Role of Curriculum and Training in Reducing Operational Skill Gap in Logistics Industry of Pakistan

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Abstract

Pakistan's logistics sector is an essential component of the country's economic growth, enabling effective local and international trading and connection. The industry suffers from an ongoing operational talent shortage that reduces its efficacy and competitiveness despite its strategic importance. This study investigates how curriculum design and educational initiatives might help close this gap in Pakistan's logistics sector. The study assesses the effects of professional development, bridge techniques, academic-industry collaboration, educational curriculum, practical training, and policy initiatives using a quantitative methodology using PLS-SEM. The outcomes emphasize the value of experiential learning and curriculum modernization by showing that the operational skill gap is considerably reduced by hands-on training and well-designed courses. On the other hand, inefficiencies in present bridging techniques, governmental interventions, and academia-industry partnership highlight the need for better implementation. The report focuses on resolving these shortcomings through focused educational reforms, industry collaborations, and legislative frameworks, offering stakeholders practical suggestions to improve worker preparedness and support Pakistan's logistics industry.

Keywords: logistics industry, operational skill gap, educational curricula, practical training, industry collaboration, policy interventions, PLS-SEM

Introduction

In Pakistan the logistics industry is integral to the economic structure of the country, allowing the effectual association of goods and services and serving as a vital connection among national and global markets. The geographical location of Pakistan, strategically located at the junction of Central Asia, South Asia, and the Middle East, improves its potential as a regional trade hub. Even though, its significance, the logistics sector faces numerous challenges, mainly an important gap in the operational skills of its employees. In addressing this operational skill gap the role of curriculum and training is a critical feature in enlightening the sector's effectiveness, competitiveness, and involvement to economic growth.

The Importance of the Logistics Sector in Pakistan's Economy

In Pakistan's economy Logistics plays an important role and supporting key industries such as manufacturing, agriculture, and marketing. In the country's GDP and employment, the sector contributes significantly while also assisting international trade. The importance of logistics has further emphasized by China-Pakistan Economic Corridor (CPEC) and developing infrastructure such as highways, ports, and railways to progress streamline trade operations and connectivity (Ul-Hameed et al., 2019). In global commerce these developments enhance regional trade and Pakistan's position as a critical player and underscore the potential of the logistics industry.

However, for skilled logistics professionals, these expansions come with increasing demands who can manage complex supply chains efficiently and adopt modern technologies. It is essential for capitalizing on the opportunities, a workforce equipped with the necessary operational skills, and it is created by development of infrastructure and global trade integration (Abbasi et al., 2018).

Challenges in the Logistics Sector

Even though the sector's strategic importance, the most pressing being the operational skill gap Pakistan's logistics industry faces critical challenges. This gap reflects the discrepancy between those possessed by the available workforce and the skills required by logistics firms. Deficiencies in technical skills, such as supply chain optimization, inventory management, and digital literacy, are predominant. Moreover, among logistics professionals, soft skills such as problem-solving, communication and leadership are often underdeveloped, further hindering operational efficiency (Imran et al., 2018).

The increase of e-commerce has compounded these challenges, as logistics companies must now manage increased demands for speed, accuracy, and real-time tracking in deliveries. Pakistan's leading e-commerce platform the companies like Daraz, due to a shortage of skilled personnel have stated significant difficulties in meeting these operational demands (Daraz Logistics Report, 2022). These deficiencies not only impede operational efficiency but also affect customer satisfaction and limit the growth potential of e-commerce and related industries.

Role of Curriculum in Bridging the Skill Gap

In Pakistan addressing the operational skill gap educational institutions play a critical role through training programs and curriculum design. Though, many logistics curricula remain out-of-date, failing to incorporate modern industry practices and technologies. For instance, important topics such as big data analytics, automated warehousing and Internet of Things (IoT), are often absent from academic programs (Abbasi et al., 2018). Therefore, graduates enter the workforce spontaneous to meet the demands of a rapidly evolving logistics industry.

Developing the abilities needed for logistics operations requires more than just theoretical knowledge. Through industry-led seminars, internships, and cooperative education, students are exposed to real-world difficulties and get practical experience, which is crucial. According to research by Haque, A., & Aslam, A. (2019), industry-academia partnership is crucial for equipping students with the skills required for logistics professions. The lack of such cooperation in Pakistan, however, widens the divide between industry and academics.

The Impact of Technological Advancements

The logistics industry continues to evolve due to global technology improvements, which highlight the need for a workforce proficient in digital tools and systems. Supply chain management is being developed by innovations like IoT, blockchain, and artificial intelligence, which make automation, real-time tracking, and predictive analytics possible (Ul-Hameed et al., 2019). But despite these worldwide trends, Pakistan's logistics sector has been sluggish to embrace new technologies since there aren't enough qualified experts to use them efficiently.

Educational institutions must integrate these technologies into their courses to satisfy the needs of contemporary logistics. Academic programs may better meet business demands and assist reduce

the operational skill gap by instructing students in the use of sophisticated logistics software, supply chain data analysis, and automated system management (Kotzab et al., 2018).

