EMERGENCE AND GROWTH OF SMALL AND MEDIUM ENTERPRISES IN DAROGHAWALA

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EXECUTIVE SUMMARY

This executive summary provides an integrated overview of a comprehensive three-part research project scrutinizing the industrial ecosystem in 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 emphasizes 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 component unravels pivotal growth determinants for SMEs operating within Daroghawala. The study reported a positive impact of the manufacturing process type and the growth in permanent clientage on industrial production. Interestingly, the study finds that corporate loan availability and research expenditure do not significantly influence SMEs growth contradicting some previous mainstream research but nevertheless resonating with some studies in Pakistani context. This divergence underscores the need for further exploration across diverse sectors and geographical regions, advocating for a strategic approach to modernizing manufacturing processes and establishing a stable client base.

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 perspective of informality. The research also reveals potent connections with other industrial clusters in Lahore city, suggesting that future research should assess similar transaction flows to aid efficacious policy-making and targeted investment.

PREFACE

This research project is a part of doctoral research by Muhammad Shafaat Nawaz, the principal investigator, for program of Urban Planning and Policy at the University of Illinois at Chicago. This research was funded by RASTA CGP 4.0 by the Pakistan Institute of Development Economics (PIDE). The study was conducted by the principal investigator (PI) with the collaboration of Mr. Rao Abdul Hameed and Mr. Salman Raza as co-PIs. The authors are grateful to the team at PIDE for reviewing the early proposals for this research, and for all their support throughout the project. Two members from the research advisory committee (RAC) are mainly acknowledged for their mentorships. Professor David Orden, and Professor Izza Aftab supervised the research team throughout the project, usually meeting once a month. These meetings were instrumental in shaping this project and moving it forward. The authors thank them for their invaluable reviews.

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LIST OF ACRONYMS

SMEs	Small and Medium Enterprises
DIOA	Daroghawala Industry Owners Association
FBR	Federal Bureau of Revenue
IRB	Institutional Review Board
LSMI	Large Scale Manufacturing Index
OEM	Original Equipment Manufacturer
TDAP	Trade Development Authority of Pakistan

INTRODUCTION TO THE REPORT

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 specialized urban districts house economic activities of various kinds but are mainly centered upon 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 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 a planned spatial planning, but only 3.5% of the industries are located in these formal zones *(The Urban Unit, 2018)*. A majority 96.5% of industrial units developed in cities but outside any industrial zone present 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 develop 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. But 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 at the edge 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 SME. Further, 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 the pattern similar to that noted by *(Cronon, 1991)* for Chicago's development as a regional trade hub, and *(Gandy, 2002)* for role of New York's public infrastructure in the spatial organization of the city.

With aim to document the factors that have caused the development of industrial clusters in Lahore, this study aims to provoke thoughts for policy makers 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 better understand spatial organization of Pakistani cities. Lastly, this study quantifies the

monetary flow of the industrial clusters in Pakistani cities at four spatial scales: intra-cluster, inter-cluster, regional, and international scale.

This research focused 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 Daroghawala industrial cluster at different spatial scales to document its economic linkages

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

1.1 Scope of Research

This research provides profiles of industrial clusters in Lahore, but mainly focuses on Daroghawala as an 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 interview for data requirements as explain in the next section.

SMEs have been defined variably with respect to the number of employees, the business turnover, and total assets. For example, European Commission defined SMEs as those with less than 250 employees with total assets of no more than 50million euro *(Eurostat, n.d.)*. Likewise, 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 *(Banking on SMEs: Driving Growth, Creating Jobs, 2022)*.

SMEs in Pakistan have been defined variably as well. SMEs bank defines small industries as one employing less than 10 employees (and less than Pkr. 100 million assets) while medium industries with over Pkr.100million assets *(Dar et al., 2017)*. Punjab Small Industries Corporation defines small scale industries with respect to fixed investment up to Rs. 20million fixed investment excluding land and building yet State Bank of Pakistan (SBP) defines SMEs as ones that employee up to 250 employees and have annual turnover up to 400 million rupees *(Punjab Economic Research Institute, 2018)*.

Through comparative analysis of the definition of SMEs around the world and the country, Punjab Economic Research Institute (PERI)[1] has suggested the following definition for SMEs: *"Small Scale*

[1] PERI definition: Punjab Economic Research Institute (PERI) defined the size classification of the enterprise per their 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. The document is available on

firm is considered as that firm which employ 5-19 number of employees and medium Scale firm which employ 20-99 workers" (Punjab Economic Research Institute, 2018). This study takes up this definition because of its implicit simplicity to identify the scale of industry during the fieldwork. This research is based on primary data collection on previously undocumented type of industries. Taking PERI's definition based on number of employees offered the clarity to identify SMEs during data collection because industry owners usually share number of employees easily in comparison to the assets of the enterprise.

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 finds key characteristics that makes a location favorable for such kind of industrial activity. Furthermore, the scope of this research is at the growth factors of SMEs to find out which policy interventions could possibly help such SMEs to 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 generalized conceptions about informality that do not apply in case of industrial clusters like Daroghawala. Hence, the scope of this research is to contextualize and explain an industrial cluster and its SMEs to bring their growth dynamics to the fore.

1.2 Data and Methodology

Industrial clusters in Lahore do not have extensive data readily available for research. Therefore, this study was majorly 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 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 IRB approval of the interview protocols. Detailed interviews from these SMEs produced both the qualitative and quantitative data. The qualitative data was majorly used for finding 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 of decline of these SMEs, and their transactions at different spatial scales.

Table 1: 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)
HBY	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

ttps://peri.punjab.gov.pk/system/files/SITUATIONAL%20ANALYSIS%20OF%20SMALL%20SCALE%20INDUSTRY%20IN%20PUNJAB.pdf; retrieved on Feb 11th, 2023

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 %age)
RSR	Retail Selling Ratio	Percentage of sales directly to the market (in %age)
ISR	Industry Selling Ratio	Percentage of sales to another industry (in %age)
ESR	Export Selling Ratio	Percentage of sales generated by export (in %age)
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 clients a year throughout enterprise history
PCR	Permanent Client Ratio	A ratio of permanent number of clients to average number of clients in a year through enterprise history (in %age)
CPD	Change in Product Demand	An estimated change in the demand of the product in the market, exogenous to the business (in %age)
QLP	Quality Level of Product Manufactured	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 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, SemiDigital, and Conventional)
PBR	Percentage of Business Cost Spent on Purchasing Raw Material	%age
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 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

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 a land use surveys to prepare industrial land use maps of key industrial cluster in Lahore. These land use surveys were the key to understand 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 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.. These 60 interviews (10 from each cluster) were conducted from different types of businesses in each cluster to get due representation to whole cluster.

Further, the construction of transaction table to show the monetary transactions of Daroghawala enterprises at different spatial scales required 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 further section) denoted 14% of the total industries in Daroghawala as marked during land use surveys. A similar proportionate 14% of the large-scale industries and industry supporting commerce were thus interviewed to complete the data for transaction table. A total of 6 large scale industries (~14% of 40) and 24 industry 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 variety of sources for data collection, 12 interviews were additionally conducted from key persons in Daroghawala who either had decades of experience in this cluster, were part of 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: Federal bureau of revenue (FBR), Trade Development Authority of Pakistan (TDAP), Pakistan Customs Department, and local office of Deputy Commissioner Revenue. These secondary data sources were used in the construction of data collection with a limitation that the original data was not allowed to be shared, hence the analysis results presented in this study.

1.3 Key Findings of This Research

This research makes several arguments as should be seen in the further sections. Key arguments are being summarized 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 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 like 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 research argues that SMEs in Daroghawala prosper when they upgrade from conventional to digital processes, enabling them to work with original equipment manufacturer clients. However, the research also notes that access to credit and research investments did not significantly affect growth.

Through a transaction 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 paid to the government in tax shows that industrial clusters like Daroghawala have huge economic potential to be capitalized.

1.4 Limitations of Research

Limitations of this study were majorly due to the lack of pre-existing data. As most of this study relied on primary data collected through interviews, it lacked the opportunity to verify responses through other data sources. 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 response was taken for their word.

Another key limitation of the research was the definition of 'growth or decline' of SMEs. While the 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 level of comprehensiveness for this research. Therefore, we have used the change in the 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 reduction in metal processed did decline. There could be the cases where businesses might grow even when weight of metal processed decreased because they produced quality goods of smaller weights, but our research could not accommodate for it 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 would be needed. This research certainly provides a base for future research, but the further research will be required to explore which factors enable SMEs to modernize their production process or secure stable clientage and the role of policy in facilitating such changes. Moreover, research will be needed to assess if findings from this study would be replicated in other cases.

EMERGENCE AND GROWTH OF AN INDUSTRIAL CLUSTER

This part of the study presents an examination of the spontaneously formed industrial ecosystem in Daroghawala, Lahore, exploring the dynamism and diversity of industrial entrepreneurship that has boosted over the past two decades with its industrial history dating back to over 70 years. Influences fostering this growth include urbanization trends, increased production in the automobile, steel and iron industries, infrastructural access, and ease of business. Daroghawala features a broad spectrum of establishments, ranging from small one-person businesses to large-scale industries, with a diversity of products catering to both local and global markets. There are multiple industrial clusters mapped and profiled in metropolitan Lahore. The emergence of these clusters, not restricted to any specific industry, on the city's edges provides a valuable contribution to literature regarding spatial organization of economy in Lahore. The findings highlight the organic development and adaptive nature of these industrial clusters, which are strategically located in proximity to other land uses such as residential and commercial spaces, and their ability to respond flexibly to economic demands and opportunities. The research emphasizes the critical role of collective industrial entrepreneur associations, facilitating representation and negotiation at various platforms. The section of the report concludes by emphasizing the need for further cluster-specific research to unveil intricate details of industrial typologies, ecosystems, and key actors shaping the city's industrial landscape.

2.1 Introduction

Lahore is a city of over 12 million residents with fastest rate of urbanization in the country *(Pakistan Bureau of Statistics, 2017)*. The city has expanded rapidly over the past two decades. City area increased by 27.41% from year 2000 to 2020 and has been projected to increase 23.15% 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 urbanize at the same pace and proportion in comparison to Karachi.

After Karachi, Lahore is the hub of second largest economic activity in Pakistan. Yet, the annual GDP growth rate of the city has been higher than that of the country recently. The city contributed 11.5% of national and 18.9% of Punjab's GDP in year 2014-15. With an estimated size of Rs. 1.23 trillion that year, the city economy was found to be growing at a rate of 6.7% annually. After the services sector, the second major contributor to the city's economy was industry *(The Size and Growth of the Economy of Lahore, 2016)*.

Lahore is growing on each parameter: population is increasing, the city size is expanding, and the economy is growing. For a city with such promising projections, the policy makers 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 policy makers. Whether that be London or Chicago, city planning has been the key focus of policy makers for metropolitan cities *(Abbott, 2020)*. Lahore has seen 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: 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) Master Plan of Lahore 2050.

The MPGL represented the city's initial endeavor in organized 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. Yet these planning efforts have been criticized by scholars for their inability to develop a nexus for the spatial dynamics of a complex city *(Hameed & Nadeem, 2006; 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 approval of the government bodies. Such activities are undertaken by two socioeconomic extremes. The city's elite often bypass 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 organically 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 legitimize their developments, while the less fortunate utilize 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, characterized 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 this complex, the official bodies try to operate in a purely legalist manner following the rule of law. Policy makers 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 despite the facts that 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 like Quaid-e-Azam Industrial Estate Kot Lakhpat, and Sundar Industrial Estate. These officially recognized industrial areas are marked on the official urban planning maps prepared by the government bodies like Lahore Development Authority. Likewise, other key industrial enclaves like the Railway workshops near the railway station are also marked as an industrial activity. However, there are many other parts of the city where industrial activities exist in the city without official status of an industrial land. For such places, these official

maps show general industrial use but largely ignore any detail on them. The official documents miss the opportunity to provide any detail on the type of industrial activity, the organization 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 did 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.

