Journal of Public Policy Practitioners (JPPP)
Volume 4 Issue 1, Spring 2025
ISSN$_{(P)}$: 2959-2194, ISSN$_{(E)}$: 2959-2208
Homepage: https://journals.umt.edu.pk/index.php/jppp



Article QR



Title: **Prospects of Employment Generation & Industrial Production: A Study of Small-Scale Industries in Pakistan**

Author (s): Naveed ul Haq[1], and Muhammad Kashif Nazir[2]
Affiliation(s): [1]University of Management and Technology, Lahore, Pakistan,
[2]Punjab Small Industries Corporation, Lahore, Pakistan

DOI: https://doi.org/10.32350/jppp.41.05
History: Received: May 23, 2024, Revised: June 17, 2025, Accepted: June 22, 2025, Published: June 30, 2025
Citation: Haq, N. U., & Nazir, M. K. (2025). Prospects of employment generation & industrial production: A study of small-scale industries in Pakistan. *Journal of Public Policy Practitioners*, *4*(1), 87–112. https://doi.org/10.32350/jppp.41.05

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Conflict of Interest: Author(s) declared no conflict of interest

A publication of
School of Governance and Society
University of Management and Technology, Lahore, Pakistan

Prospects of Employment Generation and Industrial Production: A Study of Small-Scale Industries in Pakistan

Naveed ul Haq[1*] and Muhammad Kashif Nazir[2]

[1]University of Management and Technology, Lahore, Pakistan
[2]Punjab Small Industries Corporation, Lahore, Pakistan

Abstract

The industrial sector is of great importance to the development of a country. Historically, countries with strong industrial sectors have experienced greater economic growth and development. In Pakistan, Punjab has done remarkably well in agriculture and has also made significant progress in industrialization by developing small, medium, and large-scale industries. Among these sectors, small-scale industries (SSIs) are pivotal in the overall added industrial value and employment generation. The significance of this sector can be assessed from the fact that it alone absorbs nearly 60% of the employment of the industrial sector and contributes about 58% of the overall industrial production of Punjab. In this regard, the present study examines the determinants of employment and industrial production in small-scale industries in Punjab, Pakistan. The study employed the firm's level, cross-sectional data collected from a census of small and cottage industries of Punjab, carried out by Punjab Small Industries Corporation in collaboration with the Bureau of Statistics, Punjab, in the 36 districts of Punjab during 2011-13. To estimate the determinants of employment and industrial production, the two-stage least squares (2SLS) regression analysis and structural equation modelling (SEM) analysis techniques have been used. The empirical findings are beneficial in identifying the significance of each determinant for better industrial production and employment generation in Punjab. Moreover, the policy implications have also been suggested based on empirical findings.

***Keywords*:** employment generation, industrial production, small scale industries, Punjab, Pakistan, 2SLS regression

Introduction

The growth of the industrial sector represents the development level of a country. There is no doubt that the strong industrial sector of a country leads to development and economic growth. It also plays a vital role in

*Corresponding Author: naveed.haq@umt.edu.pk

employment generation and value addition in the economy. This sector is mainly bifurcated into Large, Medium and Small-Scale Industries. Most of attention is directed towards large scale industry, as it makes a massive contribution to the overall industrial sector and the Gross Domestic Product (GDP) of a country. In Pakistan, large scale industries account for 80% share in the overall industrial sector and 10.5% in the GDP of the country. But the importance of small-scale industries (SSIs) cannot be ignored as this sector reflects a massive support in the economy in terms of employment generation, provision of goods at the domestic level, regional development, overall industrial development, and unbiased income distribution. The small-scale industries have a 14% share in the overall industrial sector and 1.88% in the GDP of Pakistan (Government of Pakistan, 2018).

Historically, Pakistan has been considered an Agrarian country, because since the inception of Pakistan, the industrial sector has not significantly developed, and the economy was heavily dependent on the agriculture sector. The initial state of the industrial sector was disappointing as out of 955 industries, only 34 were in Pakistan, while the rest were in India. During 1949-50, the contribution of the Agriculture sector was 53% while the industrial sector contributed only 9% in the GDP of Pakistan, and among this said contribution of the industrial sector, the large-scale industries contributed 2.2% share while the small-scale industries had the share of 5.8% (Khan, 2018).

The small-scale industries (SSIs) hold significant importance in terms of overall value addition and employment generation in the Region. It not only provides jobs but also produces a diverse range of goods for both domestic and international markets. Moreover, this sector can also survive in the competitive market as it produces goods with low intensity of capital and can engage family members and a part-time labor force for production. The development and growth of the small-scale industries can be assessed through their contribution to GDP as well as the annual growth rate of this sector. During the 1990s, the overall contribution of the Industrial sector to GDP was significant, with a 17.1% share. Among these contributions, the Large Scale Industries (LGI) had a share of 12.1% and the SCI contributed 5.0% in the sectoral share (Pakistan Bureau of Statistics, 2017).

