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A Critical Evaluation of Supply Chain and Procurement Skills Required in the Auto-Parts Industry of Pakistan for the Next Decade

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ABSTRACT: The automotive parts manufacturing sector constitutes a cornerstone of Pakistan's industrial economy, contributing approximately 3% to the national GDP and supporting over 2.5 million employment opportunities across the country. As global supply chains undergo rapid digital transformation, the sustainability and competitiveness of Pakistan's auto-parts industry increasingly depend upon the strategic development of supply chain management (SCM) and procurement competencies. This qualitative study critically evaluates the evolution, current state, and future requirements of SCM skills within Pakistan's auto-parts sector. Through semi-structured interviews with eight SCM professionals representing diverse functional specializations—including procurement, logistics, operations, and sustainability—the research identifies significant skill gaps in technological proficiency, digital literacy, and sustainability competencies. The findings reveal that while foundational SCM skills such as negotiation, relationship management, and risk mitigation remain relevant, the industry faces a critical shortage of expertise in artificial intelligence, data analytics, automation, and Internet of Things (IoT) applications. The study further identifies that sustainability competencies and global supply chain knowledge are emerging as non-negotiable requirements for future competitiveness. Based on these findings, the research proposes a comprehensive framework for skill development encompassing continuous professional development, industry-academia collaboration, and strategic investment in digital infrastructure. The study concludes that Pakistan's auto-parts industry stands at a pivotal juncture where strategic investment in SCM skill development will determine its capacity to compete in increasingly sophisticated global markets over the next decade.

KEYWORDS: Supply Chain Management, Procurement Skills, Auto-Parts Industry, Digital Transformation, Pakistan, Artificial Intelligence, Sustainability, Skill Development

1. Introduction

1.1 Background and Context

Pakistan's automotive parts manufacturing industry represents a significant yet underexplored segment of the national economy. The sector ranks 23rd globally in auto-parts production, contributing over Rs. 50 billion (approximately US\$220 million) to national income. Pakistan currently stands as the 35th largest vehicle manufacturer worldwide, with the automotive sector accounting for 3% of the country's GDP and employing over 2.5 million workers. The industry comprises more than 1,200 Tier-1, Tier-2, and Tier-3 suppliers, with approximately 400 Tier-1 suppliers serving the original equipment manufacturer (OEM) industry.

Despite these impressive figures, Pakistan's auto-parts industry faces substantial challenges that threaten

its long-term viability. The sector is characterized by low production volumes, high manufacturing costs, delayed vehicle deliveries, and vulnerability to external shocks such as exchange rate devaluation and import restrictions. A lack of skilled labour, coupled with minimal government investment in vocational training, has significantly hindered the sector's ability to scale up and compete internationally. Global competition from low-cost producers, particularly in neighbouring countries, has intensified pressure on Pakistan's auto-parts manufacturers.

Supply chain management plays a crucial role in addressing these challenges. Effective SCM enables cost control through optimized sourcing, logistics, and inventory management; ensures quality through systematic control mechanisms from manufacturer to final delivery; and builds strategic relationships with suppliers that enhance operational resilience. However,

the rapid pace of technological change—particularly the emergence of artificial intelligence, automation, the Internet of Things, and blockchain—demands corresponding evolution in the skills and competencies of SCM professionals.

1.2 Rationale of the Study

The rationale for this study stems from the critical need to understand how SCM and procurement skills must evolve to meet the demands of Pakistan's auto-parts industry over the next decade. Without contemporary SCM competencies, the industry cannot maintain pace with global developments or capitalize on emerging opportunities. This research addresses several pressing gaps in current knowledge.

First, there exists a significant disconnect between the skills currently possessed by SCM professionals in Pakistan and the competencies required to navigate increasingly complex, technology-driven supply chains. As the Chartered Institute of Procurement & Supply (CIPS) has noted, 84% of recruiting managers in the UK now consider digital skills more important in procurement, while 88% of businesses report difficulty finding candidates with the digital skills needed for automation and data analytics. Pakistan faces similar if not more acute, challenges in this regard.

Second, the auto-parts industry is undergoing transformation driven by technological advancements that demand new skill sets. Artificial intelligence and machine learning were identified as the number one skill in supply chain job postings in 2024. Organizations are increasingly scaling AI workflows, hiring for AI-specific roles, and prioritizing data-centric investments to better navigate disruption. These trends have direct implications for the skills required of SCM professionals in Pakistan.