2.2 Literature review

Scholars interested in the spatial organization 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 visualized the city as a series of concentric zones, each characterized 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 sparked a ripple effect, pushing established inhabitants further out in a process known as 'succession.' The model was visualized as moving from the city center outward, symbolizing the immigrants' journey from less affluent areas to more affluent suburbs *(García, 2019)*.

This model became a paradigm for urban ecology, showing how urban organization could be disrupted by incoming migrants. The Chicago School thus conceived of urban processes in a modernist manner, with the city center as a formative force on the periphery. Subsequent researchers like 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 - the Los Angeles School, focusing on postmodern urban planning. Los Angeles, a city developed not during the industrial era but in the age of automobile and post-industrial society, represented this new urban reality. The city lacked a traditional center and had a more fragmented, decentralized structure. The Los Angeles School proposed a representation of postmodern urban planning characterized by random processes and a discontinuous layout. This model symbolizes 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 a city center. 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 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 organization of these clusters in metropolitan Lahore has not been modeled before. While urban plans have shown the location of these clusters often on maps, they have ignored the modelling on their location.

The location of industrial and economic districts has been a challenge taken up by scholars 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 physical space *(Clark et al., 2000)*. These clusters, like many other abstract constructs, have been conceptualized by scholars in different ways *(Martin & Sunley, 2003)*.

As "… geographical concentrations of interconnected companies and institutions in a particular field", these clusters represent a kind of new *[sic]* spatial organizational form" *(Porter, 1998)*. Such areas have been explained through the diamond model illustrating the comparative advantages of certain industries in given regions *(Porter, 1990)*, or core-periphery model[2] to spatially describe the comparative advantage that a metropolitan city has in comparison to its countryside *(Krugman, 1991)*.

This literature investigates questions like: what makes a certain location feasible for the existence of a particular cluster? What are the enabling factors and how can they be enhanced further? And how does a specific location get 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 has 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 co-located in the form of a cluster because of the three types of externalities: (i) shared pool of suppliers and customers; (ii) shared labor 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 illustrating a balance between market and different raw materials; and Edgar Malone Hoover's localization economies explaining the benefits of the existence of many firms in the same industry, got 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 effects of globalization. Regional economists like Walter Isard – through his location theory of explaining places as location of economic activities *(Sforzi & Boix, 2015)*, and Benjamin Chinitz – through his thesis of small suppliers' impact *(Glaeser & Kerr, 2008)* 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 abandon mass production to adopt flexible specialization. Finally, this school of thought advanced via the diamond model[3] 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 the similar industries co-locating as a cluster, Jacobs

[2] 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. This theory was previously suggested by John Friedmann (1972).

[3] 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.

highlighted cases where industries apparently different from each other harnessed themselves via conglomeration. In other words, Jacobs' thesis observed economic diversification in an urban setting while Marshalls' promoted specialization regardless of the location.

A path-dependent account for the evolution of clusters often centers a geographical explanation because this approach takes historical evidence as the base for further developments of industrial clusters *(Martin & Sunley, 2006)*. However, in contrast, development of a cluster has also been documented to have a non-deterministic 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 labor 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 government's vocabulary to negotiate the presence of their businesses *(Haynes, 1991)*.

This literature on the spatial organization of metropolitan cities and the location of economic clusters in them offers points of investigation for this research. Spatial models described earlier to explain the city organization provide a motivation for developing such model for a growing city like Lahore. Morevoer, literature on economic clusters offers many possible insights for such modelling. Historical exploration for a path dependent[4] account of Lahore's industrial clusters is a promising avenue of research. Past research on industrial clusters in Punjab have highlighted that nearly 80% of industry were located within the city boundary or near to one but only 3.5% of them are located within planned industrial zones *(The Urban Unit, 2018)*. However, 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 conducts an analysis of the industrial clusters in Lahore to find a local explanation for the development of these areas.

2.3 Research methodology

2.3.1. Case study research

This section uses a case study research design because of its suitability to the research objective. The emergence of industrial clusters in Pakistani cities is a contemporary phenomenon, most of them are still in the making. This research is focused on the investigation of this contemporary phenomenon in depth. However, this phenomenon needs to be examined within its real-world context. This is because the boundaries between this phenomenon and its context are not clear. For example, development of such clusters of industries has many linkages with other phenomena like infrastructural access and the business links with other production centers. Exploration of such 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 for case study research design was guided by the type of research objective. As already mentioned, this study focused 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 existed in Lahore but were almost entirely ignored by the formal

[4] 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 on the concept in *Martin & Sunley (2006)*.

planning is the gap that this research fills. Such clusters also lack due representation in research so far.

2.3.1 Daroghawala as 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 were complex with their inherent details, and this research could not cover all of them with 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. This research chose one case study – Daroghawala Lahore – as area of inquiry so that phenomenon of industrial clusters could be explored through this case study with enough rigor and depth.

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

Daroghawala can be a key representative case of the phenomenon of industrial cluster in Lahore. The evidence for this can be found through many features found in these industrial clusters during the pilot study phase. Daroghawala exhibited similar features like other industrial clusters as will be explained in coming sections. The case research for Daroghawala was conducted through a mixed methods[5] research methodology.

2.3.2. Methods of analysis

The use of remote sensing technologies[6] 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[7]. Moreover, land use surveys[8] were performed to document the industrial typology with 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 from key stakeholders

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

[6] Remote Sensing Technologies: When satellites use cameras to collect images of the Earth, this is called remote sensing. And 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.

[7] Land Cover Change Analysis: When seen from a satellite's perspective, the image of Earth can generate important information about the cover of land surface. For example, land surface can be covered with thick and dark green color which could denote a forest, or by green color denoting agriculture, or by blue-grayish color denoting water bodies, or by yellow-grayish color 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 cover of land surface over time, like change of agriculture land to the built up area. This analysis is called land over change analysis.

[8] 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, or industry and so on.

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 from such persons who have worked in this area for decades. The interviews transcripts were later coded for analysis to develop a grounded theory for Daroghawala.

The use of grounded theory to understand the built spaces is a recently acclaimed approach *(Clarke et al., 2015)*. This approach is a part of the post-colonial and post-modernist *(Vasudevan & Novoa E, 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 come 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 own way of understanding. The stages of methodology for this section of research is presented in Table 2.

Table 2: 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., 2015)*
4.	Grounded theory for case study	

2.4 Findings and Discussion

2.4.1. Industrial Clusters in Lahore

Pakistan had a little to no industrial base when it became a country in 1947, with only 1% of country's national income being contributed by industries back then *(Ali & Malik, 2009)*. However, the country has slowly seen an increase in industrial activity. Lahore contributing 11.5% of national income currently has a strong industrial base, being the second largest sector of income for the city *(The Size and Growth of the Economy of Lahore, 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, number of establishments in each cluster have been documented alongside the inter quartile range (IQR) of the age of enterprises, and IQR of the area of enterprises in these clusters. Interviews from these clusters highlighted idiosyncratic features of each as explained in the following cluster profiles. We make interpretive arguments about these clusters based on the qualitative analysis of the interviews conducted for cluster profiling.

2.4.1.1. MISRI SHAH

Misri Shah, located near 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 characterized 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, aluminum, and lead.

Initial industrial activity in this area was geared by Batala Engineering Company (BECO) later renamed PECO (Pakistan Engineering Company) in 1970s. BECO was established in 1933 in Batala (a town now in Punjab, India). 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 neighboring cities like Lahore, Faisalabad, and Gujranwala further fueled 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% of Pakistan's iron and related metal scrap is sold and traded in this market. This percentage, however, needs further research evidence 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.

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 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 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% 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.

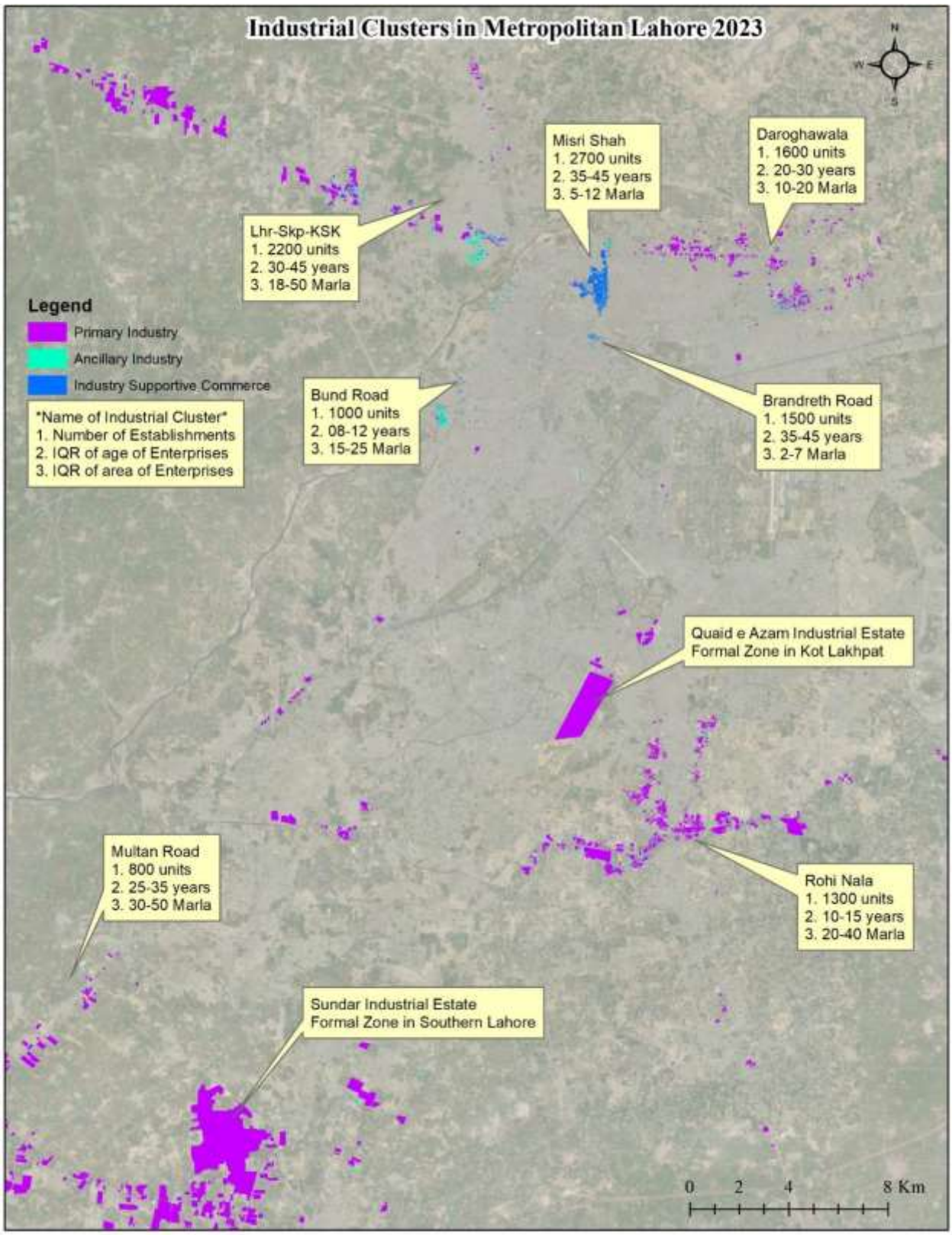


Figure 1: Industrial Clusters in Metropolitan Lahore

The average age of businesses in Misri Shah ranges from 35 to 50 years, with some establishments having been operating 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 like proper roads, drainage systems, and waste management, which can hinder the efficiency of operations. However, despite these challenges, the industrious 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.

2.4.1.2. 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, with the passage of 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 center 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 to 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, majorly around Sarai Sultan and Dil Mohammad Rd. 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 the 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% to 95% 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 modernization 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 organizations also play a vital role in liaising with government authorities and advocating for the needs of the cluster.

2.4.1.3. BUND ROAD

Bund Road Industrial Cluster is a recently developing industrial area located on the northern and northwestern outskirts of Lahore, Pakistan. 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 center of industrial activity. With its strategic location, favorable business environment, and diverse range of industries, Bund Road Industrial Cluster has now become the youngest industrial cluster in the city.

While there are 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 like 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 renowned Urdu Bazaar market of stationery products in Pakistan. Many paper related products are manufactured in this area and traded in Urdu Bazaar.