Emergence of Small Industries Corporations

In the first five-year plan, the Government of Pakistan introduced significant measures for industrial development and for the creation of small industries corporations. While the overall manufacturing sector was undertaken by the Pakistan Industrial Development Corporation (PIDC), the small-scale sector was deliberately handed over at the provincial level to be managed by small industries corporations in 1972. As a result, the Punjab Small Industries Corporation (PSIC) and Sindh Small Industries Corporation (SSIC) were developed for promoting small-scale industries in Punjab and Sindh, respectively. In North West Frontier Pakistan (NWFP), the Sarhad Industrial Development Board (SIDB) and in Baluchistan, the Department of Industries took responsibilities for promotion of small-scale industries (Junejo & Chand, 2008).

Definitions of Small-Scale Industries around the World

The small-scale industries are mainly defined as businesses established on a smaller scale, including small plant size, less labor, and relatively modest investment requirements. Moreover, these enterprises also involve family participation. In this sector, the utilization of capital in terms of physical and human resources is more effective than that of large-scale industries. It is important to note, however, that the definition of small-scale industry also varies from region to region. Moreover, in order to define the small-scale industries, different countries used distinguishing criteria to define the said sector according to their economic, social and political environment.

In this regard, most countries used the criteria of employment engaged in the small-scale industries as the definition of this industry because this sector has been taken as a labor-intensive sector. The definitions of small firms, along with base criteria that have been used around the world, have also been compiled by the author and presented in Table 1.

Table 1

Definitions of Small Firms around the World

Country	Criteria	Definition of Small Firm
Bangladesh	Employment	6-50 Employees
Bahrain	Employment & Capital	Employees <40, Annual Turnover< BHD 200,000

Country	Criteria	Definition of Small Firm
Brunei	Employment	1-9 Employees
China	Employment & Capital	Employees <300, Total Assets < ¥ 40 million, Business Revenue <¥ 30 million
India	Capital	Up to Rs. 50 million
Indonesia	Employment	5-19 employees
Japan	Employment	1-20 employees
Malaysia	Employment & Capital	5-50 Employees, annual sales turnover is b/w RM 250,000-RM 10 million

Note. Source: (State Bank of Pakistan, 2016; World Bank, n.d.)

Definitions of Small-Scale Industries in Pakistan.

Small-scale firms in Pakistan's economy are considered as the informal sector, which refers to small-scale units. However, there is no single universally accepted definition of small-scale industries (SSIs) in the country. Moreover, the different criteria have also been used by different organizations in Pakistan to define SSI. Due to the non-availability of a single definition of SSIs, it is very hard to hit the target firm regarding growth and development. Many organizations took steps to define small firms, but there is apparent variation in defining SSIs, as most of the definitions were generated for some kind of specific program and vision.

Table 2

Definitions of Small-Scale Industries in Pakistan

Institution	Criteria	Definition of Small Firm
SME Bank	Employment & Capital	Employees up to 50, Annual Sales Turnover up to Rs.150 million
Pakistan Bureau of Statistic	Employment	Employees <10
State Bank of Pakistan	Employment & Capital	Employees up to 20, annual sales turnover up to Rs. 75 million
Punjab Industries Department	Capital	Fixed assets with Rs. 10 million excluding cost of land

Institution	Criteria	Definition of Small Firm
Punjab Small Industries Corporation	Capital	Fixed assets with Rs. 20 million excluding cost of land
SMEDA	Employment & Capital	Employees 10-35, Assets up to 20 million
Sindh Industries Department	Capital	Capital investment less than Rs.10 million
Pakistan Tax Ordinance (2005)	Capital	Less than 25 million

Note. Source: (State Bank of Pakistan, 2016)

Table 2 represents the definitions of small-scale industries developed by different institutions in Pakistan. The definitions have been established in terms of the number of employees engaged and the total assets or annual turnover of firms. None of the above definitions is on one page; each definition represents the consequences of a particular vision. From the all said discussion, it has been concluded that apart from the size of firms, there is a dire need to establish a single definition to categorize the industrial segment of the region.

Overview of Small-Scale Industries in Punjab

Punjab is the largest province of Pakistan in terms of GDP contribution and population, as the said region consists of 36 districts and has more than 50 thousand industrial units (Government of Punjab, n.d.a, n.d.b). As per the population census, 2017, the population of Punjab has been recorded as 110 million, which is 53% of the total population of Pakistan (Pakistan Bureau of Statistics, 2017). As far as the contribution of GDP is concerned, Punjab has a share of 57% in the GDP of Pakistan (Government of Pakistan, 2018).

Punjab is also facing a severe economic crash towards employment creation and economic growth. Moreover, the figure of 60% employment involved in the manufacturing sector of Punjab is created by small-scale industries, which shows the scope of employment creation by utilizing less capital. The small-scale industries account for the majority share of the employment, economic growth and industrialization in the developing countries (Harris & Gibson, 2006).

Punjab is the largest province of Pakistan in terms of population. As per the population census, 2017, the population of Punjab recorded 110 million, which is 53% of the total population (Pakistan Bureau of Statistics, 2017). According to the Punjab Bureau of Statistics, among the total employment of Punjab the 16.5% persons are engaged in the industrial sector of Punjab. As far as the employment related to this sector is concerned, there is plenty of contribution of small-scale industries towards employment generation in Punjab. The employment share of SSIs in the manufacturing sector is recorded as 60% (Mujaddad, 2017).