Government Initiatives and Policy Support

The construction of infrastructure and the improvement of skills in the logistics industry have been given top priority by the Pakistani government under the Pakistan Vision 2025 framework. According to the Ministry of Planning, Development & Reform (Pakistan Vision 2025), these programs seek to increase logistics efficiency via investments in technical and vocational training, regulatory changes, and industry engagement. However, due to inadequate execution, their influence on closing the operational skill gap has been minimal.

By providing scholarships, training program subsidies, and incentives to promote industry-academia collaborations, the government might help alleviate skill gaps. Vocational training specifically designed for the logistics sector, for example, might provide students real-world experience, and tax breaks for businesses that engage in staff training could promote the wider use of skill-development programs (Naseem et al., 2021).

Opportunities for Growth

The logistics industry in Pakistan has a lot of room to grow thanks to the CPEC's advances, growing regional trade, and the emergence of e-commerce. To achieve this potential, the operational skill gap must be closed. Pakistan may promote innovation and efficiency in logistics operations by building a qualified workforce through updated training programs, enhanced industry-academia partnership, and modernized educational curriculum.

According to research, spending money on talent development has a multiplier impact that lowers expenses while increasing production and improving customer satisfaction. A competent workforce positions the industry for long-term success by being better able to embrace new technologies, overcome obstacles, and streamline supply chains (Imran et al., 2018).

The effectiveness and growth of Pakistan's logistics sector are still significantly hampered by the operational skill gap. A comprehensive strategy is needed to address this issue, one that includes government assistance, updated curricula, hands-on training opportunities, and improved industry-academia collaboration. Pakistan can boost competitiveness, unleash the full potential of its

logistics industry, and spur overall economic growth by training a staff that can handle contemporary logistics.

Statement of the Problem

Because of its advantageous geographic location and vital role in facilitating commerce, Pakistan's logistics sector is well-positioned to make a substantial contribution to the country's economic growth, especially under the China-Pakistan Economic Corridor (CPEC). Nonetheless, there is a significant disconnect in the industry between the operational abilities that companies want and the competences of the present workforce. A significant obstacle to attaining effectiveness, creativity, and competitiveness in logistics operations is this operational skill gap (Ul-Hameed et al., 2019).

One of the main causes of this disparity is that training programs and curriculum are inadequate in educating graduates for a contemporary, technologically advanced logistics industry. Many educational institutions still use antiquated curriculum that don't meet industrial demands, ignoring important topics like automation, data analytics, digital technology, and inventory management. As a result, graduates in logistics frequently lack the soft skills and technical knowledge required for efficient supply chain management and operations (Abbasi et al., 2018).

A gap between academia and the logistics sector makes the problem worse. Students who lack cooperation are ill-prepared for professional responsibilities because they have few possibilities for internships, hands-on training, and exposure to real-world problems. The issue is further exacerbated by the lack of strong government regulations to assist skill-development programs in the logistics industry.

The inability to close the operational skill gap jeopardizes Pakistan's logistics industry's competitiveness both domestically and globally as global trade grows more intricate and technologically demanding. Reducing expenses, increasing service quality, and increasing sector efficiency all depend on closing this gap through curriculum modernization and extensive training initiatives. This study examines the extent of the talent gap, points out flaws in the training programs and curriculum that are already in place, and suggests workable solutions to close this crucial gap.

Research Objectives

The research is aimed at how training and curriculum might help close the operational skill gap in Pakistan's logistics sector. Through research and applied advancements, this study offers insightful information to raise worker understanding and boost industrial performance. The following are the study's particular goals:

Primary Objective

- To evaluate the effectiveness of curriculum design and training programs in reducing the operational skill gap in Pakistan's logistics industry.

Secondary Objectives

1. **Alignment Evaluation**: To observe the alignment between academic curricula in logistics and the operational requirements of the industry, highlighting gaps and areas for improvement.

2. **Impact Assessment**: To evaluate the impact of operational skill gaps on the logistics industry's productivity, efficiency, and competitiveness in regional and global markets.

3. **Training Effectiveness**: To examine the current state of training programs, including their practical components, and evaluate their effectiveness in enhancing workforce skills.

4. **Role of Collaboration**: To explore the extent and impact of collaboration between academic institutions and logistics firms in bridging the skill gap through internships, cooperative education, and joint training initiatives.

5. **Technological Integration**: To evaluate the inclusion of modern logistics technologies, such as IoT, automation, and data analytics, in educational and training programs, and their influence on workforce readiness.

6. **Policy Recommendations**: To recommend strategies for improving logistics curricula and training frameworks and provide policy recommendations to facilitate academia-industry-government collaboration in addressing the skill gap.

7. These objectives aim to address the root causes of the operational skill gap, enhance educational outcomes, and improve the overall efficiency and competitiveness of Pakistan's logistics sector.

Literature Review

Globalization, which is technology breakthroughs, and changing consumer needs are all causing revolutionary changes in the logistics sector globally. Navigating these changes and maintaining operational efficiency depend heavily on having a trained team. However, because of limited industry-academia collaboration, insufficient practical training, and inadequate educational curriculum, the logistics sector in developing nations like Pakistan suffers a significant operational skill gap. With an emphasis on the function of training and curriculum, this review of the literature summarizes both domestic and international studies on the operational skill gap and suggests ways to close these gaps in Pakistan's logistics sector.