In terms of leadership within the industrial cluster, there isn't a 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 recognized and powerful associations, this area still has not been through such comparable organization.

Several factors have contributed to the growth and attractiveness of Bund Road Industrial Cluster. Firstly, its location away from the city center 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 bag, 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.

2.4.1.4. LHR-SKP-KSK TRIANGLE INDUSTRIAL CLUSTER

Geographically like an inverted triangle with 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, favorable economic conditions, and a wide range of industries operating within its bounds. Moreover, this area has become a key shifting place of 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 the 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 center. 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 undergo changes in 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 relies 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 presence of other industries easier because of the fringe benefits of access, labor, and services.

2.4.1.5. ROHI NALA

The Rohi Nala Industrial Cluster is a thriving industrial hub located in 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 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% 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 countries like 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.

2.4.1.6. 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. Details on this case study are offered in the following pages. However, there are other industrial clusters in Lahore. For example, 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, chemical, leather and others in this area. The industrial activity from this area is further extended all the way 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, 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 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 small scale like the ones on Gurumangat Road, and industrial areas in Gulshan Ravi and Gujjarpura. However, this study did not focus 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 were in the case of informal clusters which were our focus of research.

2.4.2. Emergence and Growth of Daroghawala as an Industrial Cluster

2.4.2.1. 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 recognized boundary, hence it's 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 Wagha 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 kilometers, 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's more practical to understand its broader, perceived spatial extent (refer to Figure 2).

By analyzing historical land cover changes (refer to Data Source*: Land use surveys (2023)*

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% 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 by authors 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 area 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 upon making of the country. Initial industrialists in this area were those who moved here from other parts of Lahore, or from 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 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 source of metal at 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) the natural gas, water, and electricity while the private companies provide 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 start. Though there were some industrial activities near this area before the decade of 1970s, the key boost came with rolling mills majorly constructed in 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 Lahori 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 profile of Bund Road cluster described above), though far later than Daroghawala.

As found through the temporal land cover change analysis, Daroghawala’s industrial activity had 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[9] with SMEs in Daroghawala asked about the nature of their operations. The data gathered revealed that over 90% of SMEs in Daroghawala were 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[10] of Pakistan's 'Iron & Steel Industries' and 'Automobile Industries'.

This comparison has many implicit interpretations. First, that production in Daroghawala seems to be stable in comparison the national industrial production (see LSMI line in comparison with Daroghawala line in Figure 5). Production of Daroghawala, however, dropped during past 5 years. We think it is because we estimated Daroghawala production based on available data on three time points within an enterprise' 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 research interview (from Nov 2022 to Jun 2023). The currency exchange rate reached 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 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 become available. However, the case may be, future research can explain better.

Correlation matrix (Table 3) between Daroghawala and the national level sectors explain that there is a significant relationship (at p=15%) between Daroghawala and joint production of two sectors at national level: Iron & Steel; and Automobiles. We found that correlation was significant at p=15% also because of recent drop. We ran the correlations excluding recent 5 years and found it significant at p=5%. This correlation, however, does not prove any causality. It, however, gives a hypothesis that Daroghawala is as important industrial cluster in Pakistan's economy that it might be a great estimator to predict national production should causality be proved through future research.

Table 3: 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

[9] Structured Interview: This is a type of survey in which the researcher collects the data by asking standardized 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.

[10] Quantum Index of Large Scale Manufacturing Industries (QIM): 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 year 2005-2006 as the base year. The index value above 100 represents the production more than that was made in the year 2005-2006; and the production less than 100 represents the lower production than that made in the year 2005-2006. The reports on these indices are available on; https://www.pbs.gov.pk/content/qimretrieved on Feb 06th, 2023.

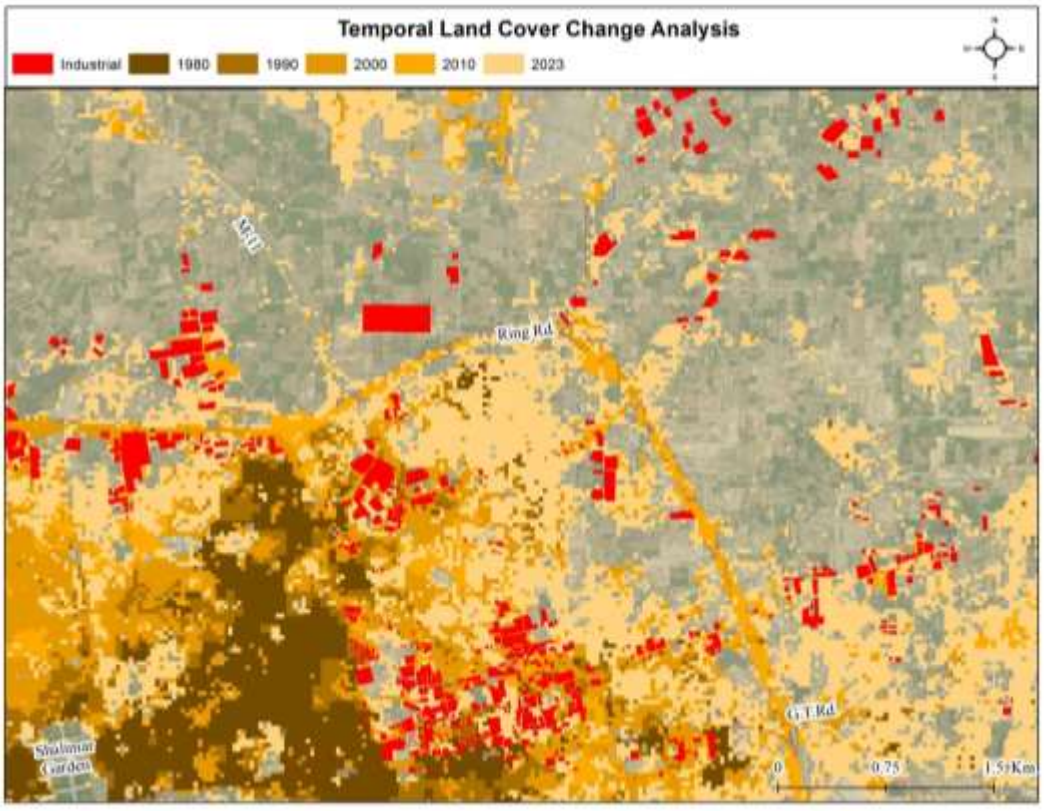
***Correlation is statistically significant at p<0.05* **Correlation is statistically significant at p<0.15*

Data Source: Quantum Index of Large-Scale Manufacturing Index published by Bureau of Statistics Pakistan (2009-2023), and Field Interviews (2023)

Interesting display of trends in Figure 5 can have multiple possible explanation, only to be tested through further research. First that the jump of automobile sector in 2022 might be an anomaly and 2023 numbers might show a decline thus explaining Daroghawala's consistent low; second that Daroghawala might be taking longer to catch up with that pace and might do so in the coming few years; or third that the national automobile sector might be supported by another industrial cluster, yet this third possibility will need other studies to be rejected or proved.

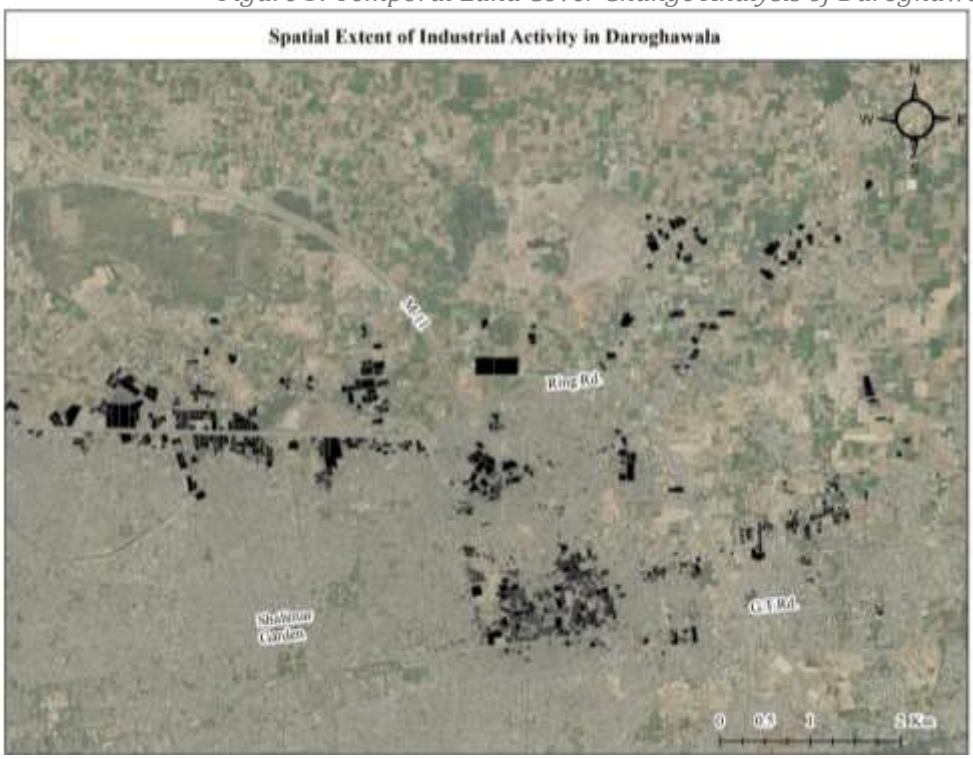
This discussion makes a convincing case for the making of Daroghawala. The area was on the urban edge of a rapidly expanding city, and the country had an increased industrial production in Iron & Steel, and Automobiles which generated enough business for new SMEs to be established. The area was further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

Figure 2: Spatial Extent of Daroghawala as an Industrial Cluster



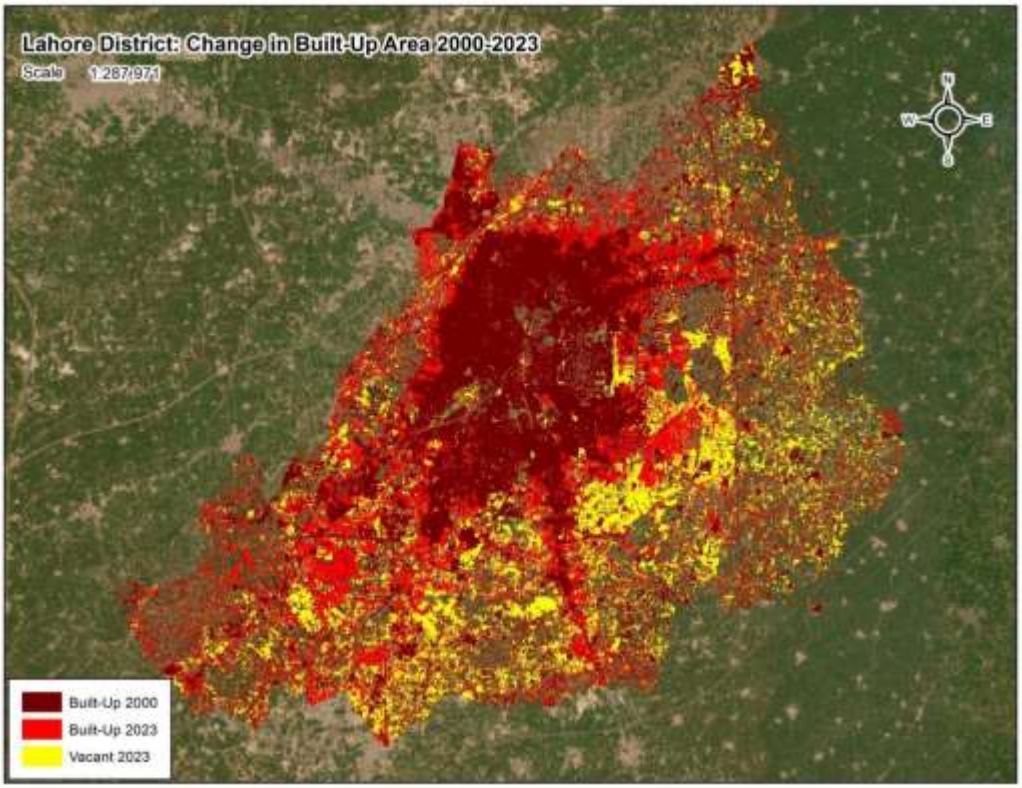
Data Source: Land use surveys (2023)