Punjab has not only performed remarkably well in the field of Agriculture but also has made significant progress in industrialization. Small Scale Industries (SSIs) are a vibrant sector in terms of employment generation and their contribution towards overall industrial output. The involvement of 60% industrial employment in Punjab in Small Scale Industries witnessed the significance of the said sector. In this regard, the employability of skilled, semi-skilled & others and local manufacturing/production have become major challenges for countries like Pakistan. There is a dire need to identify major determinants of Employment and Production in SSIs in Punjab to meet such challenges. Through this study, an attempt has been made to address the above-mentioned challenges for better output and future policy making. The present study has three main objectives as stated hereunder: -

- To determine the major determinants of production in Small Scale Industries (SSIs) in Punjab.
- To explore the prospects of employment within Small Scale Industries (SSIs).
- To present policy suggestions/recommendations for the growth and development of Small Scale Industries (SSIs).

Literature Review

This study highlighted the poor performance of Small-Scale Industries in terms of growth, established in Punjab, India. In this regard, a descriptive analysis has been presented regarding growth and the obstacles faced by this sector. The authors also pointed out that the SSI is a labour-intensive sector and does not require huge capital or investment for its survival. However, for achieving a higher growth rate, there is a need to address the

issues faced by this sector regarding the shortage of raw material, power problems, high tax rate, research and innovation, and the use of old technology. They concluded that the growth of small-scale industries is not possible without the elimination of the said problems (Singh & Shekhar, 2015).

The present research examined the prospects of small-scale industries in Punjab and reported that there are 200,000 small-scale units operating in the province, possessing ample potential in terms of employment generation and contribution towards industrial production. The author mainly highlighted that this sector is badly affected by the law-and-order situation in the region, due to which many units were shifted or closed. The government also introduced many incentives to promote SSIs, but the response was not as encouraging as was expected. Accordingly, the author found that Punjab is not only well in the agriculture sector but also plays a vibrant role in the industrial sector (Gupta & Aggarwal, 2016)

The determinants of industrial production in Syria have been examined in the paper. In this regard, the time series data has been taken to estimate the industrial production, as the dependent variable, and gross fixed capital formation, oil prices, manufacturing exports, population growth, and agriculture output as interdependent variables. In this regard, the author estimated that agricultural output has a great positive effect on industrial production; moreover, population growth, manufacturing exports and capital formation are also positively related to industrial output. On the other hand, oil prices are negatively related to the dependent variable (Mohsen et al., 2015)**.**

The author pointed out that it is very hard to ignore the importance of Small-Scale Industries to the economy, as this sector provides employment opportunities to a large number of workers with less technical skill, and has better linkages with the other sectors of the economy. The importance of this sector has been highlighted at several stages. In this regard, the government of Pakistan has provided many incentives to small scale sector, on the other hand the establishment of Small Industries Corporations in Sindh and Punjab, Small Industries Board and Small Industries Directorate in NWFP and Baluchistan respectively showed the intention of government for the promotion of this sector (Malik & Cheema, 1986).

The growth and expansion of small-scale industries generate more employment opportunities in the Region. In this regard, the base year data of the manufacturing sector, 1976, has been used, and the simple equation model has been applied in this regard. Moreover, the sample of 25 industries has been taken only. The author highlighted that the level of employment in small-scale industries, mainly dependent on the daily wage rate, capital-labour ratio, value of product, and the support of the government. As per the results of this paper, the author concluded that 81% of employment opportunities are dependent on the above-mentioned factors, while 19% is due to other variables. Moreover, the role of the value of the product will be more fruitful for the generation of employment opportunities in Pakistan (Khan, 1994).

The study explored the determinants of growth and development of small firms. In this regard, the survey data have been used against the sample size of two sectors of small firms, which are electrical fans and sports goods. The author highlighted that the said small firms cannot increase their profit in the presence of low managerial investment, poor branding and outdated installed capacity. In this regard, in order to gain more profit and growth, there is a dire need to invest in the said components so that the product may be competitive nationally and internationally. On the other hand, lack of credit facilities, unavailability of raw material, unprofessional human capital and poor labour laws are also the major constraints of small firms as compared to large firms. Moreover, the lack of interest from the government side regarding innovation and technology upgradation also discourages the small-scale industries (Afraz et al., 2014).

In order to investigate the determinants of growth in the industrial sector of Pakistan, the time series data from 1976 to 2014 have been analysed by using the Solow growth model with the help of the method of autoregressive distributed lag (ARDL) to estimate the factors affecting the growth of the industrial sector. Subsequently, the results highlighted that the determinants of trade and personal remittances are significant and positively associated with the industrial growth. Similarly, in order to uplift the industrial sector, the way forward should be developed to provide facilities and encouragement of the labor for overseas employment (Ajmair & Hussain, 2017).