Third, sustainability has emerged as a critical dimension of supply chain management. Environmental regulations, customer expectations for ethical products, and the need for operational efficiency all demand competencies in sustainable sourcing, green logistics, and circular supply chain practices. The integration of sustainability with digital competencies represents a significant challenge and opportunity for Pakistan's auto-parts industry.

1.3 Aim and Objectives

Aim: This study aims to identify and evaluate key supply chain management skills required in the auto-parts industry of Pakistan, analyze existing skill gaps, and propose actionable steps to ensure skill alignment with the demands of the next decade.

Objectives:

1. To understand the evolution of SCM skills from the past to the current era in the auto-parts industry of Pakistan
2. To analyze the current position of SCM skills and determine whether they are fulfilling the requirements of the auto-parts industry of Pakistan
3. To analyze SCM skills needed for the survival and competitiveness of the supply chain in the next decade
4. To identify recommendations for the improvement of procurement skills needed in the next decade

1.4 Structure of the Article

This article proceeds as follows. Section 2 presents a comprehensive literature review examining the evolution of SCM, current skill requirements, and future trends. Section 3 describes the research methodology, including the qualitative approach, sampling strategy, and data analysis techniques. Section 4 presents the findings from the empirical research organized by thematic categories. Section 5 discusses these findings in relation to the literature and research objectives. Section 6 concludes with recommendations for practice and directions for future research.

2. Literature Review

2.1 Understanding Supply Chain Management

Supply chain management encompasses the coordination and management of various flows—products, information, and finances—from suppliers to final consumers. In the context of corporate entities, the supply chain includes all systems, people, organizations, resources, and services involved in this transfer. SCM systems are designed to facilitate major movements between departments within organizations and between different organizational entities, achieving operational efficiency and strategic alignment.

The auto-parts industry presents unique SCM challenges due to the complexity of its supply networks, the precision required in manufacturing, and the need for just-in-time delivery systems. In Pakistan's context, these challenges are compounded by infrastructural limitations, regulatory uncertainties, and the predominance of small and medium-sized enterprises (SMEs) within the vendor base.

2.2 Procurement and SCM Skills

Procurement skills encompass the abilities required to acquire goods and services for business operations, including making purchases, receiving deliveries, and maintaining documentation throughout the supply chain process. Successful contemporary procurement requires the ability to align procurement strategies with the

overall demands of the organization and industry.

The Chartered Institute of Procurement & Supply (CIPS) has identified key procurement skills that professionals should exhibit:

- Relationship management in the supply chain
- Procurement negotiation skills
- Supply chain time-management
- Strategic research in SCM
- Change adaptation
- Risk management in SCM
- Sustainability in SCM operations
- Global market awareness
- Core technology competencies
- Financial understanding of SCM
- Collaboration in SCM
- Key Performance Indicators (KPIs)
- Forecasting in SCM
- Quality control in the supply chain
- Warehousing and inventory management skills

2.3 Evolution of SCM Skills in the Auto-Parts Industry

The historical evolution of supply chain management provides essential context for understanding contemporary skill requirements. Dating back thousands of years, the forefathers of the modern supply chain included the ancient civilizations of Mesopotamia, Egypt, Greece, and Rome, which established trading networks connecting distant civilizations. The Silk Road connected Rome with Chinese manufacturers, while Roman road networks expanded overland commerce.

The Industrial Revolution marked a significant turning point. Mechanization caused an exponential rise in industrial production, while railroad development enabled quicker and more reliable overland transit. This period saw procurement gain prominence as a distinct job function, with "materials" men managing the procurement and delivery of supplies to reduce production costs through strategic negotiation with suppliers.

The shipping container, developed in the 1950s and 1960s, revolutionized global commerce by enabling the transfer of goods across modes using standardized steel container units. This "containerization" process allowed access to smaller market participants and scaled up

international trade. Simultaneously, Toyota's "just-in-time" manufacturing strategy demonstrated the need for efficient, well-coordinated supply networks, relying on strong relationships with local suppliers to provide components on demand.