Figure 3: Temporal Land Cover Change Analysis of Daroghawala



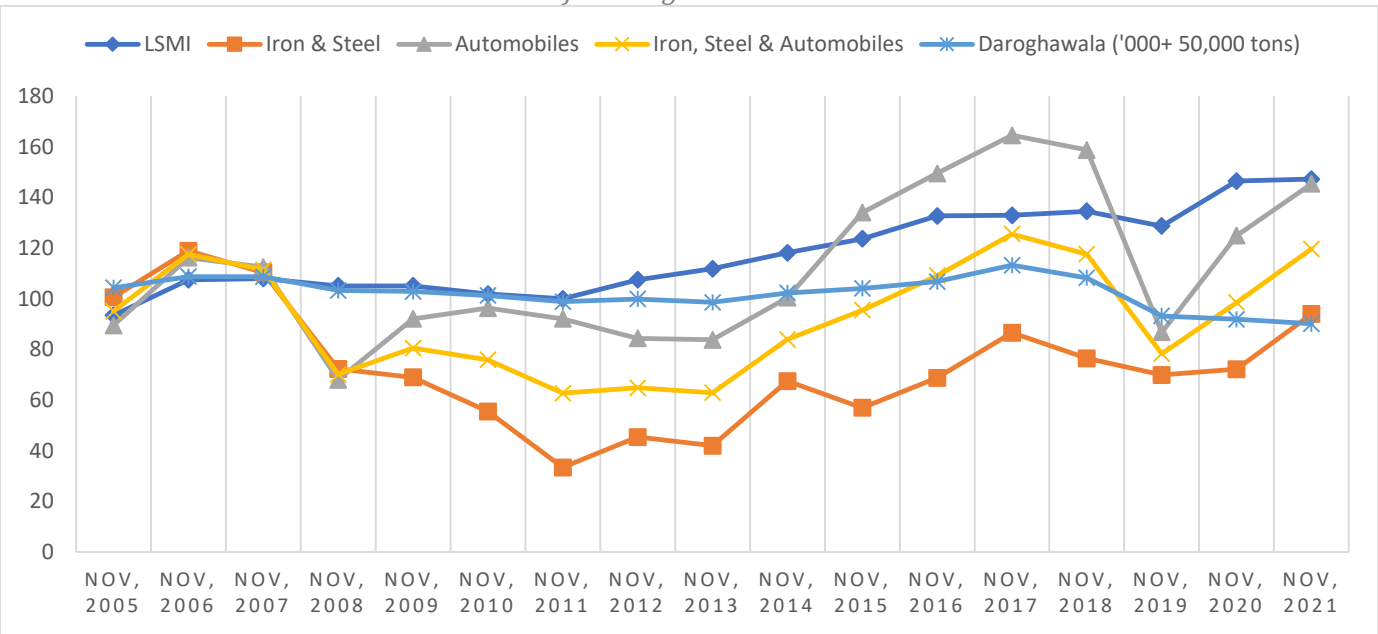
Data Source: Google Earth, and Land use Surveys (2023)

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



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

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



Data Source: Quantum Index of Large Scale Manufacturing published by Bureau of Statistics Pakistan (2009-2023), and Field Interviews (2023)

2.4.2.2. TYPOLOGICAL ANALYSIS OF INDUSTRIES IN DAROGHAWALA

Land use surveys conducted during this research were useful to understand 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 which developed their products independently while others were the units which helped these first type of industries by providing them ancillary support. Accordingly, the industrial ecosystem currently operating in Daroghawala can be explained by the following classification:

Primary Industry: These are the manufacturing industries in Daroghawala and are 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: Rolling Mills; Forging Industries; and Foundry Workshops.

Ancillary Industry: These are the processing setups in Daroghawala which do not necessarily manufacture the product, but rather cut, polish, thread, fabricate, mold, or process it by another way to add value. There are many types of ancillary industries in Daroghawala. Some of these are workshops of: Lathe Machine; Milling Machine; Computer Numerical Control (CNC) Machine; Thread Making Machine; Fabrication Workshop; or Plastic Injection Molding Machine etc.

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 Store; Scrap Store; Molasses Store; Pattern Shop; Hardware Store; Steel Pipe & Rod Store; or Old Machinery Godown (Warehouse), Metallurgical Coke (coal), and Firewood Store etc.

Table 4: Count of the units making up the Industrial Ecosystem in Daroghawala

Classification	Type	No. of Units	Total

Primary Metal Industry	Rolling Mill	334	661
	Foundry Workshop	198	
	Forging Industry	129	
Ancillary Metal Industry	Workshop of Lathe Machine	274	576
	Fabrication Workshop	94	
	Workshop of Milling Machine	65	
	Workshop of Thread Making Machine	41	
	Workshop of CNC	39	
	Electroplating Setup	23	
	Sheet Drawing Setup	20	
	Die Casting Setup	20	
Industry Supporting Commerce	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	
Total		1412	
Non-Metal Industries		283	
Grand Total		1695	

Data Source: Land use surveys (2023)

The land use map of the industrial ecosystem in Daroghawala (refer 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 supportive commerce is concentrated near the core of the cluster, and 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 supportive commerce, and 283 non-metal industries in Daroghawala (Table 4). The total number of enterprises noted during land use surveys as shown in Table 4 are total enterprises in the cluster (including large scale industries). Daroghawala Industry Owners Association (DIOA) claim 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 for its scope on metal ones. Yet non-metal industries in Daroghawala manufactured products of various materials like plastic, glass, polymers, and chemicals etc. These products, however, were often closely related to the metal products in Daroghawala. For example, while metal industries produced building structure products, non-metal industries produced related glass and plastic products. This close interaction of products explained the co-location of non-metal industries with metal dominant Daroghawala. Our investigation into non-metal industries remained at this level, as we focused in detail on the metal industries.

Primary industries in Daroghawala, the foundry, forging, and rolling mill have different processes. The foundry uses a casting process wherein raw metal is melted at high temperatures and then shaped in required products through molds. Likewise, a forging workshop includes space for pre-

heating the metal, which is then shaped through forging machines. Finally, rolling mills have furnace to melt the metal and then shape them in bars and rods etc.

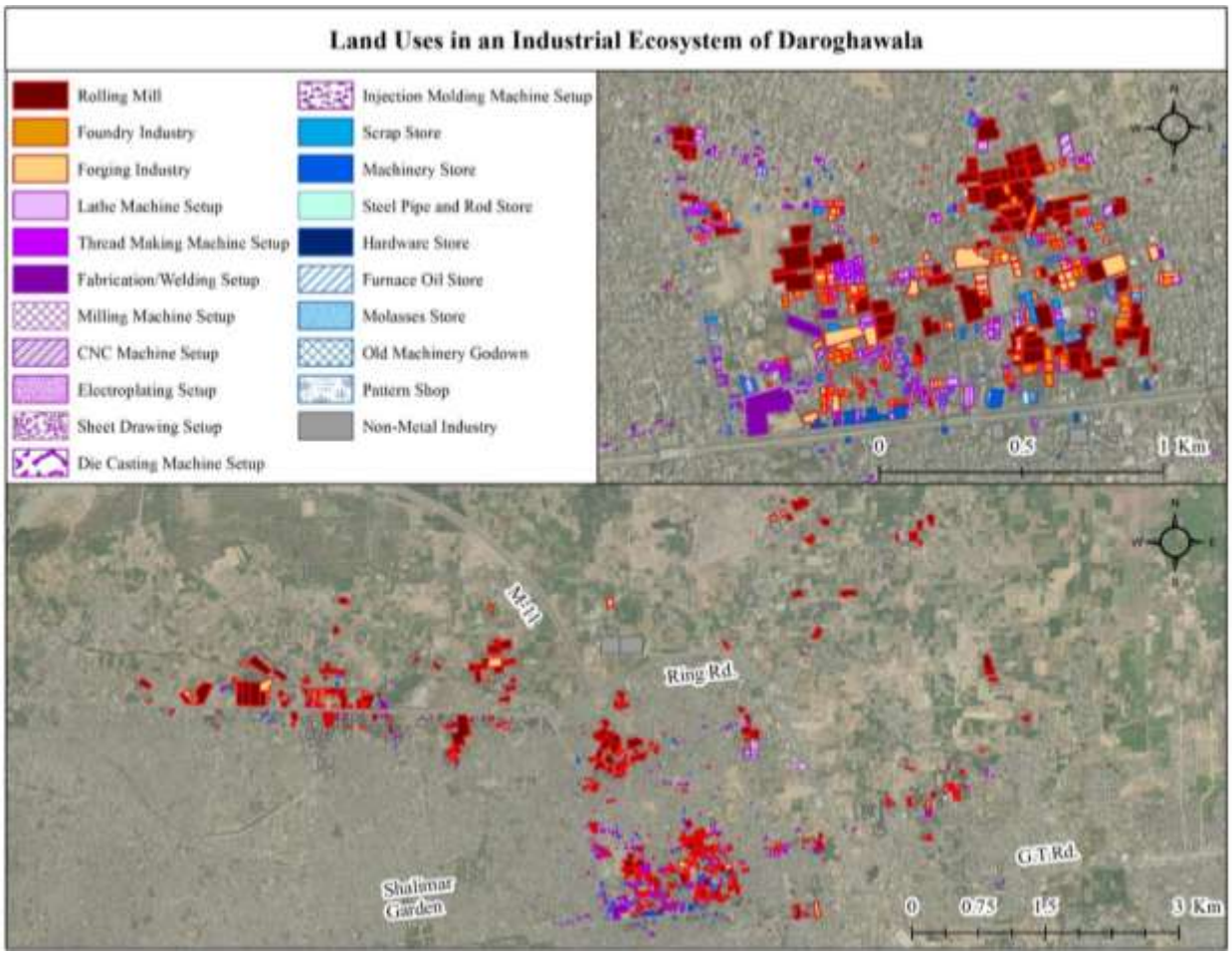
The type of industries existing in Daroghawala can be understood under Pakistan Standard Industrial Classification (PSIC) standardized by Pakistan Bureau of Statistics. Table 5 lists the 3-digit, 4-digit, and 5-digit PSIC industrial coding of the industries in Daroghawala. This categorization with PSIC highlight that industries in Daroghawala (Table 5) are engaged in Manufacture of Basic Iron & Steel, Manufacture of Basic Precious and other Non-Ferrous Metals, Casting of Metals, Manufacture of Structural Metal Products, and Manufacture of other fabricated metal products, and metalworking service activities.

