For milk consumption	No		12(12.2)	2(2.2)	6(7.7)
	Yes		86(87.8)	87(97.8)	72(100)
			Sedentary	Transhumant	Nomadic
As wealth/savings to sell for an emergency	No		27(27.6)	3(3.4)	1(1.3)
	Yes		71(72.4)	86(96.6)	77(98.7)
			Sedentary	Transhumant	Nomadic
Make dairy products (ghee, yoghurt, etc.)	No		39(39.8)	-	-
	Yes		59(60.2)	89(100)	78(100)

Source: Authors' calculation based on the field survey.  
The figures in parentheses are percentages.

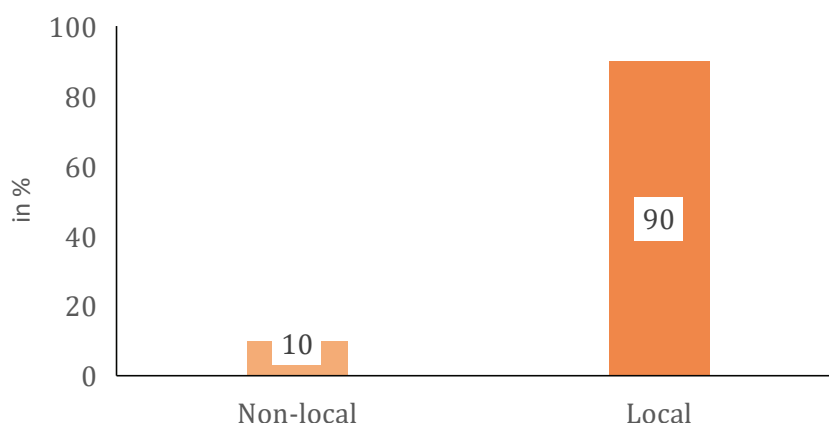
## Goat/Sheep Marketing

### Channels of Goat Marketing

In contrast to the large animal marketing channels, goat marketing is primarily informal in Lasbela, with small dealers dominating it. These traders are primarily local (90 percent) as illustrated in Figure 1. In the goat market, three different kinds of traders are engaged. The first channel consists of small traders that sell goats to clients directly in the goat market and buy from Mandi, where small traders' share is 77 percent of the goat market. The second and third channels consist of big traders and brokers whose share in goat market trade is 12 percent and 11 percent, respectively (see Figure 2). However, the big traders buy animals from local markets and then sell to the trans-district and trans-province markets, and the brokers, on the other hand, trade just to earn commission from both parties, i.e., sellers and buyers.

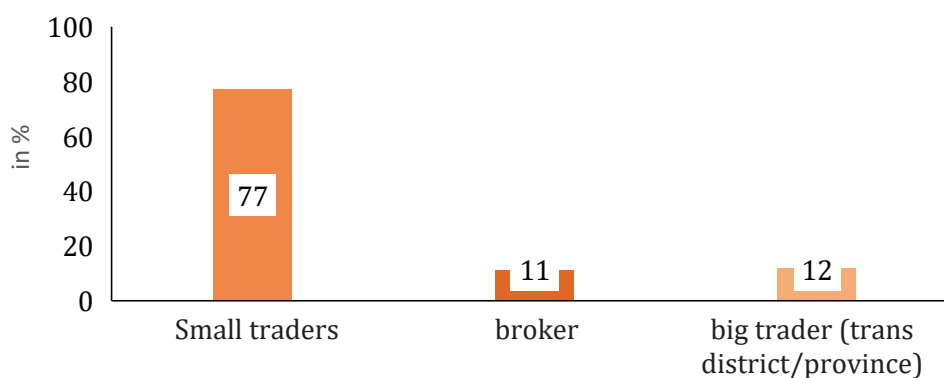


Figure 1 Goat Traders Origin



Source: Authors' calculation based on the field survey.

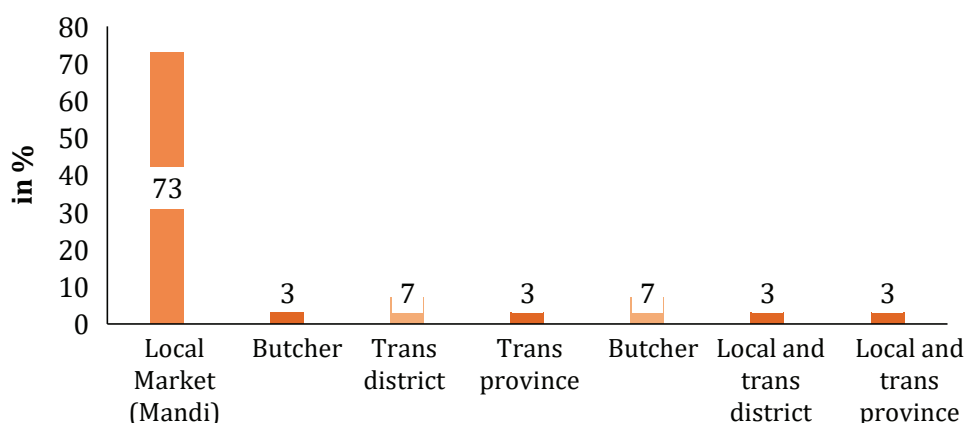
Figure 2 Channels of Goat Marketing Traders



Source: Authors' calculation based on the field survey.

The local market (Mandi), where traders sell their goats to other traders, beoparis, and consumers directly, is the most important of the seven channels available for the sale of goats (see Figure 3). The share of other channels, which are also working, is small, confirming that traders mostly use informal marketing channels, i.e., the local market. Figure 3 shows that 73 percent of traders sell goats through the local market (Mandi), which has implications for channels of investment (see Figure 4) for the enhancement of goat business in market channels other than the local market (Mandi) channel. There are two dominant channels of investment, namely, own resources (41 percent) and own resources and sharing (17 percent) as shown in Figure 4.

Figure 3 Channels of Goat Selling

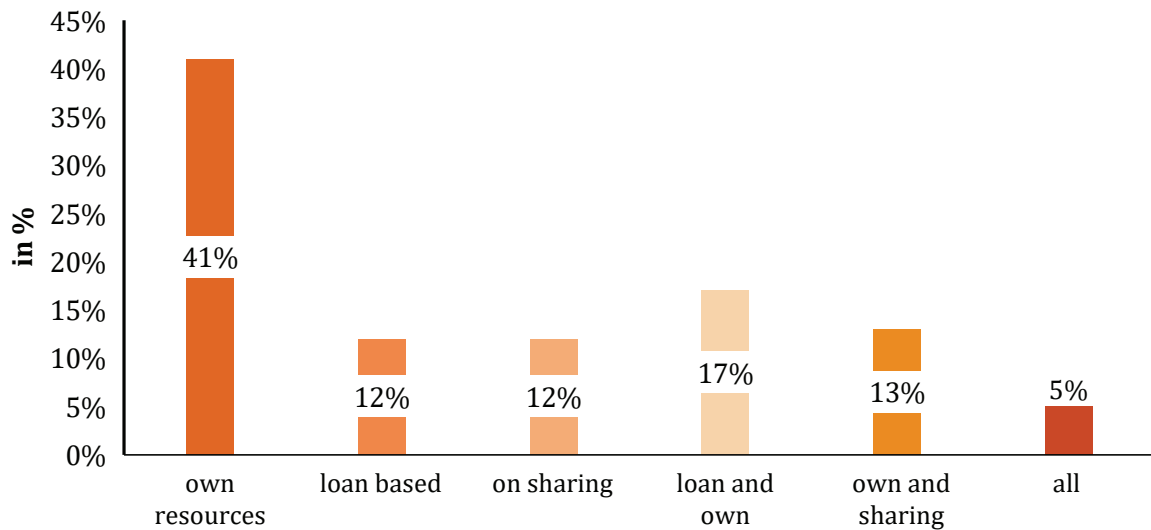


Source: Authors' calculation based on the field survey.





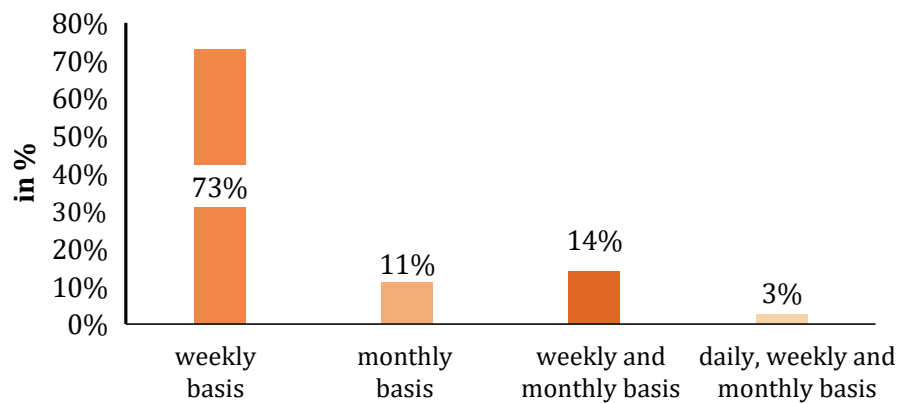
Figure 4 Channels of Investment



Source: Authors' calculation based on the field survey.