Information technology advancements in the 1960s and 1970s mechanized tracking, planning, and invoicing. Supply chain management evolved as a distinct operational role in the 1980s, propelled by personal computing advancements. The Internet further accelerated these developments, making it possible to overcome one of the most persistent obstacles to global trade: prompt, efficient communication.

In the 1990s, globalization exploded as trade barriers fell and emerging countries became industrial powers. Global supply chains that crossed continents produced networks of vendors, warehouses, transporters, merchants, and consumers. The growth of e-commerce created new delivery and distribution challenges, requiring reorganization of inventory deployment, picking processes, packaging, and reverse logistics.

In the 2010s and 2020s, supply chains saw a resurgence of focus on resilience, flexibility, and agility. The COVID-19 pandemic highlighted the flaws in globally integrated supply networks, demonstrating that many companies had over-concentrated their production without backup plans. This has driven increased interest in supply chain visibility, risk management, and diversification strategies.

2.4 Current Position of SCM Skills in Pakistan's Auto-Parts Industry

The current state of SCM skills in Pakistan's auto-parts industry reveals significant gaps between existing competencies and industry requirements. Research has shown that the industry remains modest in size and has not fully functioned as a driving force behind the expansion of the manufacturing sector.

Relationship Management: Human resource management must establish positive working relationships with diverse suppliers, as organizations need a range of products and services for daily operations. Long-term partnerships with suppliers can serve as sources of creativity and fresh perspectives that address current issues in novel ways.

Procurement Negotiation Skills: In the dynamic world of supply chain management, negotiation ability is crucial to organizational success and longevity. Supply chain professionals can use successful negotiating techniques to obtain better terms, conditions, rates, and terms from suppliers, increasing competitive advantage and reducing expenses.

Time Management: To reduce risk and guarantee

continued supply chain operations, decisions must be made quickly. Solutions must be found promptly when problems arise in the auto-parts industry. Efficient time management techniques enhance client satisfaction by providing reliable service.

Strategic Research: Organizations constantly seek fresh concepts and improved management techniques that can provide competitive advantage, reduce expenses, and enhance services. Integrating the supply chain is at the core of current thought because it can eliminate obstacles and provide a seamless flow of goods.

Risk Management: Companies can develop resilience to deal with unpredictability and maintain business continuity by establishing supply chain risk management plans. Proactive readiness enables businesses to save costs, increase customer satisfaction, prevent or minimize interruptions, and improve quality.

Sustainability: Sustainable supply chain management describes how socially and environmentally responsible methods are integrated into the supply chain at every level, from obtaining raw materials to shipping completed goods to customers.

Technology Integration: The use of cutting-edge technology in Pakistan's logistic system is not particularly evident. A significant portion of merchants continue to perform stock take-outs, shelf position identification, and other tasks manually. While some transport companies have started monitoring and displaying consumer orders, the technology is currently unable to provide real-time traceability.

2.5 SCM Skills Needed for the Next Decade

The next decade will demand significant evolution in SCM skills, driven by technological advancement, sustainability requirements, and global market integration.

Artificial Intelligence and Machine Learning: AI-enabled SCM can learn how to make decisions on its own in any given circumstance. Modeling and simulation, prediction, decision support, and optimization are four supply chain features that can be addressed by AI techniques. At least 50% of global firms will have transformed their supply chain management and incorporated AI-related technology into their IT infrastructure by 2023. AI is capable of making wiser judgments and has already been used in labour resource planning and the reduction of pointless goods journeys.

Internet of Things (IoT): A collection of real-world items that are digitally linked and accessible over a wireless network, IoT devices enable automated forecasting and asset monitoring by utilizing data from

sensors in warehouses. More than 25.4 billion IoT devices are expected to be in use by 2030. Digital manufacturing technologies related to Industrial IoT are being used by 54% of respondents to recent industry surveys, while 33% are in the process of launching them.

Automation: Automation has significant importance in supply chain management. Robots are currently used in supply chains to transport materials and produce goods more quickly and effectively than humans. Robots will become more intelligent with the use of AI and IoT. Automating production involves software and other cutting-edge technologies that improve and streamline operations. Robotics contributes to uniformity in production, eliminating human errors and minor variations in product quality.