Table 5: 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	
Manufacture of other fabricated metal products, and metalworking service activities	259	2591	25911	Ancillary Metal Industries
		2592	25921	
			25922	
			25923	
			25924	
		2599	25992	
			25993	
			25997	

Data Source: Pakistan Standard Industrial Classification (PSIC), and Field Interviews (2023)

Figure 6: Land Use Map of Industrial Ecosystem in Daroghawala



Data Source: Land use Surveys (2023)

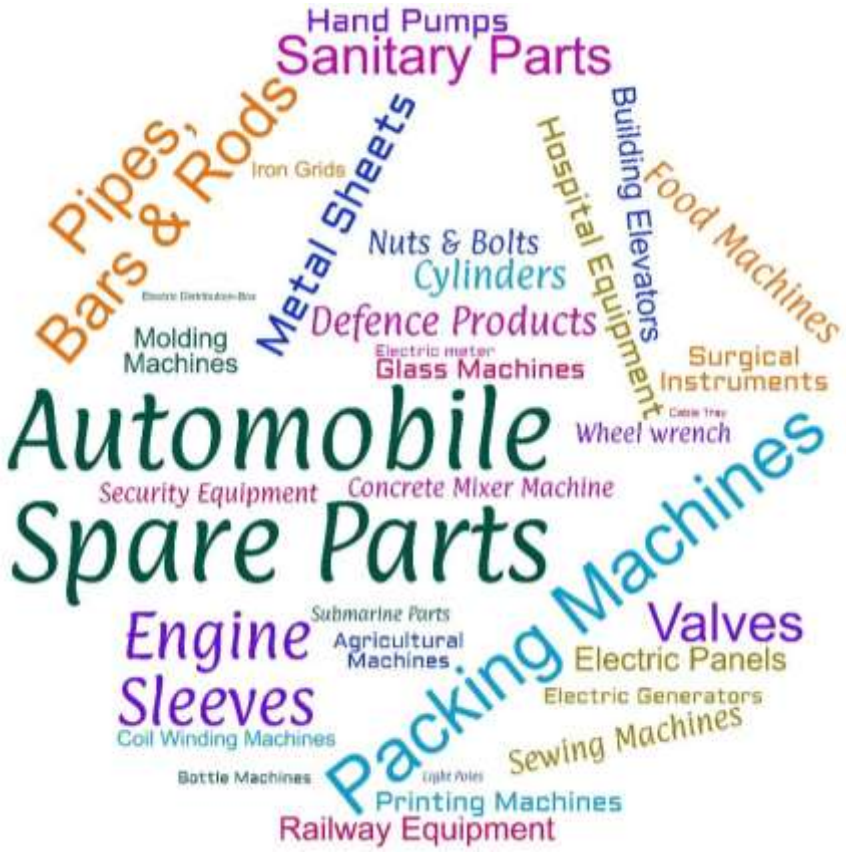
2.4.2.3. PRODUCTS MANUFACTURED IN DAROGHAWALA

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 manufacture of a broad spectrum of metal items. Figures 7-9 were created by coding the qualitative responses from 175 SMEs 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. Hence the larger the text in the figure, the most recurrent was the response in the interviews.

As clear from Figure 7, automobile parts (high-quality grade A for fresh manufacture) 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, defense products, metal valves, cylinders, metal sheets, submarine parts, and more.

The quality of these products is largely contingent on the customer's nature. High-quality products are manufactured when clients are original equipment manufacturer (OEM) firms, like a 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



Data Source: Field Interviews (2023)

2.4.2.4. PROCESS AND METALS IN DAROGHAWALA

Through our 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 6.

Table 6: 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 standardize 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 specialized establishment dedicated to the production of metal castings. The process starts with the melting

		of the metal, followed by its careful pouring into molds. 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 capitalizes on abrasive materials, ensuring the surfaces of metals are rendered smooth and refined.
9.	Tooling	Tooling is about crafting specialized 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 utilized include cast iron, mild steel, stainless steel, and aluminum, while other metals like galvanized iron, brass, copper, zinc, and nickel are incorporated into the production, often combined with other metals.

2.4.2.5. ENTREPRENEURS OF SME

As we scrutinize Daroghawala as an industrial cluster, the study of the entrepreneurs behind these SMEs presents an intriguing subject. By examining their profiles, we can not only identify these entrepreneurs but also understand how they can be further engaged. Our investigation (refer to Figure 9) revealed that most of them have previous experience in similar industries, having worked in roles such as laborer, manager, machinist, mechanic, or engineer. Most possess an academic background up to the diploma or undergraduate level. Many entrepreneurs were also drawn to this industry because they have family members already involved in the business. The major response by the entrepreneurs in Daroghawala expressed their preference for business, thus their industrial enterprise.

Figure 8: Processes (left) and Metals (right) processed in Daroghawala

Data Source: Field Interviews (2023)

Figure 9: Profile of entrepreneurs in Daroghawala

Data Source: Field Interviews (2023)

2.5 Conclusion

This study delved into a hitherto underexplored aspect of Pakistani cities: 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 have 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 organization

of 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 that are typically developed by the state with predefined industrial sectors in mind, Lahore's industrial clusters were established by industrial entrepreneurs in an incremental fashion. This implies that there wasn't any pre-existing 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 the nearby residential areas, reducing commuting times and costs, while commercial activities could evolve to support the 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. 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 surge in the number of vehicles in use nationwide. 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 prior to 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.

Through this section of the report, we have contributed to the spatial organization literature on metropolitan Lahore. 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 case of *(The Urban Unit, 2018)* report which highlighted that around 95% industries were located within 2km of major roads. However, we have also highlighted key new insights like 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 endeavors.

GROWTH OR DECLINE OF SMES

This part of the research investigates the factors affecting the growth of SMEs in the industrial cluster of Daroghawala, Lahore. Using model results, the research posits that the type of manufacturing process and the percentage change in permanent clientage significantly impact industrial production, with growth rates being 18% and 28.5% higher for SMEs adopting semi-digital and digital processes respectively, and a 0.21% increase in growth for each 1% increase in permanent clients. This is consistent with existing literature, but the study also contradicts other studies in some respects. The study finds that loan availability and research expenditure do not significantly impact SMEs growth, possibly due to data limitations and lack of significant variation in these variables. As such, this research suggests a need for future studies to confirm these findings across different industrial sectors and areas. Furthermore, the exploration of factors enabling SMEs to change processes or secure more permanent clients can provide valuable insights for policy development to promote SMEs growth. Regardless, this study offers initial insights into the growth dynamics of SMEs in Daroghawala, indicating the potential benefits of modernizing manufacturing processes and cultivating permanent clients.

3.1 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 number of units in any industrial sector in Punjab. For example, sector of fabricated metals in Punjab is comprised of 99.78% SMEs *(The Urban Unit, 2018)*. Such enterprises become even more significant in the wake of an unstable economy during which persistence of SMEs could be a challenge. Yet the government is simultaneously too limited 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 majorly planned away from the cities, and do not offer the ecosystem that breed and grow 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 research aims to explore and quantify the factors affecting SMEs growth rate over time through hypothesis testing.

SMEs contribute to employment generation at much larger proportions in comparison to the large-scale industries (Punjab Economic Research Institute 2018). This means that encouraging SMEs for a populous country like Pakistan will help reduce unemployment. The success factors of previously developed and growing SMEs could offer insights to support such enterprises. These past SME,

though not developed to the perfect industrial standards, have been generating business and employment opportunities.

3.2 Literature Review

Currently employing 60% of manufacturing sector employment in Punjab, small scale industries can play a key role to resolve unemployment crises *(Punjab Economic Research Institute, 2018)*.

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, literature suggests that more regulatory controls imposed on small and medium industries has inverse impact on their growth in Pakistan *(Khan et al., 2019)*. Scholars have noted that regulations on entry to the industrial sector act as a barrier to industrial developments *(Klapper et al., 2006)*. Accordingly, loose regulatory controls in a city could possibly be one of the encouraging factors for the development of SME.

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, 2020)*. 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 literature. One example is from Japanese model where SSI grow due to subcontracting from large scale industries while the other is Philippine's and Turkish model where growth of SSI is hindered due to linkage with large scale industries that continue the control over the prices and business terms *(Cinar et al., 1988)*. In 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 in 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 the sector supportive government frameworks *(Punjab Economic Research Institute, 2018)*, the underlying assumption that only government driven initiatives can grow SMEs 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 a 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, literature has noted that the emergence of SMEs is a process triggered by the large-scale industries when they sublet some production tasks. As such, most SMEs in developing countries generate their business from large scale industries.

Therefore, literature suggests that having permanent clientage from the 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 consensus among the literature that the SMEs in developing countries should focus on technological innovation for their growth. Technology progress has been documented as the order parameter that dominated 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 the eco-conscious stakeholders if SMEs are integrated into 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 which, the mechanisms to ensure access to funds and credit have been suggested *(Yoshino & Taghizadeh-Hesary, 2016)*. As such, it is suggested that the investment on research and development can bring advancement in SME, and hence growth *(Jamieson et al., 2012)*.

Such literature on the growth or decline of SMEs enlist various contributing factors. Though multiple factors are found from the literature, this research takes up four key factors in the case of developing countries to examine their impacts on the growth or decline of SME. Therefore, the following hypotheses have been formed to be tested in this research:

1. The industrial production change will not be affected, ceteris paribus, by the change in the permanent clientage of SME.

2. The industrial production change will not be affected, ceteris paribus, by the change in maximum loan availability to SME.

3. The industrial production change will not be affected, ceteris paribus, by the change in the annual research expenditure invested by SME.

4. The industrial production change will not be affected, ceteris paribus, by the change in the type of manufacturing process used by SME.

3.3 Research Methodology

This cross-sectional research[11] uses econometric analysis of ordinary least squares regression on the primary collected data. The data was collected through structured interviews as they were the most feasible choice for the data collection. This study required data on set variable 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 allowed the researcher to get comparable responses on set variables.

The sample for this research 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[12] with strata based on type of industrial unit (foundry, casting, rolling etc.). The proportionate number

[11] 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.

[12] Stratified Random Sampling: Amongst the random sampling techniques, this technique takes proportionate number of the 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.

of samples were 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 in this research was the number of total metal SMEs firms in Daroghawala. The land use surveys (explained in the first section of this report) indicated that there were 1237 industries in the area[13]. With N=1237, the required level of precision was chosen to be 93% with 7% error margin, thus calculating the sample size to be 175 industrial units. The selection of interview respondents was a proportionate number of units from each type of industrial activity. Table 7 shows the number of interviews conducted from each type of industry:

Table 7: 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		1237	**175**	14%

Data 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 their data. Since 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 type of Daroghawala, metal manufacturing industries. Hence data for this research was only gathered from Daroghawala based SMEs of metal manufacturing. The development of the causal relationship, as required by this part of the research, essentially required the use of the measurement methods suitable for such analysis. As such, this part of the research was met using econometric models. Multiple linear regression of ordinary least squares was therefore used for the initial model. Instrumental variable was used to address the issue of the endogeneity at the improved model as explained in the coming section.

3.4 Findings and Discussion

SMEs in Daroghawala were interviewed to collect data on multiple quantitative variables. The responses on the quantitative variables were thereafter normalized to make them comparable.

[13] 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 = 1237 SMEs units was used for sample calculation.

Furthermore, the variables for which data was collected in nominal currency values, the corresponding real currency[14] value was assessed using consumer price index[15] per 2015-2016 as the base year. For most of the variables in Table 1, data was directly obtained from field interviews. However, variables ACR and ABV were calculated indirectly by improvising the data obtained from field interviews. ACR was calculated through the initial and current metal weightage processed in each business, while 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 operationalizes the metric of industrial production change through the lens of the Annual Change Ratio (ACR) – a measure representing the yearly change in the quantity (measured in tons) of metal processed by an enterprise monthly. This approach, however, does come with its limitations. For instance, it assumes that industrial growth is primarily driven by the volume of processed metal, thereby disregarding aspects like product quality or profit variations. Despite this limitation, it was deemed the most appropriate metric for this research 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 utilized as a suitable measure for the ACR because owners easily shared the weightage of metal processed in their industry.

ACR data was generated through 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). Yet, the research confronted a significant challenge; 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 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 peaked, 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).

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

$$Real\ Currency = Nominal\ Currency\ \times \frac{deflator_{base}}{deflator_{current}}$$

[15] Consumer Price Index: CPI is a standardized 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 inflation and thus a decrease in 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 2015-2016 fiscal year, available on https://www.sbp.org.pk/ecodata/index2.asp; retrieved on Feb 11th, 2023. The real 2022-2023 currency was calculated per 2015-2016 base year using the following formula:

$$Real\ Currency = Nominal\ Currency\ \times \frac{100}{112.2}$$

The Adjusted Business Volume (ABV), representing the monthly volume of metal processed in each enterprise, was calculated as an average of the enterprise' 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 Annual Change Ratio (ACR).

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

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

3.4.1 Descriptive Statistics

Our descriptive analysis of the diverse variables within Daroghawala's industrial enterprises, despite a few anomalous data points, reveals significant findings about the area's small to medium enterprises (SMEs). These insights, visually represented through a box-and-whisker plot (please see Figure 10 while referring to Table 1 for the units of variables), are derived from a representative sample of SMEs in Daroghawala:

The sample SMEs largely experienced a positive annual business change ratio. This trend is reflected by an interquartile range fluctuating between 0% and +30%. Moreover, consistent with the prior finding of industrial activity in Daroghawala primarily increasing over the last two decades, the SMEs' age in our sample spanned an interquartile range from 08 to 24 years. The number of formal education years of the entrepreneurs in these SMEs had an interquartile range from 0 to 10 years meaning that at least 75% of the entrepreneurs were not graduates.