The author examined the implications of variations existing in the businesses of small-scale industries. In this regard, the descriptive analysis

has been conducted in the selected Industries, Electronics, Garments and Auto Parts of the Indian economy. In this regard, the author also presented the bottlenecks in the growth of the industries sector of the region, and said that small-scale industries have also been pointed out as labor labour-intensive sector and found that there is a lack of competitive power as poor technology has been used in the industries. The author suggested that the government and industry stakeholders should play a fruitful role by providing education/knowledge regarding change in business atmosphere and technology upgradation due to globalization (Bhavani, 2002).

This research investigates the impact of leader-member exchange (LMEX) and learning orientation (LEOR) on workplace innovation within entrepreneurial small and medium-sized enterprises (SMEs). It focuses on how several factors creative self-efficacy, thriving at work, task interdependence, work significance, and creative performance, act as intermediaries in this relationship. Based on data collected from Pakistani SMEs and analyzed using structural equation modelling, the study reveals that LMEX and LEOR do not directly influence workplace innovation. Instead, their effects are conveyed through mediators such as creative self-efficacy, thriving at work, task interdependence, and creative performance. Work significance was not found to significantly mediate these effects. Additionally, the study highlights the complex interplay of these mediators working together to promote innovation. These insights emphasize the importance of leadership and learning culture in driving innovation through individual and team dynamics, especially in entrepreneurial SMEs in developing countries, a field that remains underexplored (Khan et al., 2025).

A recent study explored the influence of leader-member exchange (LMEX) and learning orientation (LEOR) on innovation within entrepreneurial small and medium-sized enterprises (SMEs), focusing on the mediating role of several psychological and workplace factors. The findings revealed that LMEX and LEOR do not directly enhance workplace innovation (WPIN); instead, their impact is conveyed through variables such as creative self-efficacy, thriving at work, task interdependence, and creative performance. Conversely, work significance did not show a meaningful mediating effect. This research highlights that fostering innovation in SMEs depends more on cultivating internal team dynamics and individual capacities than on direct leadership influence, especially in the context of developing economies (Jamil et al., 2025).

A study focusing on small businesses in Pakistan examined how ethical behavior influences sales performance. Using a structured survey of 307 participants, including both sellers and customers, the research employed statistical techniques such as correlation and regression analysis. The results demonstrated a significant positive relationship between ethical practices and sales success, with a correlation coefficient of 0.737. Moreover, ethical conduct was found to explain 54.3% of the variation in sales outcomes. These findings highlight the importance of honesty, fairness, and transparency in business interactions. The study underscores that ethical behavior is not only vital for maintaining trust and credibility but also serves as a key driver of financial performance in small enterprises. This contributes to the growing body of literature supporting the integration of ethical values into business strategies, especially within emerging market contexts like Pakistan (Khalid et al., 2025).

The study examines how the Natural Resource-Based View (NRBV) framework and ecopreneur activities influence the export performance of manufacturing SMEs in Pakistan. It highlights the significance of adopting environmentally responsible practices such as reducing emissions, minimizing waste, and preventing pollution. Drawing from various empirical studies and literature, the research demonstrates that SMEs integrating green knowledge management and sustainable technologies are better positioned to compete in international markets. These practices not only align with global environmental standards but also enhance export capabilities, particularly for firms facing limited resources. Although the study is confined to manufacturing SMEs within Pakistan, it recommends expanding future research to other industries and regions. Furthermore, the authors propose the establishment of a centralized knowledge-sharing platform to help SMEs implement green strategies more effectively. The study contributes to the broader understanding of how sustainability and green innovation can serve as strategic tools for improving export performance in developing countries (Kamran & Mali, 2025).

This study provides an extensive and systematic review of existing literature on the performance of small and medium-sized enterprises (SMEs), emphasizing the influence of both public and private sector initiatives in fostering competitiveness. By carefully analyzing 77 scholarly articles published between 2000 and 2023 using stringent criteria for relevance and credibility, the research identifies 25 critical performance

indicators organized into ten comprehensive categories, such as marketing performance, entrepreneurship, technological and service innovation, organizational and entrepreneurial culture, open innovation, human resource management, and market orientation. Employing PRISMA guidelines, the study not only categorizes these indicators but also highlights their significant roles in evaluating and enhancing SME performance across diverse contexts. The findings offer a detailed framework for SME owners to implement effective performance measurement tools tailored to their unique needs, while also guiding policymakers to develop informed strategies that strengthen SME competitiveness and sustainability in increasingly dynamic market environments (Mohsin et al., 2025).

This study addresses the complex challenge faced by social entrepreneurs of balancing a strong commitment to social missions with the business acumen required to run their ventures effectively. To capture this dynamic, the authors introduce the concept of Social Entrepreneurial Ambidextrous Orientation (SEAO), which reflects an entrepreneur's ability to simultaneously pursue social impact and economic viability. Grounded in the awareness-motivation-capacity framework from strategic management, the study develops a validated measurement scale for SEAO and empirically tests its influence on venture performance using data collected from 246 social entrepreneurs in the United States. The results demonstrate that a higher SEAO is significantly associated with improved social outcomes, specifically in terms of the number of beneficiaries served. Additionally, the study finds that this positive effect on financial performance is amplified in ventures characterized by organic organizational structures and those operating in resource-abundant environments. By highlighting the role of organizational design and environmental factors, the research offers nuanced insights into how social entrepreneurs can better integrate their dual goals of social impact and economic sustainability, thereby advancing both theory and practice in the social entrepreneurship field (Kimakwa & Abebe, 2025).