Gap in Operational Skills in the Logistics Industry

The difference between the abilities that employers need and those that employees possess is known as the operational skill gap. The logistics sector, which requires proficiency in fields like inventory management, supply chain coordination, data analytics, and the use of contemporary logistics technology, is where this disparity is most noticeable (Christopher, 2016).

This lack of skills has made it more difficult for Pakistan's industry to embrace cutting-edge technologies and international best practices. According to Ul-Hameed et al. (2019), most logistics professionals in Pakistan rely on ad hoc, on-the-job learning because fewer than 30% have formal training in supply chain management. This absence of organized skill development reduces production and efficiency, raises operating expenses, and reduces the industry's ability to compete.

Curriculum's Function in Closing the Skill

Gap Out of Step with Industry Requirements

Pakistani educational institutions frequently fall short in creating courses that meet the changing needs of the logistics industry. According to studies, logistics curricula in Pakistani universities prioritize academic understanding over technical and practical aspects (Abbasi et al., 2018). For instance, most programs either underrepresent or do not include important subjects like advanced supply chain analytics, data-driven decision-making, and digital logistics.

International Best Practices

Through adaptable educational systems, nations like Singapore and Germany have effectively addressed skill disparities. While Germany's dual education system blends classroom instruction with apprenticeships, Singapore incorporates industry input into the creation of its courses (Chen et al., 2020). These methods emphasize the value of collaborative curriculum creation, which is a tactic that is mostly lacking in Pakistan.

Suggested Reforms

Workforce preparation may be greatly improved by incorporating modern logistics technologies like blockchain and the Internet of Things into university curricula. Curriculum alignment with market demands may also be facilitated by the creation of advisory groups made up of academic and industry professionals (Haque & Aslam, 2019).

Education and the Development of Skills

Practical Training's Effectiveness

To close the gap between theory and practice, hands-on training options like internships and cooperative education programs are essential. But according to Malik et al. (2020), there aren't many of these possibilities in Pakistan, where less than 10% of logistics students take part in organized internships.

Instruction in New Technologies

Advanced technological skills are now in high demand because of the logistics industry's embrace of technologies like automation, artificial intelligence, and blockchain. Logistics workers throughout the world are staying competitive thanks to training programs designed specifically for these technologies. For instance, as part of its continuing education programs, the United States places a strong emphasis on logistics technology certifications (Christopher, 2016).

Pakistan's challenges

The creation of successful training programs in Pakistan is hampered by a lack of funding, poor ties between academics and business, and little government assistance. As seen in Singapore and India, addressing these issues calls for coordinated efforts to form alliances between educational institutions and logistics companies (Khan & Ahmed, 2021).

Cooperation Between Industry and Academics

To develop a workforce capable of meeting industrial expectations, academics and industry must cooperate. However, in Pakistan, the operational skill gap has been sustained by poor ties. Less than 20% of Pakistani logistics companies collaborate with academic institutions to provide training programs or co-design curriculum, according to research by Haque & Aslam (2019).

Models of Effective Collaboration

Germany: According to Schmidt and Wagner (2018), the country's logistics education system places a strong emphasis on collaborations between academic institutions and businesses, guaranteeing that students have practical experience through apprenticeships. United States: Prominent academic institutions such as MIT work with logistics companies to provide internship and project-based learning programs (Murphy & Knemeyer, 2018).

Suggestions on Pakistan

Stronger cooperation might be promoted by creating industry-academia councils and providing incentives for businesses to take part in training and curriculum development projects. Industry engagement would be further encouraged by financial incentives and policy support for such partnerships (Malik & Haider, 2020).

The State of Policy Today

The Pakistani government has started several workforce development programs, including the Prime Minister's Kamyab Jawan Program. However, because of a lack of sector-specific emphasis and insufficient finance, these programs have little effect on the logistics industry (Naseem et al., 2021).

Interventions in Other Countries' Policies

Policies that encourage public-private collaborations and offer financial aid for logistics education and training have been put in place by nations like Singapore and India. To guarantee that training programs fill skill gaps, for instance, India's Logistics Sector Skill Council works with industry partners (Kumar & Sharma, 2019).

Suggestions for Pakistani Policy

- Provide tax breaks to logistics companies who spend money on staff development.

- Create national standards for logistics education and training to guarantee uniformity and quality; Create a Logistics Sector Skill Council to oversee skill development programs (Haque & Aslam, 2019).

The Effects of Technological Integration

Global logistics is changing because of the quick uptake of technologies like blockchain, AI, and the Internet of Things. These developments increase the demand for specialist technical abilities while also providing chances for efficiency. According to Naseem et al. (2021), Pakistan's sluggish adoption of modern technologies makes the skill gap worse because most of its workforce lacks the abilities needed to handle sophisticated systems.

Filling up the Technological Gaps

Technology literacy must be given top priority in Pakistani educational and training initiatives. This gap may be filled by establishing collaborations with tech businesses to offer training modules and introducing certifications centered on logistics technology (Abbasi et al., 2018).