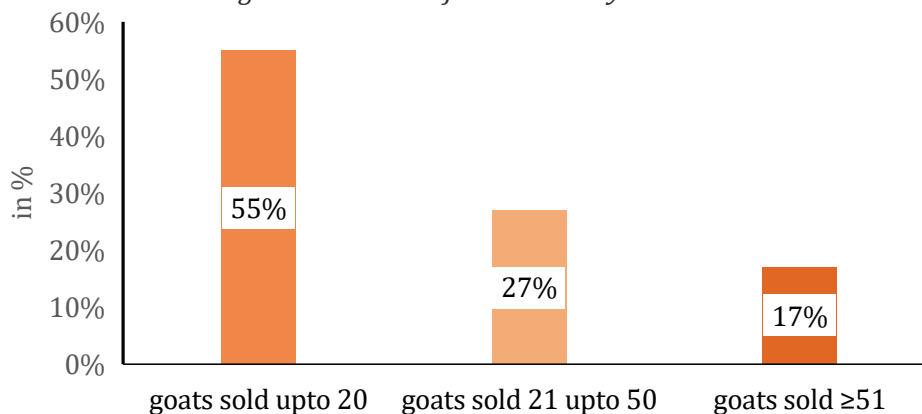
Goat traders sell goats under different arrangements. Most commonly, goat traders sell their goats weekly. Figure 5 shows that 73 percent of sellers/traders in the sample sold their goats weekly, which was a common arrangement in both tehsils. The majority of traders sold goats in the range of 21 to 50 in both tehsils followed by up to 20 goats sold, which has implications for goat marketing where small traders mostly conduct their business (see Figure 6).

Figure 5 Frequency of Selling Goats



Source: Authors' calculation based on the field survey.

Figure 6 Number of Goats Sold by Traders



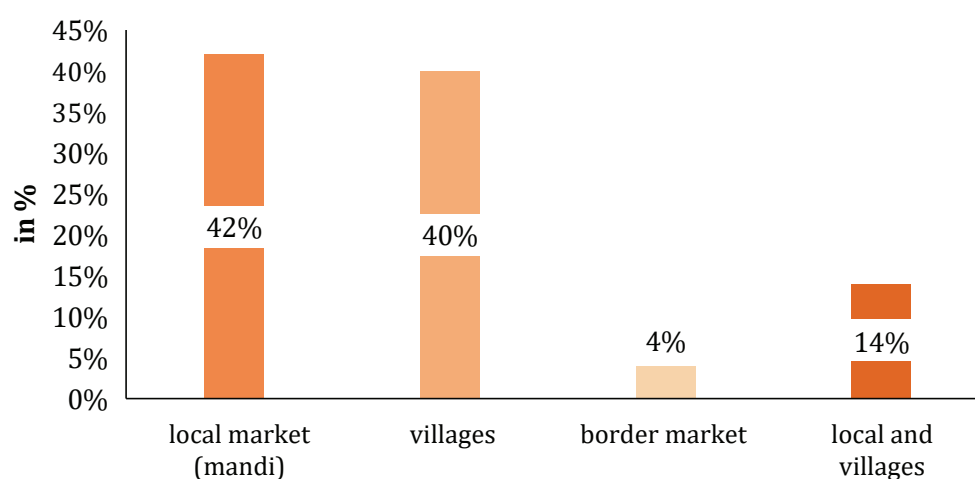
Source: Authors' calculation based on the field survey.



## Goat Purchasing

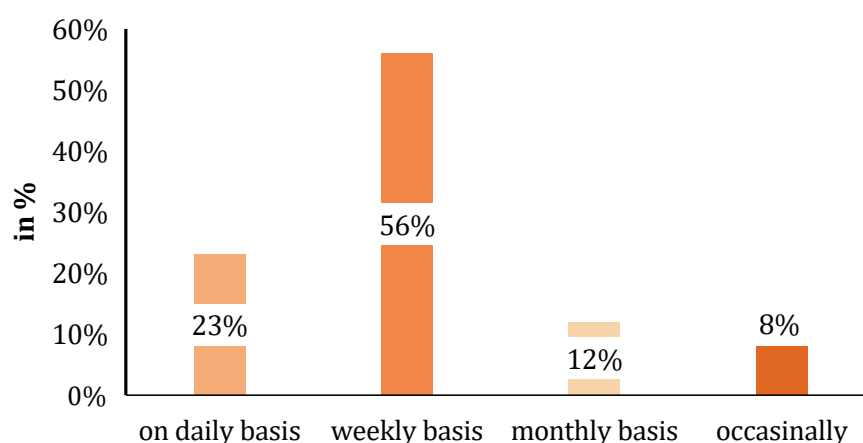
In Lasbela, purchasing goats is dominated by the local market using various channels to purchase goats. There are four channels through which goats are purchased. Goat purchasers in both tehsils of Lasbela directly mostly purchase goats in the local market. Figure 7 shows that 42 percent of the traders in the sample purchased goats through this channel. Traders also purchased goats in the village channel. Figure 8 shows that 56 percent of goat purchasing was done every week. Regarding the number of goats purchased, the dominant number of goats purchased was 1 to 5 goats followed by 6 to 10 goats. Figure 9 shows that the number of goats purchased in the range of 1 to 5 goats was 40 percent, while 31 percent purchased goats in the range of 6 to 10 goats, which confirms that the market is dominated by small-scale buyers.

Figure 7 Channels of Goat Purchasing

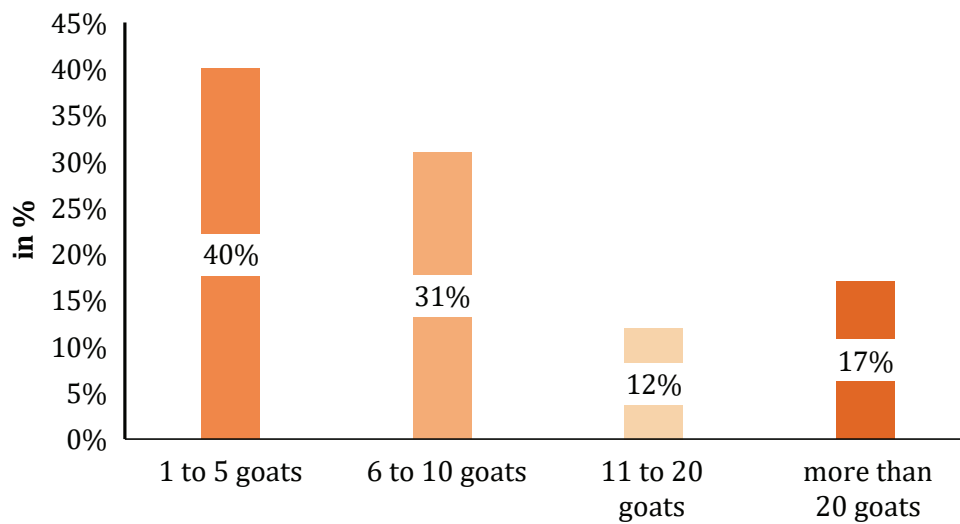


Source: Authors' calculation based on the field survey.

Figure 8 Purchasing Patterns



Source: Authors' calculation based on the field survey.

*Figure 9 Number of Goats Purchased*

*Source: Authors' calculation based on the field survey.*

## Goat Marketing Constraints and Opportunities

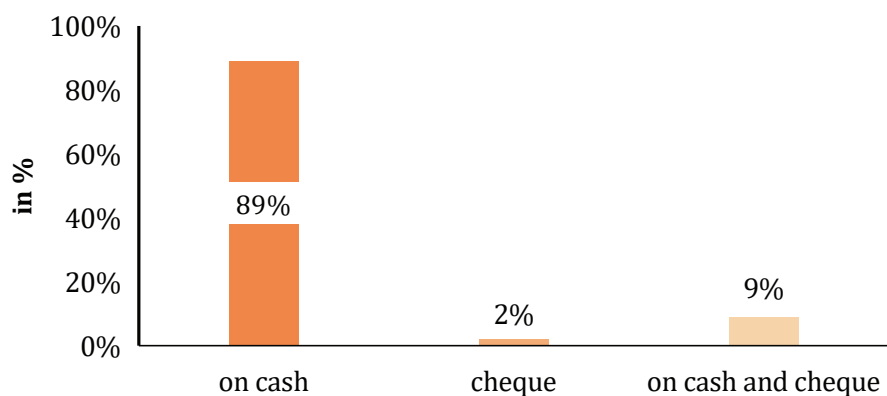
During the field survey, several constraints to goat marketing were reported by traders. It was reported that in both tehsils, goat marketing is working as an informal method where the private place is used for goat trading by buyers and sellers, while there is no such facility from the local government. Therefore, the traders reported that their businesses were not registered and traders paid no Mandi fees to the local government. Due to the lack of a formal goat marketing system with transparent and standardised price information, the goat price was agreed upon by a long process of bargaining between the seller and the buyer. Therefore, the mode of payment was dominated by cash (see *Figure 10*).