Blockchain: Blockchain technology enhances the procurement contracting process, resulting in greater time and cost savings. It provides transparency and traceability in supply chains, particularly important for sustainability and ethical sourcing initiatives.

Data Analytics: Supply chain analytics can optimize inventory visibility and strategic sourcing, save costs, and improve customer satisfaction. Supply chain management relies on details and high-quality data to provide wide advantages. Analytics drives the technological elements that provide astute plans and beneficial results.

Sustainability Competencies: Sustainability is creating demands for green skills in logistics, sustainable supply chain management, and sustainable material management. These competencies will be significant in the supply chain industry as global environmental issues intensify. Predictive analytics using AI and a long-term sustainable approach to managing inventory will be vital in giving a competitive edge.

Global Supply Chain Knowledge: Knowledge of international markets, trade laws, and cross-country transportation is essential for navigating today's global economy. Understanding customs regulations and delivery time management provides SCM professionals with an edge in international supply chain operations.

2.6 Recommendations for Skill Improvement

Pakistan faces several challenges in implementing new technologies in the auto-parts industry. The majority of businesses are SMEs, and one of their biggest challenges is the expense of using new technology in logistical and procurement processes. However, several strategies can address these challenges.

Government Initiatives: The government has set aside Rs. 1.1 billion for artificial intelligence research. The government and corporate sectors must collaborate to deploy technologies to maximize the benefits of the

China-Pakistan Economic Corridor (CPEC) by increasing efficiency, speed, accuracy, cost savings, and economic opportunities.

Training and Development: All types of businesses will need to use emerging technologies in the future. Supply chain management businesses need to invest in training their employees to utilize technology effectively. Continuous professional development programs, certification in new technologies, and on-the-job training are essential for consistent skill improvement.

Industry-Academia Collaboration: Stronger collaboration between industry organizations and academic institutions is needed for proper training offerings. Internships and apprenticeships enable candidates to gain practical training in SCM. Educational institutions should include novel technologies and trends in their curriculum.

Digital Infrastructure: The government is interested in building infrastructure needed for the use of new technologies. Technologies like RFID and artificial intelligence enhance the traceability of goods in transit and storage, allowing businesses to manage inventories precisely and effectively.

3. Research Methodology

3.1 Research Approach

This study employs a qualitative research methodology to explore the competencies needed in supply chain and procurement in the auto-parts industry of Pakistan. The qualitative approach was selected because it enables the researcher to understand thoroughly social phenomena such as the dynamism in skills in supply chain management, which could be hard to comprehend from a quantitative perspective.

Qualitative research provides comprehensive textual representations of people's experiences with a specific study topic, offering details on the "human" side of issues—people's sometimes contradictory views, relationships, behaviors, and feelings. It enables the identification of intangible traits and provides a helpful tool for understanding and analyzing the intricate details of a given situation.

3.2 Data Collection

Semi-structured interviews were employed as the primary data collection method. Interviews remain the most frequently used technique for gathering data in qualitative research for social issues, as they enable researchers to find out more about an entity or person's experiences, viewpoints, beliefs, ideas, and motivations concerning certain issues, situations, or events. This method is particularly appropriate when researching

topics where participants want to express their opinions verbally.

3.3 Sampling Strategy

Purposive sampling was employed to select participants who could provide comprehensive and in-depth information on the topic under study. This sampling approach involves selecting informants on purpose based on the attributes they possess, without requiring a predetermined number of informants.

Population: The study selected the Lahore market of supply chain related to auto-parts. Respondents were selected from the Lahore market.

Sample Size: Eight persons related to the auto-parts sector participated in the study. They are related to the business of auto parts and possess skills in supply chain management and procurement. The concept of "saturation" was applied, with the understanding that the more relevant knowledge the sample has to the actual inquiry, the fewer participants are needed.

Participant Profile: The respondents represented diverse specializations within SCM: Supply Chain Manager (15 years experience), Procurement Specialist (5 years), Operations Manager (7 years), Sustainability Manager (7 years), Supply Chain Coordinator (5 years), Logistics Manager (4 years), Procurement Specialist (8 years), and Logistics Manager (over 10 years). Their qualifications ranged from BS degrees to Master's degrees in supply chain management and business administration.