In conclusion a complex issue, the operational skill gap in Pakistan's logistics sector is caused by out-of-date curriculum, insufficient training initiatives, and a lack of cooperation between academics and business. A comprehensive strategy including curricular changes, improved training opportunities, and closer links between academics and business is needed to address these problems. Based on successful global models, Pakistan must make investments in integrating technology, promoting cooperation, and matching education and training to industry demands to develop a workforce capable of competing in the logistics sector.

Research Hypotheses

- **H_1:** There is a significant relationship between curriculum design and the reduction of the operational skill gap in Pakistan's logistics industry.
- **H_1:** Practical training programs have a significant impact on reducing the operational skill gap in Pakistan's logistics industry.
- **H_1:** Professional Development and Training have a significant impact on reducing the operational skill gap in Pakistan's logistics industry
- **H_1:** Collaboration between academia and the logistics industry significantly contributes to bridging the operational skill gap.

- **H₁:** The inclusion of current modern technologies and in curricula and training programs significantly influences the reduction of the operational skill gap.

- **H₁:** Government and institutional policy interventions significantly affect the reduction of the operational skill gap in the logistics sector.

Research Methodology

Adopting a quantitative research approach, this study investigates the function of curriculum in Pakistan's logistics industry as well as the effect of training in closing the operational skill gap. To test the relationships between the dependent variable (operational skill gap) and several independent variables, such as educational curricula, opportunities for practical training, professional development and training, industry-academia collaboration, current bridging strategies, and policy interventions, the study uses a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach (Hair et al., 2017; Fornell & Larcker, 1981).

The target demographic in Pakistan's logistics sector consists of professionals and stakeholders, such as managers and staff from logistics companies, academics teaching logistics, and government representatives in charge of policy initiatives pertaining to logistics. To guarantee sufficient power for PLS-SEM analysis, a minimum sample size of 407 individuals is required (Kline, 2015). A systematic questionnaire created utilizing validated metrics from previous research was used to gather primary data. Measures of the effectiveness and accessibility of practical training opportunities, professional development and training programs, industry-academia collaboration, current skill-gap-filling strategies, perceived impact of policy interventions, and the relevance and alignment of educational curricula were all included in the questionnaire (Henseler et al., 2009).

To evaluate the measurement and structural models, the study uses PLS-SEM with Smart PLS software. The proposed links are depicted in the conceptual model, and the strength of these interactions is indicated by the route coefficients. The study complies with ethical research norms, which include voluntary participation, anonymity, and informed consent. In conclusion, this technique offers a strong framework for assessing how training and curriculum affect the operational skill gap in Pakistan's logistics industry. PLS-SEM guarantees a thorough examination of the proposed links and offers useful information to governments, business, and academics.

Figure 1
Conceptual Framework
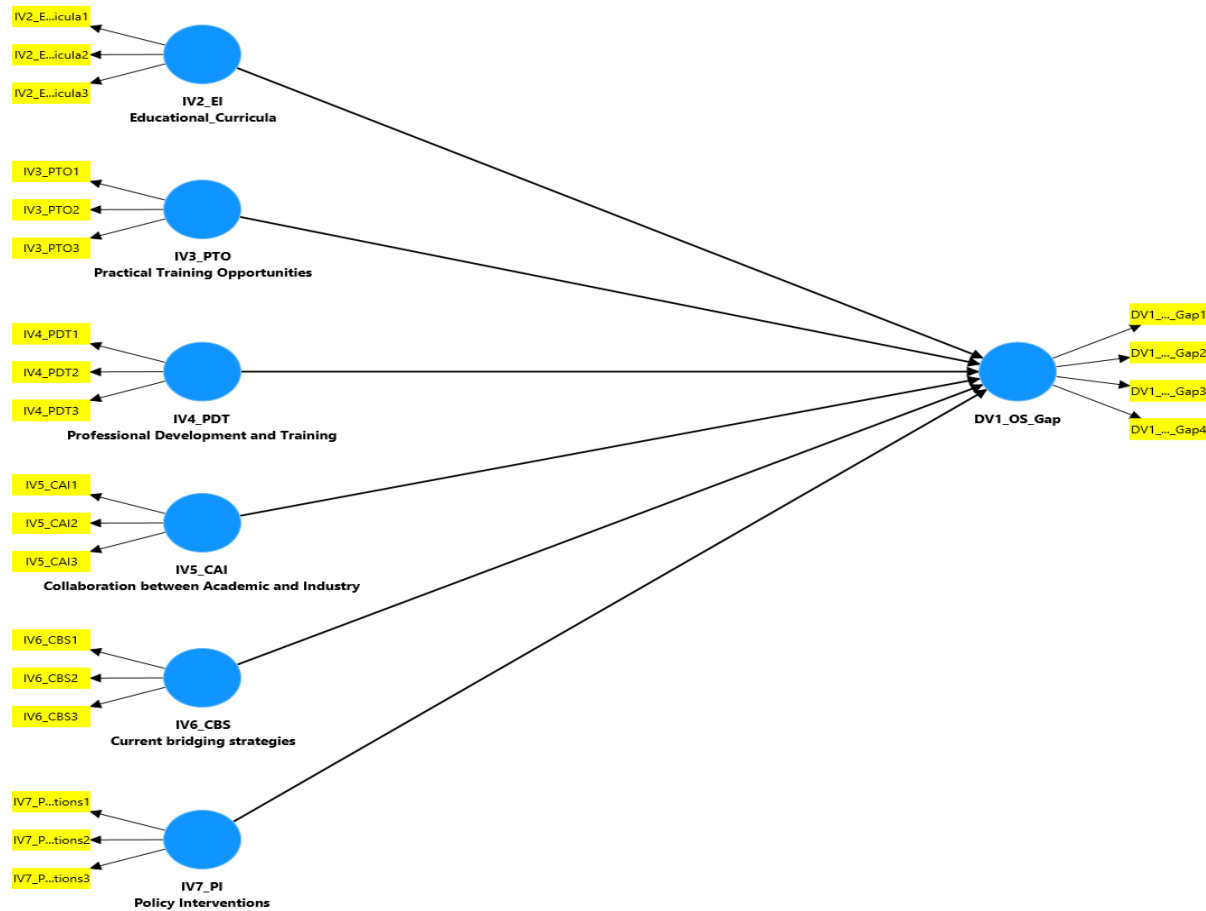
Data Analysis