The traders of the Lakhra goat market stated that there was not even a single bank in this tehsil, which is one of the constraints to cashless transactions, and there is always the fear of losing money. The respondents said if the facility of a bank were available, payment through a cheque would probably be their preferred payment mode. Similarly, the traders faced financial constraints in increasing goat marketing. Financial constraint means that there is a hindrance in goat commercialisation as traders mostly market goats using their resources (see *Figure 4*).

The other constraints associated with goat marketing are the unavailability of sheds, lack of drinking water, paucity of goat-holding facilities, and lack of proper cleaning and health management systems from the local government. Furthermore, to understand the factors affecting the goat business channels (i.e., selling and buying) and goat prices, the four main affecting factors are reported here. These factors are seasonal fluctuations (i.e., Eid-ul-Azha and other religious festivals), fluctuations in fuel prices, epidemics and infections; and extreme weather (see *Figure 11* to *Figure 14*).

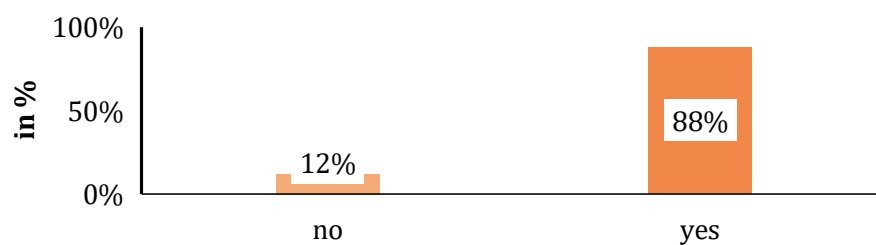


Figure 10 Modes of Payment in Goat Marketing



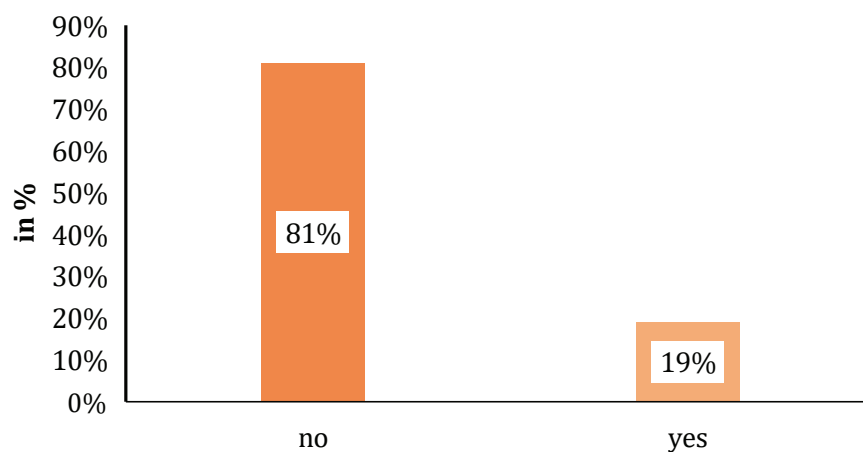
Source: Authors' calculation based on the field survey.

Figure 11 The Effect of the Season on Goat Business and Prices



Source: Authors' calculation based on the field survey.

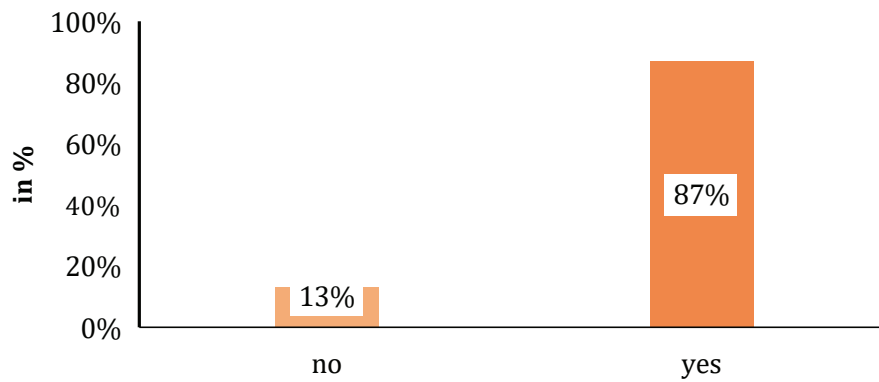
Figure 12 The Effect of Fuel Prices on Goat Business and Prices



Source: Authors' calculation based on the field survey.

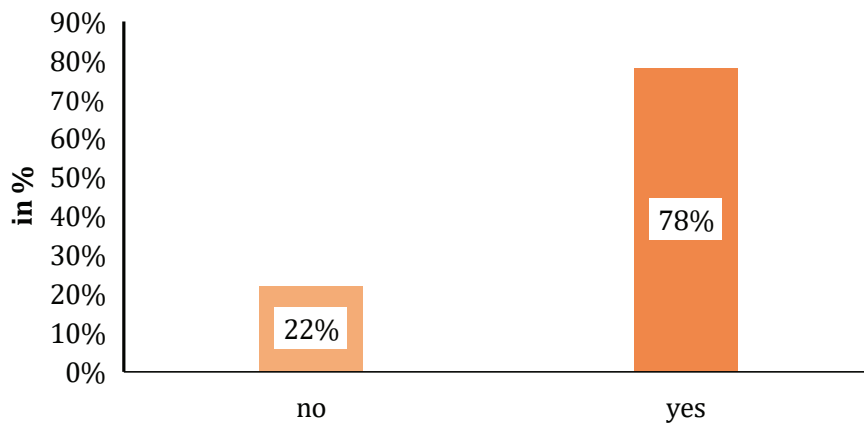


Figure 13 The Effect of Epidemics on Goat Business and Prices



Source: Authors' calculation based on the field survey.

Figure 14 The Effect of the Weather on Goat Business and Prices



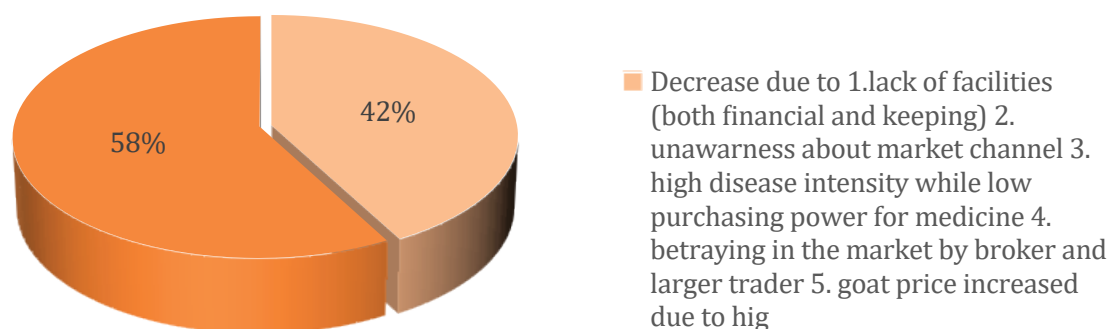
Source: Authors' calculation based on the field survey.

According to Figure 15, 56 percent of traders reported a decrease in their goat business due to a lack of facilities; a lack of both financial and proper places for keeping small ruminants; limited access and unawareness about market channels; high disease intensity; low purchasing power for medicine; market betrayal by brokers and big traders; and increased goat prices due to high cost (transportation), resulting in a decrease in their profit margin. According to the findings, 42 percent of traders reported that their small ruminant business grew because of proper marketing channel affiliation; proper breed selection based on market demand within the district; trans-district, and trans-province marketing; and maintaining a low profit margin. They also enjoyed a good reputation among sellers (villagers) and brokers.