3.4 Ethical Considerations

Ethical considerations were carefully addressed throughout the research process. Participants were informed about the purpose of the study, their voluntary participation, and their right to withdraw at any time. Confidentiality and anonymity were assured. The researcher considered potential ethical problems that could arise during the study, including concerns about the study's quality, reproducibility, and privacy. The participant-researcher interaction was conducted professionally, with respondents allowed to respond with more information and in more detail than in quantitative methodologies.

3.5 Data Analysis

Thematic analysis was employed to analyze the qualitative data. This approach involves the collection, analysis, and interpretation of qualitative data into a coherent explanation, understanding, or interpretation of the subjects and circumstances under study. The analysis focused on identifying patterns and themes within the interview data, grouping data according to research questions and seeking patterns and distinctions.

3.6 Validity and Reliability

In qualitative research, validity refers to the precision with which the results reflect the data and the integrity of the methodology utilized. Reliability denotes the consistency of the analytical procedures used. The researcher employed several strategies to ensure validity and reliability:

1. Rich, thick description of the research context and participants
2. Triangulation of data sources
3. Member checking with participants
4. Clear documentation of the research process
5. Reflexivity regarding the researcher's position and potential biases

4. Findings

The analysis of interview data revealed sixteen thematic categories that illuminate the current state and future requirements of SCM skills in Pakistan's auto-parts industry.

4.1 Roles and Responsibilities in Supply Chain Management

Respondents represented diverse specializations within SCM, including Supply Chain Manager, Procurement Specialist, Operations Manager, Sustainability Manager, Supply Chain Coordinator, and Logistics Manager. This diversity demonstrates that SCM involves much more than coordination of goods from supplier to consumer; it requires specialized skills and duties to ensure optimization and sustainability.

Despite distinct positions, many activities recur across roles, particularly in procurement, logistics, and sustainability tasks. This indicates synergy in the work of different personnel and demonstrates the integrated approach in supply chain management where multiple functions must be coordinated.

4.2 Working Experience and Tenure

Respondents had varied working experience in the auto-parts industry, ranging from four years to over fifteen years. This variation contributes to different skill sets and experiences across organizations, resulting in relative perspectives on SCM practices and issues.

Longer tenure, as mentioned by respondents with 15+ years experience, means better supply chain problem knowledge and problem-solving skills. Experience plays a significant role in competency, with more experienced professionals reporting greater job satisfaction and confidence in their roles.

4.3 Educational Engagement and Application to SCM

Expertise

A vast majority of respondents have postgraduate education, with several holding Master's degrees in supply chain management or related fields. This high level of academic achievement indicates substantial theoretical knowledge, which is crucial for effective strategic decision-making and advancement of enhanced supply chain practices.

Respondents with Master's degrees reported better opportunities for improving their employment and ability to solve complex supply chain issues than those with Bachelor's degrees. This suggests a close relationship between education and career progression in the field.

4.4 Departmental Roles and Specializations

Respondents are sourced from different organizational departments, with expertise in procurement, logistics, and distribution. This indicates diverse specialty among SCM professionals and demonstrates that SCM requires multidisciplinary input for success.

Several respondents working in procurement also work in logistics, indicating the intersection of these functions. This interaction means that supply chain processes must be managed with extra care to match the criteria of efficient procurement as well as practical supply chain management.

4.5 Current SCM Skills in Demand

Respondents stressed the need for digital skills, statistical analysis, and application of technologies like artificial intelligence in SCM. These competencies are now critical to supply chain management because of the intricate and growing nature of supply chains.

Several participants focused on aspects of operational management and sustainability in the supply chain. Leadership is required to have skills in the management of supply chain operations together with compliance with environmental standards and mastery of logistics.

4.6 Alignment of SCM Skills with Industry Needs

Some respondents admitted that the industry is gradually addressing SCM skill demands but acknowledged challenges exist, especially in hi-tech adoption and sustainability. Partial needs satisfaction indicates that while some areas are achieving satisfaction, there is need for further development.

Employees complained about inadequate provision for skill development across SCM in technology incorporation and risk issues. This emphasizes the need to continue enhancing and investing in skills to meet industry needs efficiently.

4.7 Competency Levels of SCM Professionals

Competency is a relative concept that depends on role and experience. Some respondents pointed out that competency levels among SCM professionals differ based on responsibilities and tasks assigned. Some companies focus on classical SCM approaches, and future potential workers could lack digital and specific skills.