SMEs of our focus were metal manufacturing and processing industries. The interquartile range concerning the weight of metal processed by these sampled SMEs ranges from 06 to 42 tons of metal monthly. The SMEs' total business capital, evaluated in real Pakistani rupees, displayed an interquartile range extending from 3 to 24 million rupees monthly. Nevertheless, it is crucial to emphasize that this part of the research did not include data from large-scale industries within Daroghawala that surpass this capital range, given our study's concentration on SMEs.

The availability of loans to these SMEs, also measured in real Pakistani rupees, yielded an interquartile range from 1 to 7 million rupees. Nevertheless, 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.

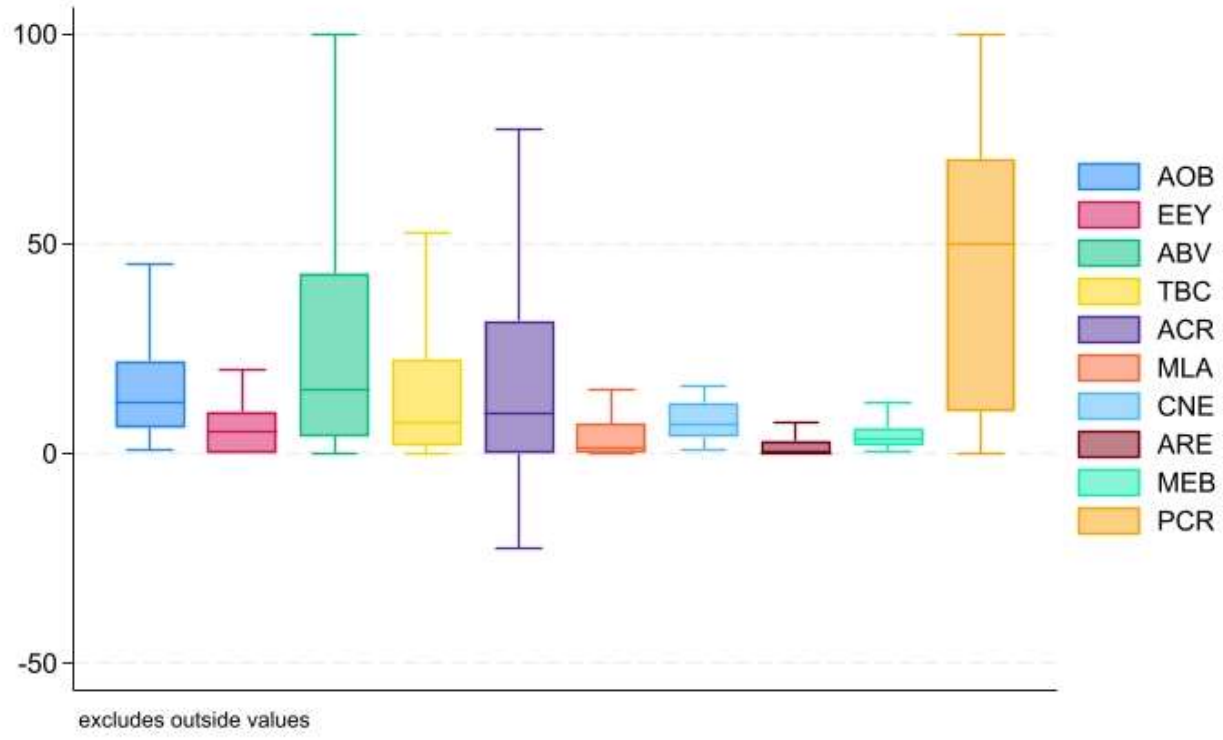
As this part of the study's focus was primarily on SMEs, classified by their employee count, it was anticipated that the current number of employees would not exceed 99. Nonetheless, the interquartile range for employees within Daroghawala's SMEs was found to be between 6 and 15. Moreover, we found that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

It was interesting that most of these industries were using electricity was their source of energy, yet the cost of electricity paid by these industries was a small portion of their business cost. The largest portion of the cost (usually reported between 60 to 75%) was on purchase of raw materials. The electricity bills, however, were small amounts when seen in comparison with the business capital. Interquartile range of monthly electricity bills was between 35,000 and 65,000 real Pakistani rupees.

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

Further, there are inherent differences in the different type and size of industries and the choices that they make. Basic cross tabulations show that percentage of digital and semi digital process adoption is relatively higher in primary industries than in secondary industries. On a similar note, it can be noted that the percentage of high-quality products is 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



Data Source: Field Interviews (2023)

3.4.2 Model and hypothesis testing

The study examined four factors influencing the Annual Change Ratio (ACR): 1. Permanent Client Ratio (PCR); 2. Maximum Loan Availability (MLA); 3. Annual Research Expenditure (ARE); and 4. The Type of Manufacturing Process (TMP) while applying controls on age of business, entrepreneurs'' education years, and type of industry.

Initially the model was sought to develop the multivariate ordinary least squares regression. The model results (refer Table 8) explain the initial possible findings about hypotheses of this research. This initial model applies controls on other important variables like age of industry, entrepreneur's education years, and type of industry. As can be seen from the results of this initial model, two of the

hypotheses are accepted and the other two rejected. The type of manufacturing process, and the change in percentage of permanent clientage seem to affect the change in industrial production while the availability of loan and percentage of research expenditures do not show a significant impact.

The growth in SMEs that adopt a digital manufacturing process is, on average, 24% more than those using conventional process. The growth is 12.3% more if a semi-digital process is adopted. Furthermore, SMEs experience an annual change rate of +0.17 by an increase of 1 in the permanent client ratio. These findings that the SMEs growth is affected by the type of manufacturing process and the permanent clientage are in line with the literature *(Jamieson et al., 2012; Li et al., 2014; Yang et al., 2021)*.

The other two findings that availability of loan, and percentage of research expenditures in case of SMEs in Daroghawala do not affect their growth contradict with the mainstream literature *(Jamieson et al., 2012; Yoshino & Taghizadeh-Hesary, 2016)*. Our understanding is that this contradiction from previous literature is due to the type of data that we were able to collect during this research. As mentioned earlier, most of the SMEs in our case study did not share their data officially ever before. We had to collect this data during the primary interviews, and their responses on the availability of loan, or the expenditure on research were an approximate value that they reported. Such responses by the SMEs were difficult to be triangulated[16] by another data source. Moreover, the responses for these two variables did not have considerable variation as should be clear from Figure 10. Lack of considerable variation in these two variables could also be a reason for their lack of impact in our model. However, when we refer to the literature on the topic in Pakistan, we find the opposite evidence that the declining SMEs depend more on the loans *(Attari & Gulzar, 2016)*. Our study might resonate with this body of literature, a possibility that can be explored through future research.

This initial model offers a first inquiry about the growth of SMEs in Daroghawala and offers insights that such enterprises can be leveraged for growth if they are supported with their client base, and with their type of process. However, as we test for endogeneity, we find that PCR was an endogenous variable. Therefore, our initial finding from the OLS model might not be true unless issue of endogeneity is resolved. We do this through the identification and use of instrumental variable. As should be seen in Table 1, the variable CPD (change in product demand) is an appropriate instrumental variable exogenous to the dependent variable ACR in the structural equation below:

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

Instrumental variable CPD was used to estimate the predicted values of PCR to address the issue of endogeneity in the original structural equation to replace *PCR* with $\widehat{PCR}$ (TMP_Digital was omitted due to collinearity). The updated model results are shown in

Table *9* with significant impact of PCR on ACR. This shows that with these controls and endogeneity issues addressed, PCR affects ACR by +0.56 by an increase of 1 in PCR.

Table 8: Results of multivariate OLS regression

ACR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig

[16] Data Triangulation: It is a type of research method in which 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.

PCR	.171	.06	2.86	.005	.053	.29	***
TMP: base Conventional							
Digital	24.116	5.349	4.51	0.00	13.551	34.681	***
SemiDigital	12.365	4.198	2.95	.004	4.072	20.657	***
MLA	-.034	.019	-1.80	.074	-.072	.003	*
ARE	.007	.138	0.05	.958	-.266	.28	
AOB	-.377	.145	-2.60	.01	-.664	-.09	**
EEY	-.541	.32	-1.69	.093	-1.173	.091	*
TOI: base Anc_DieCasting							
Anc_MillingMachine	9.536	15.311	0.62	.534	-20.705	39.777	
Anc_SheetDrawing	6.479	19.486	0.33	.74	-32.01	44.967	
Anc_Fabrication	14.853	14.552	1.02	.309	-13.889	43.596	
Anc_Electroplating	9.162	14.867	0.62	.539	-20.204	38.528	
Anc_LatheMachine	-1.076	14.44	-0.07	.941	-29.599	27.446	
Anc_ThreadMachine	2.361	16.185	0.15	.884	-29.608	34.33	
Anc_CNC	7.916	17.129	0.46	.645	-25.916	41.748	
Primary_RollingMill	9.766	14.238	0.69	.494	-18.358	37.89	
Primary_Forging	.421	14.565	0.03	.977	-28.347	29.189	
Primary_Foundry	9.056	14.449	0.63	.532	-19.484	37.595	
Constant	5.336	14.511	0.37	.714	-23.326	33.998	

Mean dependent var	17.777	SD dependent var	23.771
R-squared	0.403	Number of obs	175
F-test	6.238	Prob > F	0.000
Akaike crit. (AIC)	1550.285	Bayesian crit. (BIC)	1607.251

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

Data Source: Field Interviews (2023)

Table 9: Results of two stage lease square regression using CPD as instrumental variable for PCR

ACR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
PCR	.562	.155	3.62	0.00	.258	.866	***
MLA	-.032	.02	-1.58	.113	-.073	.008	
ARE	.037	.147	0.25	.799	-.251	.326	
AOB	-.412	.157	-2.62	.009	-.719	-.104	***
EEY	-.55	.345	-1.60	.111	-1.225	.126	
TOI: base Anc_DieCasting							
Anc_MillingMachine	24.352	16.44	1.48	.139	-7.87	56.575	
Anc_SheetDrawing	16.166	21.239	0.76	.447	-25.462	57.793	
Anc_Fabrication	23.606	15.548	1.52	.129	-6.868	54.081	
Anc_Electroplating	22.282	16.439	1.36	.175	-9.938	54.501	
Anc_LatheMachine	8.081	15.548	0.52	.603	-22.392	38.555	
Anc_ThreadMachine	14.788	17.168	0.86	.389	-18.86	48.436	
Anc_CNC	16.273	18.261	0.89	.373	-19.517	52.064	
Primary_RollingMill	18.072	15.165	1.19	.233	-11.65	47.795	
Primary_Forging	10.047	15.59	0.64	.519	-20.509	40.603	
Primary_Foundry	19.46	15.31	1.27	.204	-10.546	49.467	
Constant	-13.467	16.946	-0.79	.427	-46.68	19.746	

Mean dependent var	17.777	SD dependent var	23.771
R-squared	0.230	Number of obs	175
Chi-square	44.408	Prob > chi2	0.000

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

Data Source: Field Interviews (2023)

3.5 Conclusion

It has been established in this research that the SMEs in Daroghawala grow when they change their manufacturing process from conventional to semi-digital or digital process. This is also because updates in the manufacturing process can allow these firms to work for the original equipment manufacturer clients with whom business growth prospects are higher. Furthermore, another effective way for the growth of these establishments is the increase in permanent clientage. Having permanent clients ensures that these firms will remain in business, and this can allow them to take

risks, make investments, and update their system. However, access to credit or the amount spent on research has not significantly affected the growth or decline, mainly due to data limitations of this research.

Findings from this research have two implications for further research and inferences. First, that this is cross-sectional research on one type of industries agglomerated in one industrial cluster. Its findings, therefore, a not entirely generalizable. Therefore, future research should be conducted on other industrial areas and industrial sector to see if results of this study are echoed across the board. If so, an encompassing policy could be prepared based on the generalized findings of this and future research endeavors.