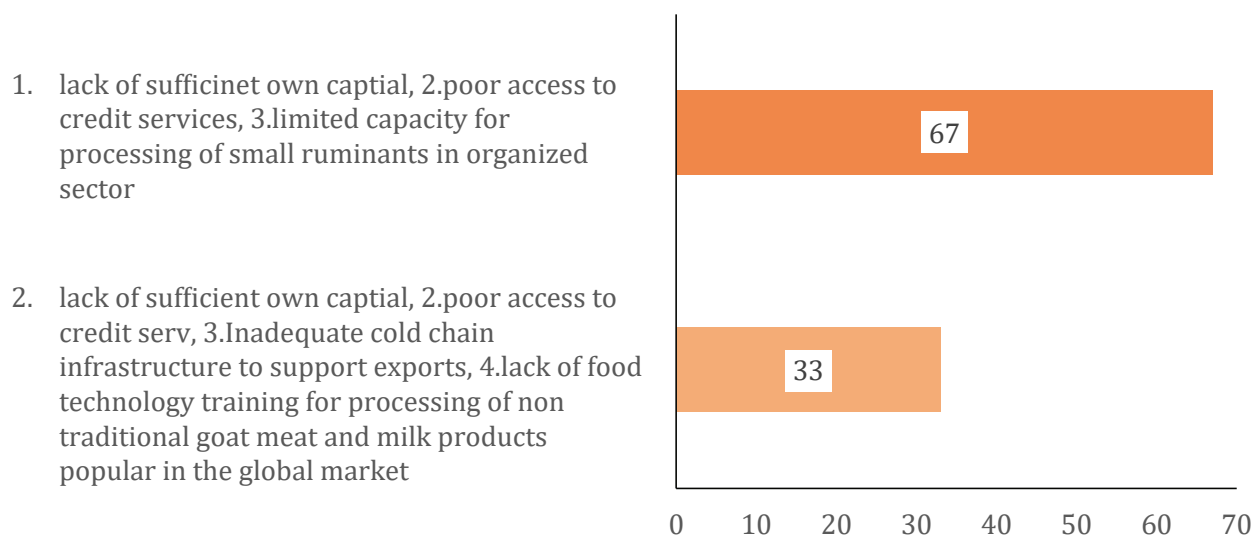
Figure 15 Principal Factors Affecting Goat Business (Increase/Decrease)



Source: Authors' calculation based on the field survey.

The constraints mentioned by goat traders during interviews are presented in Figure 16. According to 67 percent of small ruminant traders, these constraints included limited capacity for processing small ruminants in organised sectors in large cities (like Karachi), poor access to credit services, and a lack of capital. 33 percent of traders reported that due to a lack of sufficient capital to invest in this sector, limited access to credit services, and insufficient cold chain infrastructure they brought their small ruminants to cities where the facilities of cold storage, export processing, and supermarkets are available. During the field survey, they reported that they mostly transport their large flocks of goats/sheep via mini trucks to the borders of Karachi and Iran where cold chain infrastructures are available. They also reported that their export activities were limited due to a lack of food technology training for processing non-traditional small ruminant meat and milk products popular in domestic and global markets. However, significant obstacles hindering the enhancement of small ruminant marketing endeavours include inadequate capital/resources, limited access to credit facilities, and a lack of awareness.

Figure 16 Principal Constraints to Goat Trade (Export)

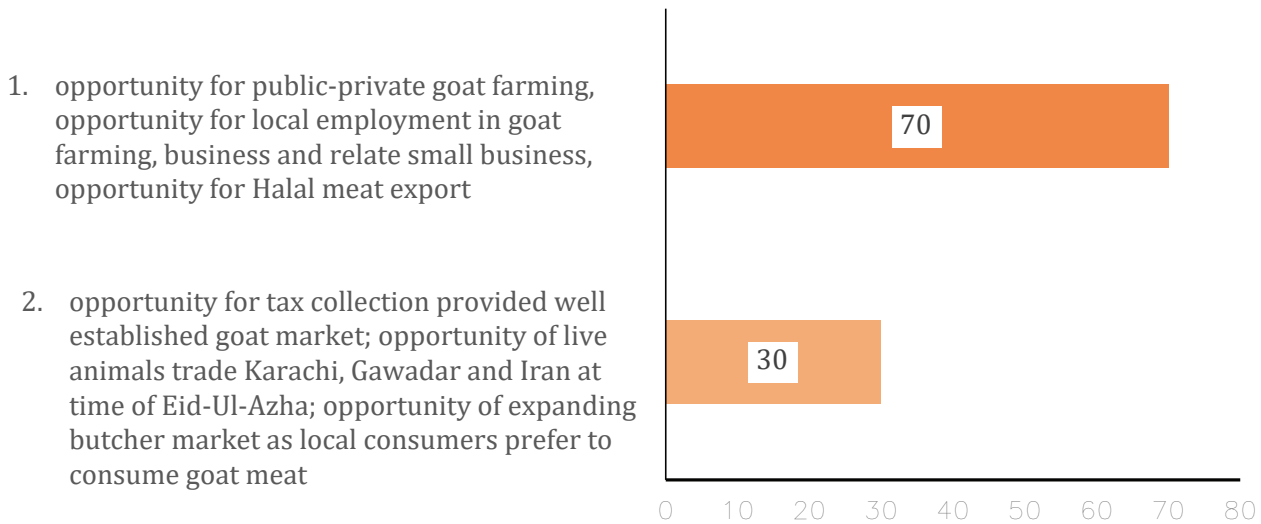


Source: Authors' calculation based on the field survey.



Figure 17 shows that 70 percent of small ruminant traders identified public-private goat farming, local employment, small businesses, and halal meat export, whereas 30 percent identified tax collection with a well-established mandi, live animal trade, and expanding the butcher market as opportunities associated with the goat market.

*Figure 17 Principal Opportunities Associated with Goat Trade(Export)*



*Source: Authors' calculation based on the field survey.*

## Regression Analysis

### *Factors Affecting Herd Size*

The findings from the regression analysis, particularly Model 1 of sedentary farmers (Table 18), reveal a significant positive association between the price variable and herd size. The coefficient associated with the price variable is positive and statistically significant, indicating that a 1 percent increase in the price of goats resulted in a 0.042 percent increase in herd size, highlighting the significance of prices for herd size. The statistically significant positive value associated with keeping goats to support family expenses indicates that in response to an increase in family expenses, there was a corresponding increase in herd size by 0.264 percent.

Factors such as animal loss and diseases are negatively associated with herd size as a 1 percent increase in animal loss led to a decrease in herd size by 0.012 percent, whereas diseases led to a 0.072 percent decrease in herd size. The findings of the sensitivity analysis indicate that including statistically significant factors contributes to explaining approximately 14 percent of the total variation observed in herd size. Moreover, the significant F-statistic underscores the collective importance of the factors incorporated in Model 1 in influencing herd size jointly.

The findings from Model 2 of transhumant farmers indicate an inverse relationship between herd size and price, suggesting that a price hike could potentially lead to a reduction in herd size. This observation aligns with the notion that elevated goat prices may constrain farmers' ability to expand their herds due to limitations in purchasing power. Specifically, the analysis reveals that a 1 percent increase in price is associated with a decrease in herd size by 0.728 percent. The animal loss has a significant negative impact on herd size, whereby a 1 percent increase in this factor is associated with a decrease in herd size by 0.007 percent.



This finding underscores the detrimental influence of diseases affecting animals, which consequently dampens farmers' willingness to expand their herds. Considering this finding, it is imperative to prioritise interventions aimed at providing effective animal treatment. By mitigating the prevalence and impact of diseases among livestock, such initiatives can potentially facilitate an increase in herd size. The overall impact of statistically significant factors on herd size accounts for 20 percent of the total variation observed. Similarly, the F-value reveals that the joint impact of the factors on herd size is statistically significant.

The findings from Model 3 of nomadic farmers show that the coefficient associated with the price variable has a statistically insignificant negative impact on herd size. This suggests that alterations in prices have no significant impact on herd size, reinforcing the notion that the livelihood of nomadic farmers is intricately tied to the size of their herds. The coefficient associated with supporting family expenses exhibits a positive and statistically significant relationship, indicating that a 1 percent increase in family expenses corresponds to a 1.96 percent increase in herd size. This finding suggests that as family expenses rise, so does the herd size, since nomadic families rely on goat rearing to meet their financial needs while no alternative sources of income are available except for the number of small animals they possess.

The value associated with supporting family expenses is positive and statistically significant, revealing that if family expenses increased by 1 percent it increased herd size by 1.96. A possible argument for the positive impact of family expenses is that nomadic families rear goats to fulfil their family expenses because they have no alternate source of expenses except the number of small animals. The value associated with diseases has a statistically negative impact on herd size revealing that diseases can reduce herd size by 0.162 percent, while lack of feeding can reduce herd size by 0.830 percent.

These findings make sense for nomadic farmers because the nomadic farmers are landless and feeding their animals depends on grazing only. Their animals' treatment is the traditional way where they hardly approach veterinary facilities for many reasons such as lack of awareness, unaffordability, and lack of ease of availability. Consequently, the combination of animal diseases and insufficient grazing reduces the herd size. The adjusted R-square value indicates that 35 percent of the variability in herd size can be attributed to variations in the response factors, and the combined influence of these factors is also statistically significant as confirmed by the F-value.

The regression findings are in line with the findings of Namonje-Kapembwa et al. (2022); Al-Khaza'leh et al. (2015); Adams & Ohene-Yankyera (2014); and Seleka (2001) in the case of factors affecting herd size. However, our findings consider the factors affecting herd size for sedentary, transhumant, and nomadic farmers. On the other hand, Namonje-Kapembwa et al. (2022) took the cases of smallholder farmers in Zambia, while Al-Khaza'leh et al. (2015) for farmers in Jordan; Adams & Ohene-Yankyera (2014) for farmers in Northern Ghana, and Seleka (2001) for farmers in Botswana took different approaches to investigate factors affecting herd size.