This study examines how micro-firms (with fewer than ten employees) collaborate with universities as part of their open innovative strategies. Using data from a UK survey and logistic regression analysis, it finds that university partnerships often form part of a broader network of collaborations. Export-oriented micro-firms are more likely to engage with

universities due to competitive knowledge needs ("market push"), while those in regions with limited local knowledge resources also seek university collaboration ("location push"). The research highlights organizational proximity as a key factor facilitating these partnerships and sheds light on how micro-firms use academic links to overcome resource limitations and improve innovation capabilities (Johnston, 2025).

This study develops and validates an eight-stage lifecycle model tailored for B40 women entrepreneurs in Malaysia's home-based businesses, capturing their dynamic, non-linear progression through phases like startup, growth, stagnation, and decline. Using focus groups with experts and entrepreneurs, the research highlights common challenges and adaptive strategies, such as managing multiple businesses simultaneously. It emphasizes the value of integrating decision support systems to provide personalized guidance at each stage, helping women make better business decisions. The model offers practical insights for policymakers and practitioners to deliver targeted support and promote sustainable entrepreneurship within this underserved demographic (Ali & Othman, 2025).

Methods

In this study, the baseline data were obtained from a census carried out during January 2012 to June 2013 by Punjab Small Industries Corporation (PSIC) in collaboration with the Bureau of Statistics (BOS), Punjab. The survey was conducted in the 36 districts of Punjab, covering both rural and urban areas. In total 164,860 enterprises were identified, including 92,942 small-scale units. In the survey the attention was given towards the variables of raw material, manpower, production efficiency, and the constraints faced by small-scale units in Punjab in terms of technical and financial prospects. For the purpose of this research, cross-sectional data from the census were employed to investigate the determinants of industrial production/output and employment in SSIs in Punjab.

Models Specification

In order to examine the determinants of industrial production and employment generation in small-scale industries, two different models have been developed so that the impact of independent variables on dependent variables can be assessed separately. In this regard, the technique of the multivariable linear regression model has mainly been used in the study.

Model 1 and Variable Descriptions

To investigate the determinants of industrial production/output of the Small-Scale Industries (SSI), the following function has been developed, where the industrial output has been taken as a function of industrial employment/labor, working capital, profit earned, technology used, and financial assistance received by the firms:

Industrial Output = *f* (Employment, Capital, Profit, Technology, Financial Assistance) (1)

Figure 1

Development of Model 1

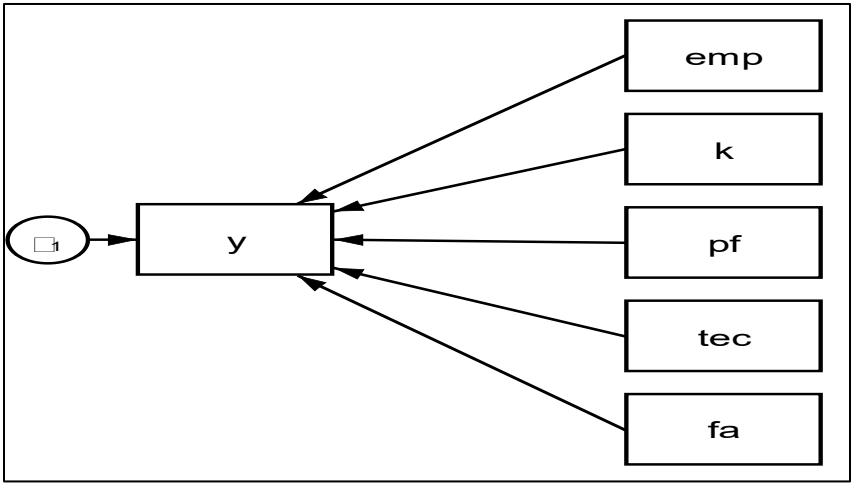


Figure 1 represents that the independent variable, that is, industrial production, has been taken as a function of industrial employment, capital used, profit, technology used, and financial assistance received earlier by the firms.

For empirical analysis, the said model has been converted into logarithmic form as given below:

$$\ln(y) = \alpha_0 + \alpha_1 \ln(emp) + \alpha_2 \ln(k) + \alpha_3 \ln(pf) + \alpha_4(tec) + \alpha_5 \ln(fa) + \varepsilon_1 \quad (2)$$

Model 2 and Variable Descriptions

Many factors can influence industrial employment, but in this study, only five explanatory variables have been taken, so as to estimate the effect of these variables on the industrial employment of small-scale industries in

Punjab. In this regard, the following employment function has been developed: -

Employment = *f* (Capital, Technology, Wage Rate, Demand, Technically Trained Labor**)** (3)