This study examined the relationship between the operational skill gap and several factors, such as professional development, training opportunities, academic-industry collaboration, educational curricula, and policy interventions, using Partial Least Squares Structural Equation Modeling (PLS-SEM). Metrics including Composite Reliability (CR), Cronbach's alpha, and Average Variance Extracted (AVE) were used to evaluate the validity and reliability of the measurement model. Path coefficients and R^2 values were used to evaluate the structural model. The findings provide evidence-based suggestions for academics, business, and government, as well as practical insights into how curriculum and training programs affect closing the operational skill gap in Pakistan's logistics sector.

Table 1
Reliability and Validity Metrics for Constructs

Construct	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
DV1_OS_Gap (Operational Skill Gap)	0.817	0.827	0.880	0.649
IV2_EI_Educational Curricula	0.730	0.736	0.848	0.651
IV3_PTO_Practical Training Opportunities	0.706	0.716	0.837	0.632
IV4_PDT_Professional Development and Training	0.833	0.835	0.900	0.750
IV5_CAI_Collaboration Between Academia and Industry	0.807	0.822	0.887	0.725
IV6_CBS_Current Bridging Strategies	0.832	0.849	0.901	0.753
IV7_PI_Policy Interventions	0.902	0.905	0.939	0.837

Interpretation of the table

With an emphasis on internal consistency and convergent validity, the study assesses the validity and reliability of the constructs utilized in a study. Internal consistency is measured by Cronbach's alpha, and all constructions have values over 0.7, which denotes strong internal consistency. Construct reliability is evaluated by composite reliability; satisfactory reliability is confirmed by values ranging from 0.736 to 0.905. The percentage of variation that is collected by the construct's indicators in relation to measurement error is measured by Average variation Extracted (AVE). With the greatest AVE, Policy Interventions (IV7_PI) has good convergent validity, with its indicators accounting for 83.7% of its variation. To validate the measurement model and support the use of these concepts in the structural model for investigating the role of curriculum and training in reducing operational skill gaps in Pakistan's logistics sector, the study concludes that all constructs meet conventional thresholds for internal consistency and convergent validity.

Collinearity statistics (VIF)

In PLS-SEM, the Variance Inflation Factor (VIF) is a metric used to identify multicollinearity across the measurement model's indicators. High correlation between two or more indicators is known as multicollinearity, and it can cause standard errors to rise and the model to become unstable. Typically:

- **VIF < 3**: Indicates no significant multicollinearity.
- **VIF between 3 and 5**: Indicates moderate multicollinearity.
- **VIF > 5**: Indicates high multicollinearity, which requires further investigation.

Table 2
VIF Outer model – List

Indicator	VIF
DV1_OS_Gap1	1.339
DV1_OS_Gap2	1.984
DV1_OS_Gap3	2.138
DV1_OS_Gap4	1.813
IV2_Educational_Curricula1	1.366
IV2_Educational_Curricula2	1.721
IV2_Educational_Curricula3	1.460
IV3_PTO1 (Practical Training Opportunities)	1.624
IV3_PTO2	1.487
IV3_PTO3	1.250
IV4_PDT1 (Professional Development and Training)	1.701
IV4_PDT2	2.140
IV4_PDT3	2.127
IV5_CAI1 (Collaboration Between Academia and Industry)	1.393
IV5_CAI2	2.496
IV5_CAI3	2.774
IV6_CBS1 (Current Bridging Strategies)	5.090**
IV6_CBS2	2.159
IV6_CBS3	3.193
IV7_PI1 (Policy Interventions)	5.406**
IV7_PI2	2.475
IV7_PI3	3.694

The operational skill gap construct and its indicators are the main subjects of the study. There are no multicollinearity problems because the VIF values for DV1_OS_Gap and IV2_Educational Curricula are less than the 3-point cutoff. Additionally, there are no multicollinearity problems with independent variables such as IV4_Professional Development and Training and

IV2_Practical Training Opportunities. Nonetheless, several indicators, including IV6_Current Bridging Strategies and IV7_Policy Interventions, have high VIF values, which might suggest possible overlap or redundancy with other items.