The second line of inquiry pursuant to this research is the exploration of the factors that enable these SMEs to change their process or gain access to more permanent clientage. This endeavor will highlight if there are any structural phenomena that cause this change in enterprises, 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 this future research.

ECONOMIC LINKAGES OF INDUSTRIAL CLUSTER

This part of the research engages with the issue of formality of enterprises in Daroghawala by constructing a transactions table. Findings reveal a high level of intraregional commerce, with notable transactions occurring among businesses within the cluster, signifying a beneficial agglomeration effect. Additionally, the presence of international trade linkages contradicts the conventional dualist view of informality, demonstrating the businesses' integration with formal economic sectors. However, the structuralist perspective of informality finds merit through evidence of industry-to-industry economic flows. A high frequency of metropolitan scale economic activities also indicates strong linkages with other industrial clusters in Lahore city. Findings confirm the importance of these SMEs to the regional and national economy, evidenced by the sizeable tax contributions from various industrial units. Therefore, the study suggests the need for future research to assess transaction flows in similar clusters, to aid in effective policy-making and targeted investment. Despite the informal nature of the SMEs, their economic value, job creation capability, and GDP contributions underscore the necessity for more focused research and policy attention.

4.1 Introduction

Pakistani enterprises majorly operate in modes of economy that are not entirely formal. Contributing to 33.5% of the country's GDP, the informal sector employees 74% of country's workforce *(Pakistan Labor Force Survey, 2011)*. Such a considerable proportion of the country's economy being contributed by the enterprises operating in informal modes needs research attention. 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% were totally informal, 33% had high level of informality, 30% had low level of informality, and only 7% were totally formal *(Williams et al., 2016)*.

Given the prevalence of informally operated industries in urban Pakistani areas, an intriguing scenario is posed. 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 under substandard infrastructure as their monetary potential remains unrecorded.

Globally, contemporary economic development strategies emphasize the measurement of local economies to ensure optimal utilization 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, application of such analysis requires measurements of the economic transactions in and between different economic units. This section of the research 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 majorly informally operating industrial cluster through an innovative, though intuitive, methodology. We argue that economy usually labelled as 'informal' is seldom estimated for its cash flows and transactions due to 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 on transactions will highlight the economic potential of the case study industrial cluster, and the type of economic flows that it garners.

4.2 Literature Review

Given the nature of many SMEs in Pakistani cities often operating in non-formal ways, 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 summarized 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 socio-economic 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: the dualist, the structuralist, and the legalist, but 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 like 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 marginalized 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 conceptualize 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 organize 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 like 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 labor 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 prioritizes the behavior 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., 2021)*. 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 was first coined by *(Haig, 1927)* followed by *(Nussbaum, 1933)*. The basic economic base method was developed by *(Hoyt & Weimer, 1939)* which was 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 the products from the local economy *(Malizia et al., 2021)*. While this assumption could hold true for the small units of the local economy, the exclusive focus on the external demand as the determinant of the regional growth could be limiting when the area of study is of a metropolitan or larger scale.

The application of economic base model, however, requires extensive primary data which needs huge funds and time. To reduce the effort, employment numbers have been 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 location quotient method for this separation. This method worked on the assumption that each region's demand pattern is like that of 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 specialized could be exporters (basic sectors) while the sectors which have lower regional employment than proportionate national number would be importers (non-basic sectors). The application of economic base model is criticized in the literature for its static nature. The

underlying economic pattern keeps changing and so should the multiplier effect[17] 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 *(Kraybill & Dorfman, 1992)* suggested a stochastic[18] intersectoral model for a dynamic multiplier. Furthermore, the economic base model is also criticized 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 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 tool for economic assessment and impact analysis *(Malizia et al., 2021)*. This study develops the transaction table for a local industrial cluster, Daroghawala, in Lahore to highlight nuanced monetary flows in the cluster and engages with the discourse of informality through this assessment.

4.3 Research Methodology

A transaction table[19] 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, and the area was selected as Daroghawala. Therefore, the transaction table was constructed to show the amount of money that each of the industry type spends or earns from similar or different type of industries within Daroghawala. Moreover, this table was further developed to assess the money flowing in and out of Daroghawala through each type of industry. These outside flows were disaggregated at four spatial scales: 1. Metropolitan Lahore; 2. Province Punjab; 3. National scale of Pakistan; 4. Global scale of outside Pakistan. Each pursuant scale showed flows excluding the previous scale.

As already mentioned, economic units selected for this research were the typologies of uses in Daroghawala. Section 1 of this report has mentioned that there were three major typologies: 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 construction of the transaction table. Since the table was to show the amount earned and spent by each type of typology, data was to be collected from each of them separately. The number of enterprises interviewed for this part of the research was therefore more than that of 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 industry supporting commerce. While data for 175 sampled industries (as explained in methodology of section 2) was gathered for this research, an additional 6 large scale primary metal industries and 24 industry supportive

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[17] Multiplier Effect: The multiplier in an economic base model is $1/(1-\alpha)$ where α 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 the employment can be used for this estimation.

[18] Stochastic: This statistical term elaborates 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.

[19] Transactions Table: The concept of transactions table hails from the early works of economist 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.

commerce enterprises were interviewed. This additional number of interviews were the same proportion (14% of the total type of units) as 175 sampled industries of section 2.

To assess the economic flows for each type of industrial typologies, questions were asked about the weightage of metal that they manufactured or processed in a month, and whether 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 us an estimate of the amount that each enterprise spent on raw materials. Follow up questions were asked about the percentage of operating costs for purchasing equipment, machines, utility bills, government fees, labor costs, and such. These percentages in comparison to that of the raw materials with estimated amount generated 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, and to 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 confidentiality of enterprises was not violated, and hence the reporting of the analyzed 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 inference of population level monetary transactions in Daroghawala. Interval estimation for the population mean was estimated through the sample data using the following formula:

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

Where,

$\bar{X} = Sample\ Mean$

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

$\sigma = Sample\ Standard\ Deviation$

$n = Sample\ Number$

Hence, the monetary linkages of Daroghawala had to be 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 select sample, each of the three types of establishments were asked about their monetary flows, but through indirect ways. The indirect approach was adopted because respondents were not comfortable sharing direct monetary value responses. For example, the data was collected about the tons of metal that they process in one month. Further, the type of metal processed was also noted.

B. The amount of metal processed was then multiplied with per ton rate of each type of raw metal. This generated the total cost of raw metal that each SMEs paid.

C. Each SMEs was asked how much percent, 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 material previously estimated, the total business cost was estimated.

D. Each SMEs 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. Further, 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 (i) selling their product to other industries; and (ii) by selling their product directly to the commerce for sale in the market. Further, 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 economic linkages that they ensued.

G. The primary data collected through the sample cases was used to assess the interval estimation for population mean using four steps. Step 01: Estimate Sample Mean and Standard Error - We calculated this from our primary interviews; Step 02: Estimate Population Mean Interval; Step 03: Convert values to millions of Pakistani rupees; and Step 04: Aggregation by multiplying per industry values with the number of industries in each type.

H. Secondary data was also used to complete the cells regarding government fees and imports and exports outside Pakistan 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 10. The table shows annual average cash flows from the data from the last five years.

4.4 Findings and Discussion

The economic linkages of Daroghawala are assessed as can be seen in

Table *11* 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, first column from top to bottom shows 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 earn 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 are considerable amounts of transactions among the enterprises within Daroghawala. This hints that these enterprises benefit from agglomerating together, thus producing business for each other. For example, primary industry purchases goods

worth 792.1 million real rupees from industry supporting commerce annually and sell products worth 986.9 million real rupees to other primary industries within Daroghawala.

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

Furthermore, as can be seen in the transactions table, purchase, and sale of products from enterprises of Daroghawala at different scales shows strongest linkages with metropolitan Lahore in comparison to any other scale. For example, primary industries sell their products worth 5,723.3 million real rupees annually in Lahore which is 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 outside Pakistan as can be seen in Table 10 which enlists the aggregated data for the last six fiscal years. Cumulatively, industries in Daroghawala imported goods worth an average of 383.9 million real rupees and exported products worth an average of 1,227.6 million real rupees annually. 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 marginalized and separated from the formal economic sector and manufacturing. Contrarily, these enterprises purchase and sell products not only locally but also internationally.

Table 10: Monetary Linkages of Daroghawala outside Pakistan (in millions)

	Exports		Imports	
Fiscal Year	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

Data Source: Aggregated Government Data (2023)

The row of government payments shows the amounts that each type of industrial unit pays as tax. For example, primary industries pay tax worth 185 million real rupees annually followed by ancillary industries paying 11.3 million real rupees and industry supporting commerce paying 1.8 million real rupees. 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. There is, however, an inherent attitude observable from this part of the table: the proportionate percentage of tax payments by the primary industries (5.45%) are more than the ancillary industries (0.26%) or the industry supporting commerce (0.28%). This is firstly because primary industries include large scale industries of Daroghawala which mostly

operate more formally thus paying taxes on the documented economy. 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 record of revenues.

Table 11: Annual Economic Linkages of Daroghawala

	Primary Metal Industry	Ancillary Industry	Industry Supporting Commerce	Export (Lahore)	Export (Punjab)	Export (Pakistan)
Primary Metal Industry	986.9	241.3	16.5	5,723.3	4,738.8	965.0
Ancillary Industry	820.2	37.0	26.0	4,452.2	1,397.1	659.8
Industry Supporting Commerce	792.1	712.1	0.8	51.9	1.5	-
Import (Lahore)	2,951.9	796.3	304.2			
Import (Punjab)	2,891.7	669.4	184.2			
Import (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			

Data Source: The data for this table was obtained through a combination of field interviews, and secondary data from trade development authority Pakistan (TDAP), Pakistan Customs Department, 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

4.5 Conclusion

This section of the research has assessed the economic flows between different industrial typologies of Daroghawala. Daroghawala's robust economic landscape, characterized 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 perceives 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 marginalized entity detached from the formal economy. Instead, these international linkages underscore that even if many of Daroghawala's businesses operate outside the fully formalized 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 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 the "basic industry" that exports the 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 emphasizes the role of the means of production for which we find that enterprises of Daroghawala have access to these means.

Moreover, the structuralists scrutinize 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 for this explanation in case of Daroghawala. We find many industry-to-industry economic flows hinting that structure of economic activity in the area and in 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 of this research 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.

REFERENCES

Abbott, A. (2020). The Chicago School and City Planning. *Civic Sociology*, *1*(1), 1–14. https://doi.org/10.1525/001c.14106

Aboelmaged, M. (2018). The drivers of sustainable manufacturing practices in Egyptian SMEs and their impact on competitive capabilities: A PLS-SEM model. *Journal of Cleaner Production*, *175*, 207–221. https://doi.org/10.1016/j.jclepro.2017.12.053

Ahmad, M. N., Shao, Z., Javed, A., Islam, F., Ahmad, H. H., & Aslam, R. W. (2023). The Cellular Automata Approach in Dynamic Modelling of Land Use Change Detection and Future Simulations Based on Remote Sensing Data in Lahore Pakistan. *Photogrammetric Engineering & Remote Sensing*, *89*(1), 47-55(9). https://doi.org/10.14358/PERS.22-0010242

Ajmal, S., Hasan, L., & Ahmad, I. (2020). A Tale of Two Punjabs and CPEC. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3709236

Ali, I., & Malik, A. (2009). The Political Economy of Industrial Development in Pakistan: A Long-Term Perspective. *The Lahore Journal of Economics*, *14*(Special Edition), 29–50. https://doi.org/10.35536/lje.2009.v14.isp.a3

Attari, M. U. Q., & Gulzar, S. (2016). Financing the Formation and Growth of Micro and Small Enterprises in Pakistan: A Demand and supply Analysis. *Pakistan Journal of Social Sciences (PJSS)*, *36*(2), 1153–1161. https://www.researchgate.net/publication/338488176

Babb, L. A. (2013). *Emerald City: The Birth and Evolution of an Indian Gemstone Industry*. State University of New York Press.

Banking on SMEs: Driving Growth, Creating Jobs. (2022).