Figure 2

Development of Model 2

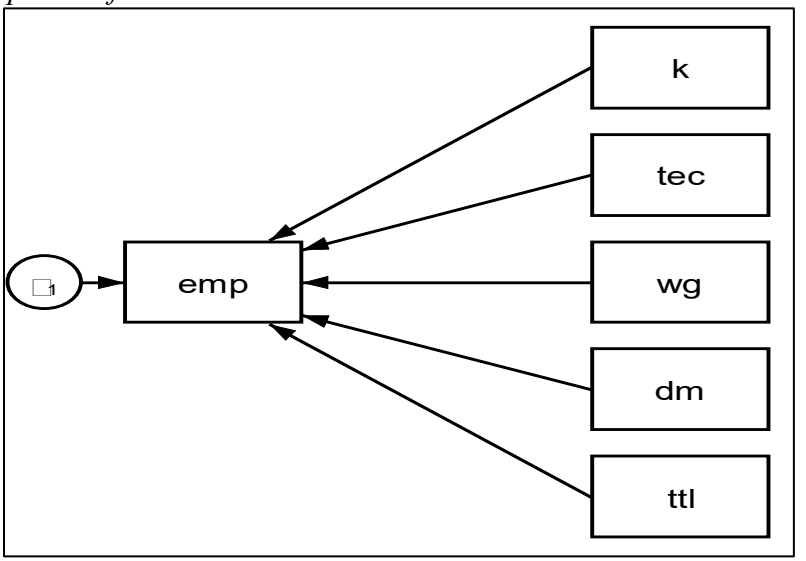


Figure 2 represents employment as a function of capital, technology, wage rate, market demand and technically trained labor.

The logarithmic form of the said model is as under:

$$\ln(emp) = \beta_0 + \beta_1 \ln(k) + \beta_2 \ln(tec) + \beta_3 \ln(wg) + \beta_4(dm) + \beta_5 \ln(ttl) + \varepsilon_2 \quad (4)$$

Structural Equation Modelling (SEM)

The Structural Equation Modelling (SEM) technique has been employed in this study to explain two different models or equations simultaneously. It is a multivariate statistical framework to explain multiple linear equations in factor analysis and path analysis. These are also visualized by a graphical path diagram and usually represented in the set of matrix equations (Hox & Bechger, 1998). Structural equation modelling provides a very general and convenient framework for statistical analysis that includes several traditional multivariate procedures, for example, factor

analysis, regression analysis, discriminant analysis, and canonical correlation, as special cases. Structural equation models are often visualized by a graphical path diagram.

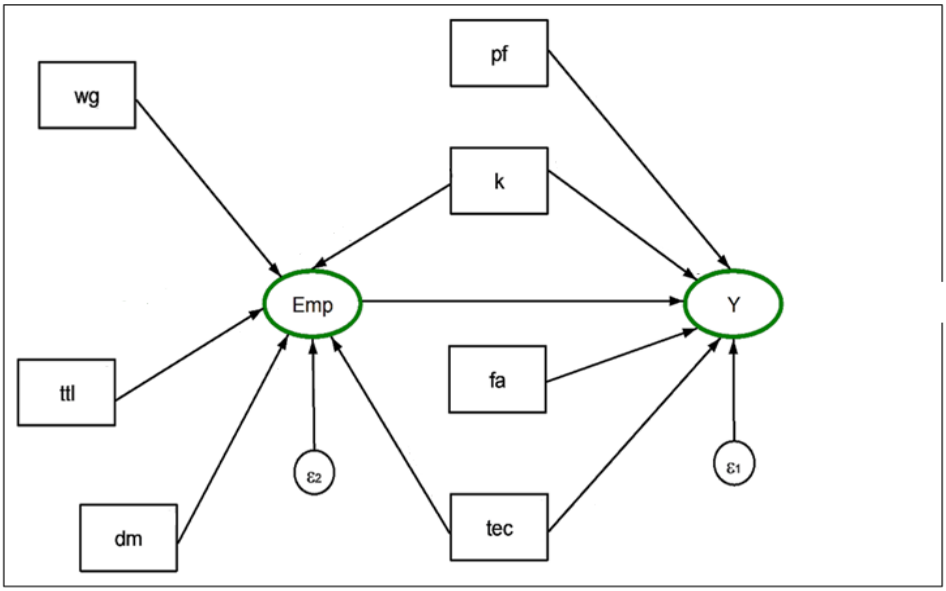
SEM has its roots in path analysis (Wright, 1921). A path diagram mainly consists of boxes and circles, which are connected by arrows. In the present study, the SEM has been used for the above-mentioned models, where industrial output and employment have been defined as the functions given below:

Y = f (emp,k,pf,tec,fa)

Emp = f (k,tec,dm,ttl,wg)

Figure 4

Development of Structual Equational Model (SEM)



The output of both models, obtained from SEM, is shown in Figure 4. The above figure shows that the variables in the circles are dependent variables, while all the other independent variables have been presented in the form of boxes and can be viewed with the direction of arrows towards dependent variables. It is imperative to mention that employment has been shown as an instrumental variable and affects the industrial output (Y) with the help of other explanatory variables. The above and below values in the boxes are variances and means of each independent variable, and the results

are shown in the form of a regression line of each variable, consisting of the value of coefficients, standard errors and the p value.