These constructs may need further evaluation to ensure distinct dimensions of their respective constructs. The study recommends investigating high VIF indicators, analyzing content and purpose, considering refinement or removal, and re-estimating the model to ensure all VIF values fall below 5 and ideally below 3. The VIF results support the validity of the measurement model, but specific indicators within these constructs require further investigation to address moderate to high multicollinearity.

Figure 2
Measurement Model
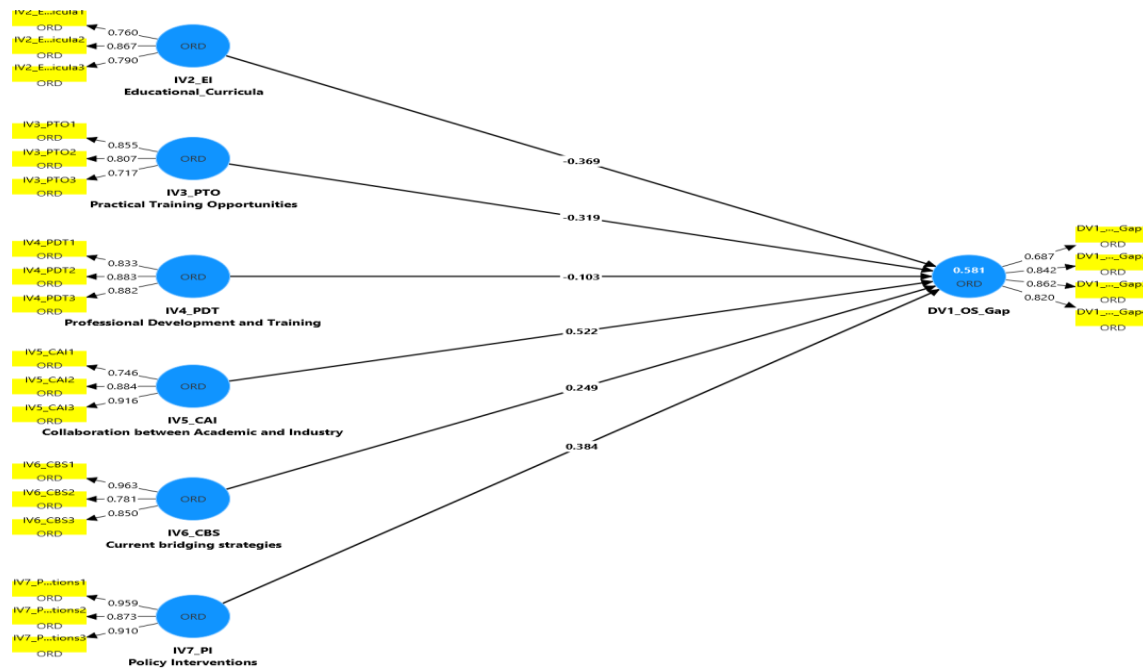
Interpretation of the Structural Model

The model shows how several independent variables (IVs) and the dependent variable (DV) in Pakistan's logistics sector are structurally related. It has a moderate explanatory power, accounting for 58.1% of the variance in the operational skill difference. The direction and intensity of the link between the independent and dependent variables are shown by the path coefficients.

The operational skill gap and educational curricula have a reasonably strong negative association, indicating that more matched curricula can considerably narrow the gap. Opportunities for practical training also have a rather significant detrimental impact on the gap since they assist close it by equipping workers with the industry-required practical skills. The gap is weakly and negatively correlated with professional development and training, indicating that although professional training helps close the skill gap, its impact is less noticeable than that of curriculum and hands-on training opportunities.

Contrary to what one might anticipate, industry-academia collaboration improves the operational skill gap. The skill gap and current bridging techniques have a high positive correlation, indicating that the gap is not being sufficiently addressed by the strategies and that they may need to be reevaluated or restructured to be more successful. The operational skill gap and policy interventions show the largest positive correlation, indicating that although policies are in place, their design or execution may not be sufficient to close the gap and may call for major changes or more robust enforcement measures.

Measurement model details are also included in the model, which illustrates how effectively the indicators capture the corresponding constructs (latent variables). The skill gap may be substantially closed by strengthening professional development programs, providing more hands-on training opportunities, and upgrading school curriculum, according to negative path coefficients. Positive route coefficients draw attention to places where existing approaches, such industry-academia collaboration, may be ineffectual or detrimental. Enhancing curriculum alignment, increasing chances for hands-on training, updating collaborative models, updating policy frameworks, and strengthening bridging techniques are some of the recommendations. The logistics sector may successfully close the operational skill gap and raise its level of competitiveness by resolving identified inefficiencies.

The gap is weakly and negatively correlated with professional development and training, indicating that although professional training helps close the skill gap, its impact is less noticeable than that of curriculum and hands-on training opportunities. Contrary to predictions, cooperation between academics and industry improves the gap. The skill gap and current bridging techniques have a substantial positive correlation, indicating that they would need to be reevaluated or restructured to be more successful. The gap and policy interventions show the largest positive

correlation, indicating that although policies exist, they may not be implemented or designed in a way that effectively closes the gap.

The operational skill gap in Pakistan's logistics sector may be clearly understood thanks to the model. The benefits of cooperation, bridging techniques, and policy interventions underscore the necessity for major advancements in these areas, even though professional development, practical training, and curriculum are essential in closing the gap.