Table 18: Factors Affecting Herd Size

Variables	Model 1 Sedentary	Model 2 Transhumant	Model 3 Nomadic
Constant	2.765* (0.185)	12.860* (1.742)	2.954* (0.552)
Price of goat/sheep	0.042* (0.015)	-0.728* (0.156)	-0.089 (0.133)
Support family exp: (=1)	0.264** (0.194)	0.001 (0.124)	1.960** (0.850)



Animal loss	-0.012** (0.005)	-0.007** (0.003)	-0.006 (0.004)
Diseases (=1)	-0.072** (0.034)	-0.127* (0.056)	-0.162** (0.091)
Lack of feeding (=1)	0.062 (0.152)	-0.091 (0.184)	-0.830* (0.167)
<b>Sensitivity Analysis</b>			
Adjusted R-square	0.14	0.20	0.35
F-Stat	4.82	6.77	9.32
Significance	0.001	0.00	0.000

Source: Authors' estimations using the field survey data.

Notes: \* and \*\* denote 5% and 10% significance levels; the values in parenthesis show standard error; we assigned 1 for animal diseases and lack of feeding, otherwise 0.

## 5. WAY FORWARD

Over the years, livestock has been one of the key subsectors of Pakistan's agriculture sector as it earns foreign exchange, contributing about 3.1 percent to total exports, 61.9 percent to agriculture value-added, and 14 percent to the national GDP. Animal husbandry for dwellers who live in Pakistan's rural areas is their main source of income where more than 8 million rural families are engaged in this sector and derive 35-40 percent of their income from this sector. According to GOP (2022), this subsector registered a record growth of 3.26 percent in 2021 compared with 2.38 percent in the previous year.

According to GOP (2022), the estimated livestock population has increased over the last three years, with each rural family owning 3 to 5 cattle and 4 to 6 goats/sheep. In terms of the number of small ruminants, the province of Punjab has the biggest share (26.7 million goats), followed by Sindh (16.6 million goats), and Balochistan (15.8 million flock size of goats).

Balochistan's livestock, particularly small ruminants, are of vital importance in the prosperity of the local population as the province's residents primarily depend on raising small ruminants for their livelihood. The selection of Balochistan's small ruminants was made for many reasons but the most important reason is that Balochistan is the largest province in terms of land size in Pakistan, the existence of the province's rural population depends mostly on livestock farming, which provides the only reliable source of milk and dairy products for rural communities. However, this sector received little attention in terms of investment from both the private and public sectors. Balochistan's livestock sector could provide jobs, provide opportunities for local populations, as well as national and local businesses, by processing and exporting meat.

The study findings in the light of the farmer-friendly goat production system suggest that it is necessary to enhance small ruminant farming because it requires less capital, is easy to manage, and cultural factors. Small ruminants are considered ATMs because it is easy to sell them for cash in times of emergency times. Furthermore, from a policy perspective, the availability of supplemental stall feeding, easy sources of fodder, immunisations for disease prevention, routine visits by veterinarians to farms, and suitable management practices for small ruminants could be policy options to enhance goat productivity, and the public-private investment in small ruminants could also be a policy choice to increase goat production since the majority of farmers raise small



ruminants that they have self-purchased. Thus, increasing the flock size of small ruminants is anticipated to generate employment locally, contribute to food security, reduce poverty, and improve the health of farmers' families through the intake of milk and meat.

According to the study's findings, farmers in Balochistan encounter a variety of challenges while attempting to rear small ruminants, such as disease incidences, insufficient nutritional supplements, prolonged drought, and a shortage of sufficient animal health care. To increase herd size, proper management practices like veterinarian visits to farmers' homes, supplemental feeding, and fodder could be recommended as policy choices. Similarly, the results of the econometric analysis indicate that almost all farmers lack a formal education, making goat husbandry their primary source of income. A policy choice that could have a positive impact on herd size is to increase the opportunity for people with no formal education to earn their primary living from goat farming. Given the positive impact of price on herd size, the policy option that favours goat/sheep prices would increase herd size.

Goat marketing, on the other hand, is largely informal and dominated by small-scale local traders. Two types of traders participate in goat markets, which are small traders and large traders. Their mode of investment is their own resources, and the goat price is determined by long one-on-one bargaining between sellers and buyers, with cash being the dominant mode of payment. Because the goat market operates informally, and most traders trade every week, they have a smaller number of goats due to financial constraints. Policy recommendations for enhancing goat production and marketing and export channels in the goat business necessitate proper marketing channel affiliation, breed selection based on market demand, and facilitation of market actors in the goat business by the local government. Improving goat exports necessitates easy access to credit services, the provision of cold chain infrastructure, and food technology for processing nontraditional goat meat and milk production.

Goals 1 and 2 of the SDGs (no poverty, zero hunger), and goals 3 and 10 (good health and well-being and reducing inequality) could be met by enhancing goat productivity and the associated business value chain in Lasbela, Balochistan. Because most households/farmers raise goats to meet their expenses and consume milk, as well as a source of wealth/saving in emergencies. Similarly, most goat traders in goat markets are locals whose primary goal is to add to their income.





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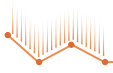
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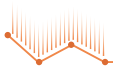


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# PART II

## BUSINESS & MARKETS

*Policy Briefs*



# EMERGENCE AND GROWTH OF SMALL AND MEDIUM ENTERPRISES IN DAROGHAWALA

Muhammad Shafaat Nawaz and Rao Abdul Hameed

## INTRODUCTION

Even though the share of the industrial sector in Punjab's GDP is 22%, 96.5% of the industries in the province are located outside official zones. At the same time, Pakistan's policy aims to support and prioritise small and medium enterprises (SMEs). Using Lahore's organic industrial cluster Daroghawala as a case study, this brief attempts to inform the policymakers of the inherent economic potential of such industrial clusters as Daroghawala for economic progress. The research on which this policy brief is based, first, explains the factors that contribute to the emergence of these clusters. Second, it quantifies the factors that cause SMEs in these clusters to grow. Third, it estimates the economic ties of these clusters with other sectors.

## METHODOLOGY

The study uses primary data based on 175 interviews with Daroghawala's SMEs, providing both qualitative and quantitative insights. Additional data was collected from land use surveys, and various additional interviews from other industrial clusters, large industries and industry-supporting commerce in Daroghawala, and key local figures. Secondary data sources, including governmental entities, further added to the research.

A mixed-methods case study methodology allowed for the qualitative analysis of the interviews supported by quantitative evidence. Content analysis of the interviews was used to explain which factors endowed industrial activity in Daroghawala and possibly other similar clusters. The effect of different

factors on the growth of SMEs was estimated using two-stage least square regression. Finally, the economic linkages and cash flows for the cluster were estimated through the construction of a transactions table showing monetary transactions within the cluster and beyond at different spatial scales.

## FINDINGS AND CONCLUSIONS

Firstly, the exploration of Daroghawala highlights the key dynamics of organic industrial clusters in Lahore. For example, these areas have emerged organically and incrementally as industrial clusters. These clusters evolved naturally, created by entrepreneurs who transformed cheap agricultural lands into manufacturing units in response to economic needs over time. Over time, as cities expand and residential areas envelop these industrial hubs, larger industries tend to migrate to newer urban fringes, leaving their former locations more focused on trading activities.

Proximity to vital infrastructures, like the Grand Trunk Road and the Lahore Ring Road, played a pivotal role in the formation and growth of clusters like Daroghawala. Furthermore, around 95% of industries are located within 2 kilometres of major roads, emphasising the importance of accessibility. These clusters consist of different types of industries, i.e., small-scale cottage industries and medium and larger-scale units. These hubs are diverse and exhibit symbiotic inter-industrial relationships. Furthermore, industrial associations play a significant role in these clusters as they represent the interests of the cluster, negotiate better rates with suppliers, and voice concerns to local government bodies.





External factors influence the growth and nature of specific clusters, like Daroghawala. The surge in vehicle usage nationwide, for instance, stimulated the demand for related products in Daroghawala, thus promoting entrepreneurship in the automobile, iron, and steel sectors. The Daroghawala cluster, as an example, showcases a range of metal products catering to both local and international markets, from top-quality products for Original Equipment Manufacturer (OEM) clients to grade-B and grade-C products for the local low-cost automobile maintenance market.

Though not directly highlighted, the role of industrial entrepreneur associations in negotiating with local governments implies a level of interaction and possibly oversight. Each cluster, like Daroghawala, possesses idiosyncratic features and dynamics which influence its development, such as specific industry typologies, ecosystems, and key actors. This underlines the importance of cluster-specific research to grasp their nuances.

For the second contribution of this research, the effect of factors influencing the growth of SMEs in Daroghawala was estimated. The research looked at what influences the yearly growth of businesses, focusing on factors like the percentage of permanent customers, available loans, money spent on research, and manufacturing processes. Control variables were also considered like the age of business, the education of the entrepreneur, and the kind of industry. It was found that businesses that use digital or semi-digital manufacturing processes grow faster compared to those using older, conventional methods. It is possible because businesses grow when they upgrade their manufacturing processes due to an increase in product demand.