While assessing competency, different respondents employ various measures such as technical knowledge, order fulfillment accuracy, and KPIs. This variation in evaluation methods calls for harmonization of competency evaluation methods within the discipline.

4.8 Challenges Faced by SCM Professionals

Respondents identified rapid changes in technology and environmental factors as major concerns. Acceptance of new technologies and incorporation of sustainability are challenges that SCM professionals face in the context of higher regulation and increased globalization.

Several respondents pointed to issues of supply chain interruption occasioned by political instabilities and transportation delays. These disruptions can be very damaging to the flow of inputs or whole supply chain processes.

4.9 Future Deployment of SCM Skills and Role of Technology

Respondents expect that skills such as AI, automation, and blockchain will be vital in the next decade. These areas are anticipated to bring about efficiencies and improvements in supply chain processes and constitute fields of concern for future SCM experts.

Respondents insist on the future relevance of linking sustainability with high digital competencies. Predictive analytics using AI and a long-term sustainable approach to managing inventory will be vital in giving a competitive edge in the auto-parts industry.

4.10 Influence of Sustainability on SCM Skills

Respondents reveal how sustainability is creating demands for green skills in logistics, sustainable supply chain management, and sustainable material management. These competencies will be significant in the supply chain industry as global environmental issues intensify.

Respondents noted the relevance of technology in promoting sustainability goals. Using artificial intelligence to improve route optimization and blockchain for transparent sourcing are plans of action for SCM professionals wishing to reduce environmental

impact and improve efficiency.

4.11 Global Supply Chain Knowledge for Pakistan-based SCM

Respondents highlighted the need to have global supply chain knowledge to extend understanding of other countries' markets, trade laws, and cross-country transportation. This relevance cannot be overemphasized due to the competitiveness and efficiency characteristic of today's global economy.

Respondents emphasized that global supply chain expertise is important when it comes to final cost, customs regulation, and delivery time. Due to this specialization, SCM professionals in Pakistan have an edge in international supply chain operations.

4.12 Recommendations for SCM Training and Development

Respondents stress that SCM training should focus on digital literacy, knowledge and skills in emerging trends like AI, data analysis, and blockchain. These courses are viewed as necessary for preparing practitioners for future supply chain scenarios.

Respondents advised that training should also entail aspects of strategic thinking and sustainability so that SCM professionals are in a position to make informed decisions that meet business requirements. Training consistent with these priorities will lead to satisfaction and preparedness among professionals.

4.13 Preparation of Students for Future SCM Roles

Respondents pointed out the need for real-world exposure including internships and industry linkages. Such experiences assist students in making a transition from class knowledge to functional knowledge so that upon graduation, they are well-equipped for SCM positions.

Respondents opined that educational institutions should include novel technologies and trends in the curriculum. Training students to become conversant with industry-specific and state-of-the-art applications such as advanced inventory management systems, artificial intelligence, and global supply chains is important.

4.14 Strategies for Consistent SCM Skills Improvement

From the respondents' perspective, there is a need to establish continuous professional development as well as certification in new technologies and international SCM trends. These programs assist in the development of SCM professionals by updating their skills to sustain market forces.

Participants claimed that on-the-job training and practical experience are key to achieving consistent gains.

Learning on the job through actual movement from one workplace to another for training purposes is considered a best practice for building employee capabilities.

4.15 Growth Strategies for SCM Professionals

Respondents emphasized that new SCM professionals should adopt a culture of learning and deploy skills such as adapting to new technology and strategic thinking. It is important to update oneself with the latest innovations and grasp the vitalities of the supply chain to have long-term sustainability in the job field.

Relations with suppliers and customers are paramount. Building these networks is crucial for managing supply chain challenges and professionalism.

4.16 Suggestions for SCM Professionals Entering the Auto-Parts Industry

Respondents propose that new SCM professionals should closely follow technological progress in the fulfillment of SCM functions, including technologies like ERP systems and AI. This is especially important in the continually changing environment of the supply chain.

Respondents also insist on comprehensively grasping the characteristics of the auto-parts industry and establishing close connections with suppliers and customers. Gaining good knowledge of the processes applied specifically to the industry and personal relationships are key factors for long-term sustainability in the SCM discipline.