Estimation Strategies

In this study, the cross-sectional data of 36 districts of Punjab, Pakistan, has been used. The information received/collected from 60,972 small scale industries, through a survey a survey conducted by Punjab Small Industries Corporation during 2012-13, and the impact of total employment, capital, profit, technology, and financial assistance on industrial output has been estimated, similarly, the impact of capital, technology, wage rate, market demand and technically trained labor has also been analyzed on total employment engaged in SSI.

In order to identify the problem of endogeneity in the model has also been checked with the help of the Durban-Wu-Hausman test, because the problem of simultaneity normally appears in such a case, when an independent variable does not truly affect the dependent variable and it would be the function of some other variables. In this study Two Stage Least Squares (2sls) regression analysis technique has also been used, as the said analysis method is an extension of the OLS technique. This method has a significant use when the disturbance term of a dependent variable correlates with the independent variables of the model.

As far as the present study is concerned, the two different models have been used, in this regard, in order to explain two models simultaneously; the Structural Equation Modelling (SEM) technique has mainly been used for the said purpose.

Results

This study investigated the determinants of industrial production and employment generation in small-scale industries (SSIs) in Punjab using cross-sectional data collected by PSIC. Several econometric models were employed, including Ordinary Least Squares (OLS), Durbin-Wu-Hausman endogeneity testing, Two-Stage Least Squares (2SLS) regression, and Structural Equation Modelling (SEM) to ensure robustness and address potential issues such as multicollinearity and endogeneity. The key findings have been summarized as detailed below:

Industrial Production was analyzed as a function of Employment (EMP), Capital (K), Profit (PF), Technology (TEC), and Financial

Assistance (FA) using multiple regression on 36 observations and the model explained about 71% of the variation in industrial production, showing a strong relationship between the independent variables and production. Employment, Profit, and Technology were found to be statistically significant and positively associated with Industrial Production across both OLS and 2SLS models, confirming that labor intensity, innovation, and profitability are key drivers of output in SSIs. However, Capital and Financial Assistance, although positively related to production, were statistically insignificant, indicating that SSIs in Punjab may not be heavily reliant on formal capital or financial aid.

Table 3

Results for Model – I

Variables	Coefficient	*SE*	*t*-statistics	*p*
EMP	1.832	0.636	2.879	0.007
K	0.008	0.289	0.029	0.976
PF	0.632	0.112	5.623	0.000
TEC	2.297	0.767	2.992	0.005
FA	0.367	0.362	1.012	0.319
C	4.148	1.830	2.265	0.030

The effects of Capital (K), Technology (TEC), Wage Rate (WG), Market Demand (DM), and Technically Trained Labor (TTL) on Industrial Employment (IE), have also been examined. The findings show that TEC and TTL are highly significant at the 1% level, indicating that the use of modern technology and the presence of skilled workers substantially boost employment. DM is significant at the 5% level, reflecting the influence of market demand on labor requirements. Despite the predominance of family labor in SSIs, WG also has a significant effect at the 10% level, suggesting that wage levels play a role in employment decisions. All significant variables are positively associated with industrial employment, highlighting the joint importance of capital investment, technology, skilled labor, and market conditions in driving employment growth in SSIs.

Table 4

Results for Model –II

Variables	Coefficient	*SE*	*t*-statistics	*p*
K	-0.027	0.059	-0.460	0.648
TEC	0.623	0.136	4.576	0.000

Variables	Coefficient	*SE*	*t*-statistics	*p*
WG	-0.298	0.160	-1.861	0.072
DM	0.059	0.025	2.293	0.029
TTL	0.292	0.106	2.756	0.009
C	-0.979	0.681	-1.437	0.161

The SEM analysis reveals that industrial production in small-scale industries is primarily influenced by employment, technology, and production factors, with employment exerting the strongest impact. Capital and fixed assets show no meaningful contribution, reaffirming the labor-driven structure of SSIs. On the employment side, technology use, skilled labor availability, and market demand significantly promote job creation. Rising wages, however, reduce employment levels, reflecting the inverse relationship between wage growth and labor demand. Overall, the results indicate that growth and employment in SSIs depend more on labor, technology adoption, and skill development than on capital investment.

Table 5

SEM Results for Model –I &II

Variables	Model 1 (Industrial Production)		Model II (Employment)	
	Coefficient	*p*	Coefficient	*p*
EMP	1.800	0.000	-	-
K	0.086	0.970	-0.027	0.610
PF	0.632	0.000	-	-
TEC	2.297	0.000	0.620	0.000
FA	0.361	0.270	-	-
Cons.	4.148	0.013	-	-
	-	-	-	-
DM	-	-	0.059	0.012
TTL	-	-	0.290	0.002
WG	-	-	-0.300	0.041
C	-	-	-0.980	0.120

Discussion

The findings of the present study can play a pivotal role in the understanding of the working of industrial production and the creation of job opportunities in small-scale production (SSI) in the province of Punjab, Pakistan. The relevance of employment, profitability, and technological adoption that existed consistently between the OLS and 2SLS models validates the

closeness of the variables in the distribution of industrial output. The above research findings are similar to the literature, which focuses on labor-intensive endearments, modernization of technologies and profitability in enterprises, which are the foundation of SME sectors' productivity growth in developing economies. In particular, the positive correlation between technology and output adds to the reasoning that in any traditionally low-tech SSIs, incremental upgrade of technologies can be translated into significant output increases.