Brenner, T., & Mühlig, A. (2013). Factors and Mechanisms Causing the Emergence of Local Industrial Clusters: A Summary of 159 Cases. *Regional Studies*, *47*(4), 480–507. https://doi.org/10.1080/00343404.2012.701730

Chen, M. A. (2012). The Informal Economy: Definitions, theories and Policies. In *Women in Informal Employment Globalizing and Organizing* (No. 1). https://doi.org/10.18474/0749-8004-32.1.72

Cinar, E. M., Evcimen, G., & Kaytaz, M. (1988). The Present Day Status of Small-Scale Industries (Sanatkar) in Bursa, Turkey. *International Journal of Middle East Studies*, *20*(3), 287–301.

Clark, G. L., Feldman, M. P., & Gertler, M. S. (Eds.). (2000). *The Oxford Handbook of Economic Geography* (1st ed.). Oxford University Press. https://doi.org/10.2307/4140815

Clarke, A. E., Friese, C., & Washburn, R. S. (Eds.). (2015). *Situational Analysis in Practice: Mapping Research with Grounded Theory*. Left Coast Press, Inc.

Cronon, W. (1991). *Nature's metropolis: Chicago and the Great West* (1st ed.). W. W. Norton & Company.

Dar, M. S., Ahmed, S., & Raziq, A. (2017). Small and Medium-Size Enterprises in Pakistan: Definition and Critical Issues. *Pakistan Business Review*, 46–70.

Dear, M. (2003). The los angeles school of urbanism: An intellectual history. *Urban Geography*, *24*(6), 493–509. https://doi.org/10.2747/0272-3638.24.6.493

Delgado, M., Porter, M. E., & Stern, S. (2014). Clusters, convergence, and economic performance. *Research Policy*, *43*(10), 1785–1799. https://doi.org/10.1016/j.respol.2014.05.007

Dou, Z., Wu, B., Sun, Y., & Wang, T. (2021). The competitiveness of manufacturing and its driving factors: A case study of g20 participating countries. *Sustainability (Switzerland)*, *13*(3), 1–17. https://doi.org/10.3390/su13031143

Drucker, J. (2015). Economic Impact Analysis amid Rapid Change: Challenges, Strategies, and Examples from Defense Communities. *Journal of Planning Education and Research*, *35*(4), 401–418. https://doi.org/10.1177/0739456X15586626

Eurostat. (n.d.). *Small and Medium Enterprises*. Retrieved July 16, 2023, from https://ec.europa.eu/eurostat/web/structural-business-statistics/information-on-data/small-and-medium-sized-enterprises#:~:text=Small and medium-sized enterprises (SMEs) are often referred,employing less than 250 persons.

Farness, D. H. (1989). Detecting the Economic Base: New Challenges. *International Regional Science Review*, *12*(3), 319–328.

Frey, D. E. (1989). A Structural Approach to the Economic Base Multiplier Author(s): *Land Economics*, *65*(4), 352–358.

Gandy, M. (2002). *Concrete and Clay: Reworking Nature in New York City*. Massachusetts Institute of Technology.

García, I. (2019). Human Ecology and Its Influence in Urban Theory and Housing Policy in the United States. *Urban Science*, *3*(56). https://doi.org/10.3390/urbansci3020056

Glaeser, E. L., & Kerr, W. R. (2008). Local Industrial Conditions and Entrepreneurship: How much of the Spatial Distribution can we explain? *Center for Economic Studies*, *CES 08-37*.

Haig, R. M. (1927). *Regional Survey of New York and its Environs*.

Hameed, R., & Nadeem, O. (2006). Challenges of Implementing Urban Master Plans: The Lahore Experience. *World Academy of Science, Engineering and Technology*, *24*, 101–108. https://doi.org/ISSN 1307-6884

Harper, J. D. (1981). *Small Scale Foundries for Developing Countries: A Guide to Process Selection*. An Intermediate Technology Publication.

Haynes, D. E. (1991). *Rhetoric and Ritual in Colonial India: The Shaping of a Public Culture in Surat City, 1852-1928.* University of California Press.

Haynes, D. E. (2012). Small Town Capitalism in Western India: Artisans, Merchants and the Making of the Informal Economy, 1870-1960. In *Small Town Capitalism in Western India*. Cambridge University Press.

Hoyt, H. (1954). Homer Hoyt on Development of Economic Base Concept. *Land Economics*, *30*(2), 182. https://doi.org/10.2307/3144940

Hoyt, H. (1961). Utility of Economic Base Method in Calculating Urban Growth. *Land Economics*, *37*, 51–58. https://doi.org/https://doi.org/10.2307/3159349

Hoyt, H., & Weimer, A. (1939). *Principles of Urban Real Estate*. The Ronal Press Company.

Hull, M. S. (2012). *Government of Paper: The Materiality of Bureaucracy in Urban Pakistan*. University of California Press. https://doi.org/10.1525/california/9780520272149.001.0001

Hussain, Z., & Nadeem, O. (2021). The nexus between growth strategies of master plans and spatial dynamics of a metropolitan city: The case of Lahore, Pakistan. *Land Use Policy*, *109*(2020). https://doi.org/10.1016/j.landusepol.2021.105609

Isran, M. A., Siddiki, S. N., Kumar, M., & Zaidi, E. Z. (2019). CPEC: Threat or Opportunity Protecting Local Industry through Infant Industry Theory Framework. *Asian Social Science*, *15*(10), 104. https://doi.org/10.5539/ass.v15n10p104

Jamieson, D., Fettiplace, S., York, C., Lambourne, E., Braidford, P., & Stone, I. (2012). *Large Businesses and SMEs: Exploring how SMEs interact with large businesses*.

Javed, N., & Riaz, S. (2020). Issue in Urban Planning and Policy: The Case Study of Lahore, Pakistan. In B. Dahiya & A. Das (Eds.), *New Urban Agenda in Asia-Pacific* (pp. 117–162). Springer. https://doi.org/https://doi.org/10.1007/978-981-13-6709-0 Library

Khan, N. R., Raziq, A., & Ghouri, A. M. (2019). Strategic Human Resource Management and Organizational Competitiveness in SMEs of Pakistan: Moderation Role of Regulatory Environment and Industry Characteristics. *Journal of Business & Ecnomics*, *11*(2), 51–73.

Klapper, L., Laeven, L., & Rajan, R. (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, *82*(3), 591–629. https://doi.org/10.1016/j.jfineco.2005.09.006

Kraybill, D. S., & Dorfman, J. H. (1992). a Dynamic Intrsectoral, Model of Regional Economic Growth. *Journal of Regional Science*, *32*(1), 1–17. https://doi.org/10.1111/j.1467-9787.1992.tb00165.x

Krugman, P. (1991). *Geography and Trade*. MIT Press.

Lesage, J. P., & Reed, J. D. (1989). The dynamic relationship between export, local, and total area employment. *Regional Science and Urban Economics*, *19*(4), 615–636. https://doi.org/10.1016/0166-0462(89)90023-9

Levy, J. M. (2017). *Contemporary Urban Planning* (11th ed.). Routledge. https://doi.org/10.4324/9781315664453

Li, Y., Li, Y., Zhao, Y., & Wang, F. (2014). Which factor dominates the industry evolution? A synergy analysis based on china's ICT industry. *Engineering Economics*, *25*(3), 273–282. https://doi.org/10.5755/j01.ee.25.3.5823

Malizia, E., Feser, E., Renski, H., & Drucker, J. (2021). *Understanding Local Economic Development*. Routledge.

Martin, R., & Sunley, P. (2003). Deconstructing clusters. *Journal of Economic Geography*, *3*(1), 5–35.

Martin, R., & Sunley, P. (2006). Path dependence and regional economic evolution. *Journal of Economic Geography*, *6*(4), 395–437. https://doi.org/10.1093/jeg/lbl012

McCartney, M. (2020). The China-Pakistan Economic Corridor (CPEC): Infrastructure, Social Savings, Spillovers, and Economic Growth in Pakistan. *Eurasian Geography and Economics*, *00*(00), 1–32. https://doi.org/10.1080/15387216.2020.1836986

Menzel, M. P., & Fornahl, D. (2009). Cluster life cycles-dimensions and rationales of cluster evolution. *Industrial and Corporate Change*, *19*(1), 205–238. https://doi.org/10.1093/icc/dtp036

Mitra, A., Sharma, C., & Veganzones-Varoudakis, M. A. (2012). Estimating impact of infrastructure on productivity and efficiency of indian manufacturing. *Applied Economics Letters*, *19*(8), 779–783. https://doi.org/10.1080/13504851.2011.603687

Norton, R. D. (1992). Agglomeration and Competitiveness: From Marshall to Chinitz. *1Urban Studies*, *29*(2), 155–170.

Nussbaum, F. L. (1933). *A History of the Economic Institutions of Modern Europe*. F. S. Crofts & Company.

Pakistan Bureau of Statistics. (2017). *Provisional Census Results - 2017*.

Pakistan Labor Force Survey. (2011).

Porter, M. E. (1990). *The Competitive Advantage of Nations*. The Free Press.

Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*, *76*(6), 77–90.

Potts, D. (2008). The urban informal sector in sub-Saharan Africa: From bad to good (and back again?). *Development Southern Africa*, *25*(2), 151–167. https://doi.org/10.1080/03768350802090527

Punjab Economic Research Institute. (2018). *Situational Analysis of Small Scale Industry in Punjab*.

Punjab Planning and Development Board. (2019). *Punjab Growth Strategy 2023*.

Rahman, S. M. T., & Kabir, A. (2019). Factors influencing location choice and cluster pattern of manufacturing small and medium enterprises in cities: evidence from Khulna City of Bangladesh. *Journal of Global Entrepreneurship Research*, *9*(1). https://doi.org/10.1186/s40497-019-0187-x

Sforzi, F., & Boix, R. (2015). What about Industrial District(s) in Regional Science? *Journal of Regional Research*, *32*, 61–73.

Shaw, A. (1990). Linkages of Large , Small and Informal Sector Industries. *Economic and Political Weekly*, *25*(7/8).

Singh, R. K., Garg, S. K., & Deshmukh, S. G. (2010). Strategy development by small scale industries in India. *Industrial Management & Data Systems*, *110*(7), 1073–1093. https://doi.org/10.1108/02635571011069112

Speldekamp, D., Saka-Helmhout, A., & Knoben, J. (2020). Reconciling Perspectives on Clusters: An Integrative Review and Research Agenda. *International Journal of Management Reviews*, *22*(1), 75–98. https://doi.org/10.1111/ijmr.12216

The Size and Growth of the Economy of Lahore. (2016).

The Urban Unit. (2018). Industrial Development. In *Punjab Spatial Strategy*.

Thulare, M. H., Moyo, I., & Xulu, S. (2021). Systematic review of informal urban economies. *Sustainability (Switzerland)*, *13*(20), 1–18. https://doi.org/10.3390/su132011414

Tiebout, C. M. (1962). *The Community Economic Base Study*. Committee for Economic Development.

Vasudevan, R., & Novoa E, M. (2022). Pluriversal planning scholarship: Embracing multiplicity and situated knowledges in community-based approaches. *Planning Theory*, *21*(1), 77–100. https://doi.org/10.1177/14730952211000384

Williams, C. C., Shahid, M. S., & Martínez, A. (2016). Determinants of the Level of Informality of Informal Micro-Enterprises: Some Evidence from the City of Lahore, Pakistan. *World Development*, *84*, 312–325. https://doi.org/10.1016/j.worlddev.2015.09.003

Yamane, T. (1967). *Statistics, An Introductory Analysis*. Harper and Row.

Yang, F., Sun, Y., Zhang, Y., & Wang, T. (2021). Factors affecting the manufacturing industry transformation and upgrading: A case study of guangdong–hong kong–macao greater bay area. *International Journal of Environmental Research and Public Health*, *18*(13). https://doi.org/10.3390/ijerph18137157

Yin, R. K. (2014). *Case Study Research: Design and Methods* (5th ed.). SAGE Publications Inc.

Yoshino, N., & Taghizadeh-Hesary, F. (2016). Major Challenges Facing Small and Medium-Sized Enterprises in Asia and Solutions for Mitigating Them. In *ADBI Working Paper Series* (Issue 564). https://doi.org/10.2139/ssrn.2766242