Figure 3
Structural Model
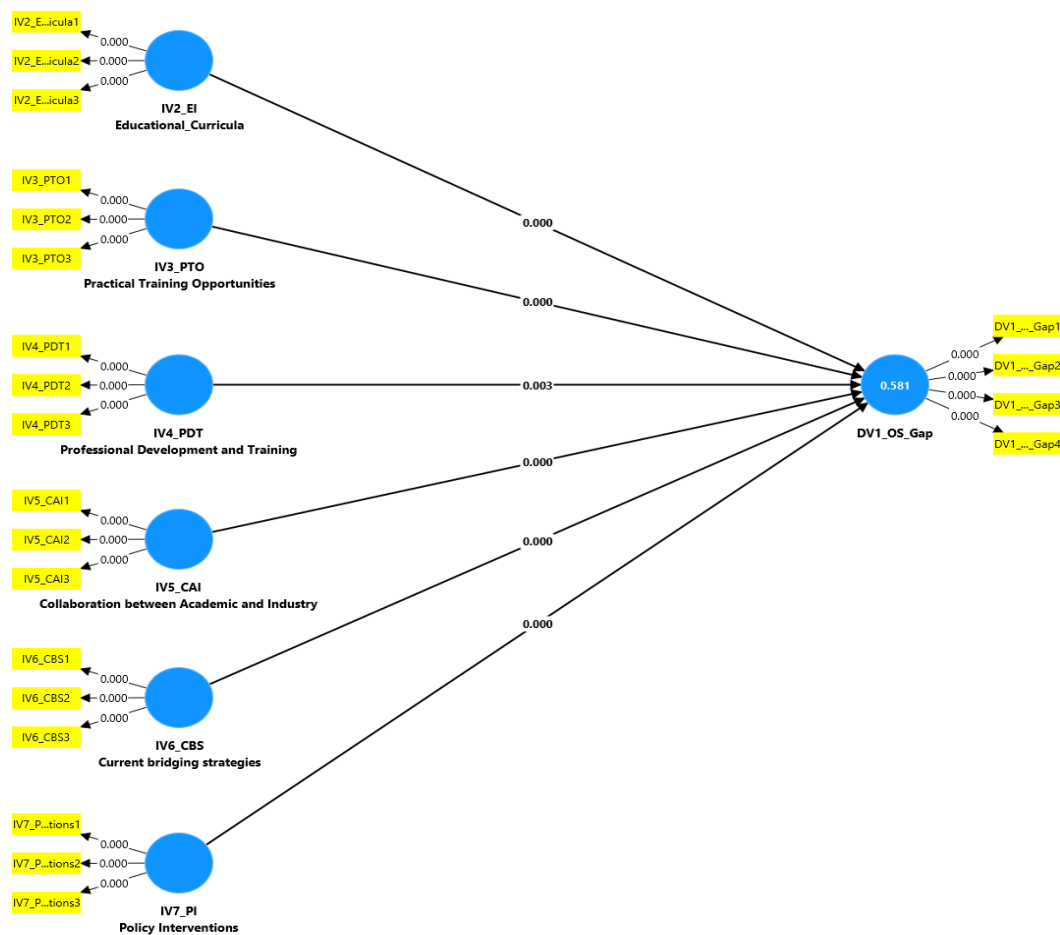
The study examines the link between several independent factors (IV2_EI, IV3_PTO, IV4_PDT, IV5_CAI, IV6_CBS, and IV7_PI) and the dependent variable (DV1_OS_Gap) in Pakistan's logistics sector using a structural equation model (SEM). The findings indicate that the operational skill gap is reflected in the dependent variable, DV1_OS_Gap, and that a sizable amount of the

factors influencing it can be explained by the independent variables taken together. The findings show that professional development and training, as well as practical training opportunities, have a minor but statistically significant influence on closing the operational skill gap, but educational courses have no effect at all. Additionally, there is no discernible influence from academic-industry collaboration, indicating that present tactics may not be successful or well implemented. Additionally, there is no statistically significant effect of policy interventions on closing the operational skill gap. According to the model, the operational skill gap in Pakistan's logistics sector requires major changes to school curriculum, training opportunities, industry partnerships, and policy initiatives.

Table 3
Hypotheses result from a structural model.

Hypothesis	t-test	P-Value	Result
H1: Educational Curricula → Operational Skill Gap	7.980	0.000	Accepted
H2: Practical Training Opportunities → Operational Skill Gap	8.381	0.000	Accepted
H3: Professional Development and Training → Operational Skill Gap	2.967	0.003	Accepted
H4: Collaboration Between Academia and Industry → Operational Skill Gap	8.495	0.000	Accepted
H5: Current Bridging Strategies → Operational Skill Gap	6.591	0.000	Accepted
H6: Policy Interventions → Operational Skill Gap	7.226	0.000	Accepted

The table displays the T-statistics and P-values for the correlations between the independent factors and the Operational Skill Gap (DV1_OS_Gap), the dependent variable. The T-statistics compare estimated values to their standard error to determine the path coefficients' significance. Statistical significance is shown by a T-statistic larger than 1.96. The P-values evaluate how likely it is that the link happened by accident.