Furthermore, it was found that companies with more permanent clients experience more growth. Many SMEs in Daroghawala were found to be manufacturing their products for other large-scale industries. Having permanent clientage leverages their business over time.

Surprisingly, having more available loans or spending more on research did not seem to affect growth much in the area they studied. But, this could be because the businesses did not share detailed data on these

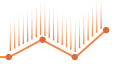
variables. There is, however, literature in Pakistan which suggests that SMEs rarely use formal credit. Our finding seems to be in line with that body of literature.

The third contribution of the research is highlighting the inherent economic potential of the Daroghawala industrial cluster and its extent. It was found that Daroghawala is not just an isolated industrial area. Its intricacies and dependencies within the formal and informal sectors reveal the essential role it plays in the broader economic landscape. This interconnectedness means that any policy targeting Daroghawala will have ripple effects on other areas.

The international economic activities of Daroghawala highlight that even its seemingly informal businesses are not marginalised but play a crucial role in the broader economic framework, both locally and globally. There is an inherent potential to strengthen international trade and export policies that could cater to these industries, ensuring they receive the necessary support to maintain and expand their international linkages.

The transactions table also brings to the fore the tax data of otherwise largely unknown industrial clusters. The difference in tax contributions between primary and ancillary industries suggests that they have different approaches to a formal, documented economy. It, however, also hints at possible intentional evasion. There is, again, an inherent opportunity to implement a taxation strategy that recognizes the diverse contributions and capacities of different sectors in Daroghawala. The key could be to focus on incentivizing ancillary industries to formalize and increase their tax contributions.

Daroghawala's transactions with Lahore indicate the region's potential as a key driver for economic prosperity based on external demand. This could be leveraged to enhance regional transportation, communication, and logistics infrastructure to facilitate and optimize these transactions, promoting both local and external economic growth. Currently, Daroghawala's enterprises have access to production means, contradicting some traditional views of informal economies that used to say that these are marginal economies. With this opportunity, the investment in infrastructure and training programs



could further enhance the production capabilities of Daroghawala's enterprises.

This transaction table also shows that Daroghawala's economy is embedded in Pakistan's economic situation. The structure of economic activity in Daroghawala and the broader Pakistan environment significantly affects the businesses within this cluster. This research hints that there is room to conduct a comprehensive macroeconomic analysis to identify potential bottlenecks and areas of intervention that could enhance the overall business environment in and around Daroghawala and similar clusters. The transaction table from this research reveals significant insights into the monetary flow dynamics of Daroghawala. Similar research across other industrial clusters in Lahore and Punjab will provide not only the triangulation for this study but also the overall economic profile of metropolitan Lahore. This will not only provide valuable insights but will also guide targeted investments and policy interventions, optimizing the economic impact across the region.

## POLICY RECOMMENDATIONS

Based on the rigorous research conducted on Daroghawala's industrial dynamics, SMEs' growth factors, and the inherent economic potential of this cluster, the following policy guidelines are suggested to foster sustainable economic growth and strengthen enterprises within this cluster, and other areas of sorts.

### Infrastructure Enhancement & Development:

#### *Connectivity:*

- Prioritise infrastructural development around major roads and vital arteries such as the Grand Trunk Road and the Lahore Ring Road to enhance accessibility.

#### *Logistics and Communication:*

- Develop state-of-the-art logistics hubs and communication networks to ensure smooth transactional flow within and outside Daroghawala, ensuring faster and more efficient transportation of goods and services.

### Supportive Ecosystem for SMEs:

#### *Digitalisation:*

- Encourage and support businesses to transition to digital or semi-digital manufacturing processes through incentives and training programs. This will bolster their growth and make them competitive.

#### *Strengthen Client Relationships:*

- Facilitate business-to-business (B2B) programmes that allow SMEs to establish permanent client relationships, leading to stable growth.
- Establish forums and platforms where businesses can network and collaborate.

### Financing and Credit Systems:

#### *Redefine Loan Structures:*

- While current loan structures might not seem influential, there is a need to redefine and tailor these to cater specifically to the needs and capacities of businesses in Daroghawala. The current system works on the available assets to leverage credit-seeking ability but this does not seem to work. Alternative models need to be explored.

#### *Financial Literacy:*

- Organise financial literacy programs that highlight the benefits of formal credit systems, ensuring that more SMEs tap into available financial resources.

### Foster Entrepreneurial Associations:

#### *Strengthen Collective Bodies:*

- Recognise and empower associations of industrial entrepreneurs, allowing them to negotiate better terms with suppliers and voice concerns more effectively to governmental bodies.



*Establish Cluster-Specific Councils:*

- Considering the idiosyncratic features of each cluster, form cluster-specific councils that can provide insights, share best practices, and address unique challenges.

**International Trade and Export Policies:**

*Trade Facilitation:*

- Develop export promotion policies and provide support, especially to those industries in Daroghawala that are involved in international trade, not only directly but also through one link of another directly exporting business, ensuring they receive the necessary support for their ventures.

*International Collaboration:*

- Facilitate international partnerships that can help businesses in Daroghawala expand their horizons and tap into new markets.

**Taxation Strategy:**

*Incentivised Taxation:*

- Implement a fair taxation strategy, focusing on encouraging ancillary industries to formalize and contribute equitably. Introduce tax incentives for those who join the formal sector and maintain transparency in their operations.

*Tax Education:*

- Organise awareness campaigns about the importance and benefits of tax contributions for both primary and ancillary industries.

**Comprehensive Macroeconomic Analysis:**

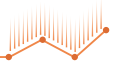
*Research & Analysis:*

- Fund research to conduct a thorough macroeconomic analysis of Daroghawala to understand potential bottlenecks and areas for intervention, ensuring a conducive business environment.

*Holistic View:*

- Extend similar research to other industrial clusters in Lahore and Punjab. Such a comprehensive analysis will guide targeted investments, ensuring optimized economic growth across the region.

The economic vitality and resilience of the Daroghawala industrial cluster serve as a testament to the entrepreneurial spirit and the potential for organic industrial growth. The outlined policy guidelines, grounded in research, aim to support and amplify this growth, ensuring that Daroghawala and similar clusters continue to thrive as economic powerhouses within the region.



# BUILDING POLICY FRAMEWORK FOR BUSINESS INCUBATION

Abdul Wahid and Gulfam Khan Khalid Baghoor

## INTRODUCTION

Start-ups, while riskier, have a great potential for success compared to established businesses. However, start-ups require more risk and involve entrepreneurs creating something new to make money. Therefore, access to finance is vital for start-up success but Pakistan ranks low on various factors that lead start-ups to success.

Given the importance of start-ups and their potential for success, the government has taken significant steps to promote entrepreneurship by establishing business incubation centres in universities and major cities. These centres have achieved an exceptional success rate of over 50%, and Plan9 stands out with a perfect 100% success rate, which is highly uncommon. On a global scale, the failure rate of start-ups is high, with 9 out of 10 not meeting industry standards. Additionally, the number of successful start-ups in Pakistan is relatively low compared to other regions like Asia and China. The Global Entrepreneurship Index ranks Pakistan 108th out of 137 countries, indicating significant interest in entrepreneurship but relatively low pursuit and success in the field.

The study, on which this policy brief is based, focused on exploring the current state of the start-up ecosystem, identifying strengths, gaps, and potentials, and proposing tailored policy measures for fostering a conducive environment for innovation and entrepreneurship in Pakistan's incubation ecosystem.

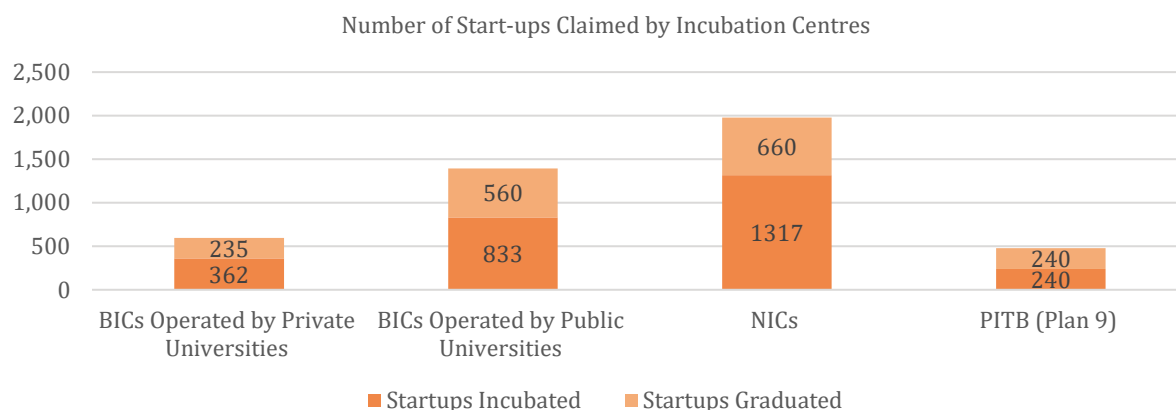
## METHODOLOGY

Through literature review and expert opinions, the study identified the causes of low productivity and output from incubation centres. Random sampling was used to select representative incubation centres, including three national incubation centers (NICs), Plan9 of PITB, and 19 business incubation centers (BICs) affiliated with the Higher Education Commission (HEC). Data collection involved online and offline sources, physical visits, one-to-one meetings with officials, and interactions with incubates. Interviews and focus group discussions (FGDs) provided qualitative data, while quantitative data underwent descriptive analysis for a comprehensive understanding.