The empirical evidence shows a significant and positive influence of the technological adoption and labor-intensive approaches of production on the output and employment in industry and negligible impact of formal capital investment finds a close echo with the recent studies of the small-scale industrial sector in Pakistan. According to a report by the Punjab Economic Research Institute, SSIs in Punjab have abnormally high employment contributions (approximately 60 percent of total manufacturing employment), in spite of low amounts of capital utilization, which underscores that the marketplace is highly labor-intensive and labor could be used in favor of capital in this setting (Mujaddad, 2017b). On the same note, Qureshi et al. (2021) emphasize that inability to access formal finance becomes one of the primary drivers of SMEs not being able to scale up (that is, adopt new technologies) and becomes the reason as to why many end up using either informal finance or retained earnings to finance its operations. This in conjunction helps to make a sense of structural anomalies in formal credit accessibility and low responsiveness to capital injection that was cross-checked in Punjabi SSIs.

Related evidence in support of the essential role of innovation and human capital formation is the positive, straightforward association in your study between supply of skilled labor, demand conditions, technological adoption, and jobs. A study by Ahmad et al. (2021) on examining process innovation in the context of Pakistan SMEs revealed that technological upgrading has a positive impact on firm growth and economic growth of the SMEs. Additionally, provincial plans at large exist, e.g., the MSME strategy in Punjab and the Uraan Pakistan economic transformation plan, which focus on affordability of credit and skills development as well as technological adoption to drive the SME-driven growth and subsequent job creation (Industries, Commerce, Investment & Skills Development Department, n.d.). Collectively, the results support the assertion that small

steps in technological modernization and skill upgrading of labor more effectively serve as policy tools in boosting SSI productivity and job creation than the financing programs that are capital intensive.

Conclusion

The apparent purpose of the study was to present an evidence-based account of the role of small-scale industries of Punjab. Given that SSIs contribute nearly 60% of employment within the industrial sector of the province, there was a clear need to empirically analyses the data collected from the census conducted by PSIC during 2013. No recent study has yet been conducted at the Punjab level regarding prospects of small-scale industries in terms of production and employment generation.

Overall, the results emphasize the labor-intensive nature of SSIs in Punjab and highlight the importance of promoting skilled labor and technological modernization to enhance both production and employment outcomes. Policy measures that support technology adoption and technical skill development, rather than simply increasing financial assistance or capital infusion, may yield better performance in this sector.

In order to investigate the relationship between the dependent variable and independent variables, two different models were developed so that the impact of industrial production and employment generation can be examined separately. For the said purpose, different empirical techniques have been used. The Ordinary Least Squares (OLS) has been used in both models, according to Field (2009) Regression analysis enables us to predict future outcomes based on the values of predictive variables. Through this method of estimation, the contribution of each independent variable can be assessed in the outcomes of the dependent variable. The Hausman test has been established to identify the problem of simultaneity. The non-fulfilment of the exogeneity condition or endogeneity of inputs is defined as the correlation between the level of inputs chosen and unobserved productivity shocks (De Loecker, 2011).

The Two Stage Least Squares (2sls) regression analysis technique has also been used, as the said analysis method is the extension of the OLS technique. This method has a significant use when the disturbance term of a dependent variable correlates with the independent variables of the model. By using the above-mentioned empirical techniques, it has been examined that the small-scale industry is the labor-intensive sector and does not

require more capital in terms of production and employment generation. The results show that in order to boost the production level of the firms, there is a need to accelerate the technology level of the firm, as most of the SSIs are operated by poor technology.

On the other hand, the variable of employment is also very significant in terms of industrial production, as this sector absorbs more workers; therefore, the rise in labor will increase the production level of the firms. The profit rate of the firms also increases their production level, as more profit leads to accelerated production. This sector is labor-intensive and does not require more capital; therefore, the variable of capital is not as significant as compared to other variables.

On the basis of the above empirical findings, the following policies have been suggested to promote industrial production and employment generation in Small Scale Industries.

- Most of the SSIs used outdated and poor technology for production purposes, which caused low production; therefore, to gain an optimal level of production, incentives should be provided for the upgrading of technology.
- To improve the profitability of the sector, the cost of doing business should be reduced by providing incentives and finance at a subsidized rate/terms & conditions.
- The SSI is labor labor-intensive sector; in this regard government should design a policy to manage the labor force, including wage rate, social security benefits, and necessary / required skills, etc.
- Most of the entrepreneurs avoid loan facilities due to high interest rates and insufficient collateral, so there is a need to inject more credit in small industries based on soft terms.
- The study on the same or some other variables can also be conducted in other provinces for examination and verification of the results of this study.

Conflict of Interest

The authors of this manuscript declare no financial or non-financial conflicts of interest.

Data Availability Statement

Data associated with this study will be provided by corresponding

author upon reasonable request.

Funding Details

The authors did not receive any specific funding for this work.

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