The findings indicate that well-aligned courses are crucial as they considerably close the operational skill gap. The substantial detrimental effect of practical training chances indicates that better training initiatives are very successful in closing the gap. Compared to curriculum and training opportunities, professional development and training have a statistically significant but less pronounced impact on closing the skill gap. The operational skill gap is significantly reduced when academics and industry collaborate, indicating inefficiencies in the structures now in place

for collaboration. The skill gap is significantly and favorably impacted by current bridging measures, indicating that these strategies are either insufficient or unsuccessful in closing the gap. The operational skill gap is significantly improved by policy interventions, indicating that current policies can benefit from reform or stronger enforcement.

Discussion and Conclusion

Discussion

The results of this study offer insightful perspectives that highlight the operational skill gap in Pakistan's logistics sector following the structural model analysis. Numerous important factors, such as educational curricula, opportunities for practical training, professional development programs, industry-academia collaboration, current bridging strategies, and policy interventions, all have an impact on the operational skill gap, which impairs the sector's performance and competitiveness. A thorough examination of the results and their implications is given in this section.

Courses of Study

Consequently, a statistically significant and adverse correlation between school curricula and the operational skill gap was found. This demonstrates how effectively the skill gap may be closed by carefully crafting curriculum that are in line with industry demands. The operational requirements and contemporary technology of the logistics sector, such as automation, big data analytics, and the Internet of Things (IoT), may not be adequately incorporated into Pakistan's present curricula. Competency-based education has been shown to be effective in closing skill gaps across industries in previous research (Haque et al., 2019; Naseem et al., 2021).

Realistic Training Possibilities

Opportunities for practical training also have a significant detrimental impact on the skill gap. The significance of experiential learning, internships, and cooperative education programs in equipping students for real-world logistics difficulties is underscored by this. Previous studies have shown that experiential learning is a vital aspect of workforce preparation, especially in industries like logistics, and that it is highly dependent on operational efficiency and technology (Ul-Hameed et al., 2019; Harrasi et al., 2023). Regretfully, Pakistan has few options for internships and field-

based training to satisfy industrial expectations, which lowers the workforce's capacity.

Professional Training and Development

The operational skill gap and professional development programs had a substantial but weaker association than other factors. This suggests that although skill development is aided by training programs, they need to be better matched with the changing demands of the sector. Continuous professional development has been emphasized in earlier research as being crucial, particularly for promoting adaptability in quickly changing sectors (Kumar & Sharma, 2019; Abbas et al., 2020).

Working together Between Industry and Education

Unexpectedly, there was a significant beneficial impact on the operational skill gap characterized by the link between university and industry. This surprising discovery points to a lack of proficiency in the existing frameworks for cooperation. Prior studies have demonstrated the dynamic nature of successful academia-industry relationships in coordinating educational outputs with the demands of the labor market (Haque et al., 2019; Naseem et al., 2021). According to the positive connection, the skill gap may not be closed by present partnerships because they lack structure, quantifiable goals, or active participation from both sides.

Current Methods for Bridging

The operational skill gap and current bridging solutions also showed a significant positive correlation, suggesting that the gap may not be adequately addressed by current methods. This is consistent with results from global research that suggests talent shortages can be made worse by poorly thought out or poorly executed tactics (Kotzab et al., 2018; Christopher, 2016). With an emphasis on focused interventions like advanced skill-building programs and vocational training, bridging initiatives in Pakistan need to be reviewed.

Policy Measures

The operational skill gap was also significantly positively correlated with policy interventions, underscoring the inadequacy of policy formulation and execution. Policies are in place to encourage skill development, but their effectiveness may be constrained by a lack of funds, poor enforcement, or low stakeholder participation. According to research, cooperation between government, business, and academia is necessary for successful policies to solve systemic issues (Haque et al., 2019; Abbas et al., 2020).

Conclusion

The study's conclusions give a thorough grasp of the variables affecting the operational skill gap in Pakistan's logistics sector as well as practical advice for policymakers, business, and academics.

1. Educational Curricula and Practical Training: These components were shown to be the most crucial in closing the operational skill gap. To ensure that the workforce has the necessary skills, it should be a top priority to reform logistics curriculum and increase training possibilities.

2. Collaboration and Bridging Strategies: These activities require a strategic makeover due to their favorable effects on the skill gap. Meaningful collaborations between academia and industry are required, with well-defined goals including operational competency and graduate employment.

3. Policy Interventions: To make sure that their conception and execution meet the demands of the logistics sector, policies intended to promote skill development must be reexamined. Mechanisms for monitoring and assessing the efficacy of policies ought to be implemented.

4. Professional Development: Although professional training programs help close the talent gap, their limited impact suggests that they be modified to better meet the sector's changing needs.

Recommendations

1. Curriculum Reform: Include industry-specific topics like supply chain analytics and warehouse automation in academic curricula.

2. More Training Opportunities: Logistics companies and academic institutions may collaborate to offer internships and cooperative education.

3. Policy Redesign: Create focused policies to guarantee efficient enforcement systems and encourage talent development.

4. Improved Cooperation: Rethink academic-industry collaborations to incorporate consistent participation, jointly created initiatives, and quantifiable results.

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