## FINDINGS AND ANALYSIS

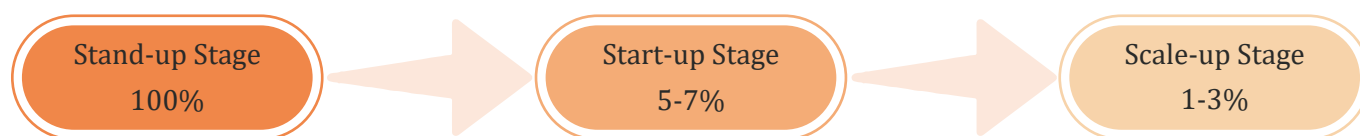
### Start-ups Landscape

The data obtained from reports and websites submitted to sponsoring agencies indicate that BICs in public sector universities produced 560 start-ups, and BICs in the private sector established 235 start-ups. Plan9 sponsored by PITB generated 240 start-ups. NICs in Islamabad, Lahore, and Peshawar reportedly produced 660 start-ups as shown in Figure (1), but concerns have been raised about their true nature as incubation centres, with many start-ups being pre-existing entities.

*Figure 1: Start-up Landscape in Pakistan*

Pakistan's success rate of over 50% in these centres contrasts with the global average of below 10%. However, it was found that reported graduation numbers were inflated by 85-90%, revealing a significant gap between projected and actual outcomes. Upon investigation, it was revealed that

there is confusion surrounding “incubated” and “graduated start-ups,” which the illustration below clarifies. The illustration shows the success rate at each stage. The NICs performed better in nurturing start-ups compared to BICs, with PITB showing the highest effectiveness in fostering successful ventures.



### Start-up Ecosystem in BICs

BICs in Pakistan follow a standard induction process for students and faculty only. Interested entrepreneurs apply online, providing details about themselves and their business ideas. The incubation centre selects promising ideas and offers support, mentorship, resources, and networking opportunities. Once businesses are ready to stand on their own, they exit the programme. The criteria for BICs are established by the Higher Education Commission (HEC) in collaboration with universities. The accepted qualification levels include university students, alumni, faculty, and staff, without specific requirements. BICs do not charge fees or require investments, only adherence to the set criteria.

A comparative analysis of public and private university BICs shows that private sector universities have higher numbers of start-ups incubated and graduated, creating more direct and indirect jobs. Private universities spend an average of 200k-233k

rupees per incubate as operational costs. Revenue generated by start-ups within BICs varies, with NUST leading in revenue and investment generation. All BICs have similar infrastructure and services, such as offices, meeting rooms, and support like training, financial services, IT solutions, counselling/mentorship, and funds/grants. However, HEC-established BICs differ from NICs in that they do not offer company formation services.

### Start-ups Ecosystem in NICs

The incubation criteria for NICs encompass various aspects such as qualification, investment fees, and conditions. The National Incubation Center Islamabad has a lenient criterion, accepting individuals with any qualification level as long as they present a business proposal or idea. The facility provides services for free if the proposal is accepted. Similar criteria apply to the NIC Lahore and NIC Peshawar. These centres support start-ups with seed funding, mentorship, technical advice, and network





access. However, critics argue that they may prioritise already established start-ups over new ones due to vague selection criteria.

Data from NICs indicates impressive results, with over 50% of start-ups transitioning successfully, creating significant employment opportunities and attracting substantial investments. However, further examination suggests embellished figures and a possible overstatement of the impact. The data also raises doubts about the accuracy of claimed graduated start-ups and job creation. NICs receive annual funding of at least PKR 1.5–2 million per incubatee, but the returns generated by start-ups seem less remarkable than expected, implying ambiguity in fund utilisation and reporting. Regarding facilities, NICs have infrastructure support for coworking and offices but lack meeting rooms and cafeterias. The NIC Lahore stands out for having these amenities. Services provided by NICs include training, financial assistance, mentorship, and more. However, NICs lack IT solutions, grants, and company formation services, while NIC Lahore only offers regular training. Expanding services could lead to better results.

### Start-up Ecosystem in Plan9 (PITB)

Plan9's induction process invites teams from Pakistan to relocate to Lahore for six months. No minimum educational qualification is required, focusing on novel business ideas with well-devised plans. It has launched 14 cohorts, with 240 start-ups valued at USD 77.1 million, creating 1450 jobs. Plan9's support has attracted investments of USD 6.1 million. Offering

complimentary office space at Arfa Tower, uninterrupted power, and networking opportunities, Plan9 fosters growth. Consultations, training sessions, and workshops enhance start-ups' capabilities. The team assists with business strategies, product development, bookkeeping, sales, marketing, investments, and legal counsel, nurturing innovative ideas into prosperous businesses. Plan9 plays a pivotal role in nurturing early-stage technology enterprises with a well-orchestrated framework and an enabling environment.

### Start-up Ecosystem and Missing Links

A comparison of BIC, NIC, and Plan9 incubation centres with developed economies' start-up ecosystems shows that infrastructure meets standards, but training lacks depth because of inexperienced trainers. A major deficiency is the lack of indigenous literature and case studies on successful ventures in Pakistan, particularly in Urdu. Networking with industries is weak, hindering growth opportunities. Incubates lack crucial skills for obtaining loans and issuing IPOs. To address these weaknesses, strategic partnerships with industries are essential, offering mentorship and market access. Comprehensive training programmes should enhance financial literacy and entrepreneurial acumen. BICs lack crucial business support like legal assistance, while NICs and Plan9 offer limited services. Incubates lack IT experts for prototype development. Improvements are needed to boost the incubation centers' effectiveness in supporting start-ups as shown in Table 1.

Table 1: Comparison Between Local and Global Entrepreneurship

Elements	Global Ecosystem	NICs	BICs	Plan 9
<b>Basic Infrastructure</b>	Free office space	✓	✓	✓
	Free meeting rooms	✓	✓	✓
	Ideas rooms and discussion centres	✓	✓	✓
	Free internet	✓	✓	✓
	No Utility Charges	✓	✓	✓
<b>Training and Capacity Building</b>	Ongoing training programmes	✓	✓	✓
	Mentors from professional bodies	✓	×	×
	Mentors from industry and business	×	×	×



<b>Knowledge Support System</b>	Local case studies & models (literature)	×	×	×
	Specialised & core competencies in a specific field	×	×	×
	Researches & surveys on local market dynamics	×	×	×
	Ideas contests	✓	✓	✓
<b>Funding and Investment Opportunities</b>	Dedicated angel investors and donors	×	×	×
	Investment available in incubation centre	×	×	×
	Linkages with local and international networks	×/✓	×/✓	×/✓
	Services available for loans/IPOs and other funds	×/✓	×	×
<b>Business Development Services</b>	Legal services	×/✓	×/✓	×/✓
	IT experts and technical staff for prototype development	×	×	×
	Accounting & auditing services	×/✓	×	×/✓
	Backward and forward supply chain network	×	×	×

Note: (✓= available, ×=not available and ×/✓= partially available)

Source: Authors' computations.

## CONCLUSION

Incubation centres in Pakistan aim to boost start-ups by offering resources, mentorship, and access to investors. However, Pakistan's graduate entrepreneurship lags behind its Asian counterparts due to limited access to finance and underwhelming progress in the entrepreneurial ecosystem. Reported start-up numbers from these centres are exaggerated, raising concerns about their true purpose. Insufficient funding and a lack of experienced mentors add to the challenges. Additionally, few IPOs and no market research hinder business growth and innovation. Weak IT infrastructure, regulatory policies, and a dominant "Seth" culture further obstruct start-up scaling. A conducive ecosystem is essential to unlock Pakistan's potential and empower educated graduates to lead entrepreneurship. Based on the study's findings, the following recommendations are proposed:

### Sponsored Agencies (HEC, Ministry, Technology Board):

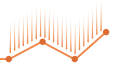
- Supplement data and reports from incubation centres with independent evaluations for true performance assessment and cost-benefit analysis.
- Direct financial resources towards supporting

start-ups instead of just focusing on operational aspects.

- Invest in enhancing entrepreneurs' business acumen, marketing expertise, and product development skills.
- Establish a platform featuring local and international case studies in Urdu, along with video documentaries, to provide insights to aspiring entrepreneurs.

### Incubation Centers:

- Develop on-site IT support facilities exclusively for start-ups' prototype and technology-based product development.
- Offer complimentary accountancy, auditing, and legal services to reduce initial costs for start-ups.
- Concentrate efforts on a specialised field aligned with core competencies, fostering collaboration between universities and industries.
- Create a network for start-ups to access affordable raw materials and efficient distribution channels.



**Government:**

- Introduce enticing financial opportunities, such as zero or nominal interest rate seed funds, for start-ups with innovative products or services.
- Allocate funding based on thorough assessment and endorsement of business plans by incubation centres.
- Align BICs and PITBs in peripheral and mainstream cities to cultivate early-stage start-ups (start-ups), while NICs in major cities foster advanced level i.e. start-ups.
- Implement a strategic approach for BICs and PITB Incubation Centres to focus on early-stage entrepreneurs, while NICs nurture more advanced start-ups.
- Select entrepreneurs for NICs through an ideas competition in each BIC and IT board incubation centre to segregate them based on their growth stage.
- This approach will accelerate entrepreneurship in Pakistan, leading to a more productive and successful entrepreneurial ecosystem.



# ENHANCING GOAT PRODUCTIVITY AND THE ASSOCIATED BUSINESS VALUE CHAIN IN DISTRICT LASBELA, BALOCHISTAN

Hazrat Yousaf, Atiq ur Rehman, and Azhar Iqbal

## INTRODUCTION

Livestock is one of the most important agricultural subsectors as it contributes significantly to agricultural exports and serves as a primary source of income and employment for rural populations. Rural populations' livelihoods are linked to various livestock channels, for example, animal rearing, feeding, grazing, management, and marketing through which this sector employs approximately one billion people worldwide.

World's total production of goat meat was 6.39 million tons in 2021, with Asia and Africa contributing the most. Africa provided 1.4 million tons, whereas Asia contributed 4.7 million tons to the production of goat meat. In 2021, Pakistan produced 0.518 million tons of meat, making it the third-largest meat-producing nation in the world behind China and India, which produced 2.519 and 0.547 million tons, respectively.

Over the years, livestock has been one of the key subsectors of Pakistan's agriculture sector as it contributes about 3.1% to total exports, 61.9% to agriculture value-added, and 14% to the national GDP. Animal husbandry is the main source of income for Pakistan's rural population as more than 8 million rural families are engaged and derive 35-40% of their income from livestock. According to the Pakistan Economic Survey 2021-22, livestock grew at 3.26% in 2021 compared with 2.38% in the previous year, while its share in Pakistan's agriculture sector was 61.9% and 14.04% in GDP. According to the Economic Survey, the estimated livestock population has increased over the last three years, with each rural family owning 3 to 5 cattle and 4 to 6 goats/sheep. In

terms of the number of small ruminants, the province of Punjab has the biggest share (26.7 million goats), followed by Sindh (16.6 million goats), and Balochistan (15.8 million goats).

Balochistan's livestock, particularly small ruminants, is of vital importance in the prosperity of the local population as the province's residents primarily depend on raising small ruminants for their livelihood. Balochistan is the largest province in terms of land size in Pakistan and the province's rural population depends mostly on livestock farming, which provides the only reliable source of milk and dairy products. However, this sector has received little attention in terms of investment from both private and public sectors. Balochistan's livestock sector could provide jobs and economic opportunities for the local population as well as for national and local businesses by processing and exporting meat.

The research report, on which this policy brief is based, focused on the Lasbela district. The following three objectives were set:

- To profile nomads, transhumant, and sedentary households' livestock farming;
- to know farmer-friendly goat production systems; and
- to gain a better understanding of the goat business value chain, associated constraints, and opportunities.

Lasbela has the advantage of an appropriate climate for goat farming and access to a big meat market, i.e., Karachi, Iran, and the CPEC route. Thus, the findings of this project can have potential policy



options/recommendations for the local government and livestock department on how to raise awareness among livestock farmers and traders.

## METHODOLOGY

The project collected primary data from farmers and traders associated with the goat business in the Lasbela district. The sample size was 265 farmers/households involved in livestock production. The information was also collected from livestock market traders/Mandi (Pidri in the local language). A total 73 of randomly selected traders responded to the questionnaire. An econometrics exercise was also performed to investigate factors affecting herd size.

## FINDINGS

- The analysis of the livestock composition and ownership shows that sedentary and transhumant keep cattle in larger numbers than nomads. Sedentary and transhumant people have access to more agricultural areas than nomads do, which makes it difficult for nomads to move their cattle. Second, nomads and transhumants use donkeys and mules to transport tents, luggage, water, and firewood while sedentary households keep camels for firewood and milk consumption to satisfy their family members' nutrition intake. Sedentary people mostly purchase cattle themselves, whereas transhumant and nomadic people receive cattle as gifts in addition to purchasing cattle. The gifts are usually in the form of a dowry received at the time of marriage. In sedentary and transhumant systems, the principal motives for keeping livestock are milk, offspring for selling, and manure.
- There is a significant difference in average livestock size across the three systems. Sedentary and transhumant households tend to keep more cattle than nomadic households. Moreover, results show that the nomadic people tend to keep donkeys, mules, goats, and sheep, more than sedentary and transhumant people do. However, sedentary households keep more camels than nomadic and transhumant households do.
- Sedentary, transhumant, and nomadic households' flocks experienced average flock losses of 13%, 25%, and 23%, respectively mainly due to disease incidence, poor nutrition, and prevailing droughts. They reported the lack of awareness regarding animal treatment centres and the unaffordability of medicines. The results also show that 55.1% of sedentary, 76.4% of transhumant, and 73.1% of nomadic households' small flocks depend on grazing. According to the farmers, due to the drought in Lasbela, there is a lack of fodder in various areas, so they were willing to adopt tethering but faced stall-feeding and purchasing power constraints. Since a sedentary lifestyle includes agricultural activities and animal rearing, they prefer stall-feeding to feed their animals.
- Sedentary households use self-grown fodder (16.3%), gather it from various locations (55.1%), and use a mix of three sources, i.e., as payment for work period, collected from various locations, and bought from markets (28.6%). As for transhumant households, 60.6% of the fodder used by transhumant households who own small flocks is paid for, collected from various sources, and purchased, while the remaining 28% comes from other sources. The nomadic small-flock owner households collect fodder from different areas, as payment for their services, and purchases. Animal health coverage under three systems is self-treatment. The principal motives for keeping goats and sheep are to support family expenses, for business motives, for milk consumption, and for wealth/savings to sell in an emergency.
- The findings of goat/sheep marketing show that, unlike big animal marketing, three main channels are used in goat markets. The first channel is where small traders sell goats to clients directly in the goat market and buy from Mandi. In this arrangement, small traders share 77% of the goat market. The





second and third channels consist of big traders and brokers whose share in goat market trade is 12% and 11%, respectively. However, the big traders buy animals from local markets and then sell them in trans-district and trans-provincial markets. Brokers, on the other hand, trade animals to earn commission from both parties, i.e., sellers and buyers. As for investment, there are two dominant methods of investment, which are investing using own resources and owning and sharing. Goats are purchased from the local market, the village, and the border market.

- Constraints associated with goat/sheep marketing are financial constraints, lack of shade facilities, lack of drinking water, absence of goat-holding facilities, and lack of proper cleaning and health management system from the local government. Traders reported a decrease in their goat business due to a lack of facilities, a lack of both financial and proper places for keeping small ruminants, limited access and unawareness of market channels, high disease intensity and low purchasing power for medicines, market betrayal by brokers and big traders, and increase in goat prices due to high transportation costs. The results of the econometric analysis indicate that almost all farmers lack a formal education, making goat husbandry their primary source of income.

supplemental stall feeding, easy sources of fodder, immunisations for disease prevention, routine visits by veterinarians to farms, and suitable management practices for small ruminants could be options to enhance goat productivity. Moreover, the public-private investment in small ruminants, awareness of farmers regarding animal treatment units, and awareness of farmers regarding investment loaning agencies could also be policy choices to increase goat production since the majority of farmers raise small ruminants that they have self-purchased. Thus, increasing the flock size of small ruminants is anticipated to generate employment locally, contribute to food security, reduce poverty, and improve the health of farmers' families through the intake of milk and meat.

- A proper marketing channel affiliation, breed selection based on market demand, the facilitation of market actors in the goat business by the local government, and raising awareness by the government, particularly livestock and industrial sectors, of meat markets could be policy choices to enhance goat marketing.
- Awareness of traders about access to credit services, the provision of cold chain infrastructure, and awareness of food technology for processing nontraditional goat meat and milk production could also be policy options for exports in this sector.
- Since almost all farmers lack formal education, a policy choice that could have a positive impact on herd size is to provide opportunities to people with no formal education to earn their primary living from goat farming.
- Given the positive impact of price on herd size, the policy option that favours goat/sheep prices, for example, awareness to farmers regarding goat marketing channels outside the district would increase herd size.

## KEY POLICY RECOMMENDATIONS

### Key Policy Recommendations

- The project findings in the light of farmers' friendly goat production system suggest that it is necessary to enhance small ruminant farming because of cultural factors, it requires less capital, is easy to manage, and small ruminants are considered ATMs as it is easy to sell them for cash in emergency.
- From a policy perspective, the availability of

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