5. Discussion

5.1 Integration of Findings with Literature

The findings of this study align with and extend the existing literature on SCM skills in several important ways. The emphasis on technological competence and digital literacy resonates with the literature documenting the increasing importance of AI, automation, and data analytics in supply chain management. The finding that machine learning was the number one skill in supply chain job postings in 2024 is reflected in respondents' recognition that AI skills will be vital in the next decade.

The study confirms the literature's assertion that sustainability competencies are emerging as non-negotiable requirements for SCM professionals. The finding that sustainability is creating demands for green skills in logistics, sustainable supply chain management, and sustainable material management directly supports the literature on sustainable supply chain management.

The research also validates the literature's emphasis on global supply chain knowledge. The finding that knowledge of international markets, trade laws, and cross-country transportation is essential aligns with the literature on the importance of global market awareness for SCM professionals.

5.2 Skill Gaps in Pakistan's Auto-Parts Industry

The findings reveal significant gaps between current SCM competencies and industry requirements in Pakistan's auto-parts sector. These gaps can be categorized into several areas.

Technological Gap: The limited adoption of cutting-edge technology in Pakistan's logistic system represents a significant gap. While some transport companies have started monitoring and displaying consumer orders, the technology is currently unable to provide real-time traceability. This contrasts with global trends where organizations are scaling AI workflows, hiring for AI-specific roles, and prioritizing data-centric investments.

Sustainability Gap: The finding that employees complained about inadequate provision for skill development in sustainability indicates a gap between the growing importance of sustainability in global supply chains and the current competencies of Pakistani SCM professionals.

Digital Literacy Gap: The emphasis on digital skills, statistical analysis, and AI applications reveals a gap between the skills demanded by increasingly sophisticated supply chains and the current capabilities of the workforce.

Training and Development Gap: The finding that there is inadequate provision for skill development across SCM indicates a systemic gap in professional development infrastructure. This is consistent with the literature noting a lack of skilled labour and minimal government investment in vocational training.

5.3 Implications for Practice

The findings have several implications for practice in Pakistan's auto-parts industry.

For Organizations: Organizations must invest in training programs that develop technological competencies, particularly in AI, data analytics, and automation. They should also prioritize sustainability training and global supply chain knowledge development. The finding that on-the-job training and practical experience are key to achieving consistent gains suggests that organizations should implement job rotation programs and cross-functional training initiatives.

For Educational Institutions: The finding that students need real-world exposure including internships and

industry linkages suggests that educational institutions should strengthen industry-academia collaboration. They should also include novel technologies and trends in their curriculum.

For Government: The government should increase investment in vocational training and skill development programs. Initiatives such as the PPRA-World Bank capacity-building initiative represent positive steps, but more comprehensive programs are needed. The government should also continue to invest in digital infrastructure and support technology adoption in the auto-parts industry.

5.4 Contribution to Knowledge

This study makes several contributions to knowledge. First, it provides empirical evidence on the current state of SCM skills in Pakistan's auto-parts industry, addressing a gap in the literature on developing country contexts. Second, it identifies specific skill gaps and provides recommendations for addressing them. Third, it validates and extends the existing literature on SCM skills in the context of an emerging economy. Fourth, it provides a framework for understanding the evolution of SCM skills that can inform future research and practice.

5.5 Limitations

Several limitations should be acknowledged. The small sample size ($n=8$) limits the generalizability of findings. The focus on the Lahore market may not capture the full diversity of Pakistan's auto-parts industry. The reliance on self-reported data may be subject to social desirability bias. The cross-sectional design provides a snapshot at a single point in time rather than capturing longitudinal changes.

6. Conclusion and Recommendations

6.1 Conclusion

This study has critically evaluated the supply chain and procurement skills required in Pakistan's auto-parts industry for the next decade. The research has demonstrated that Pakistan's auto-parts industry stands at a pivotal juncture where strategic investment in SCM skill development will determine its capacity to compete in increasingly sophisticated global markets.

The findings reveal that while foundational SCM skills such as negotiation, relationship management, and risk mitigation remain relevant, the industry faces a critical shortage of expertise in artificial intelligence, data analytics, automation, and Internet of Things applications. Sustainability competencies and global supply chain knowledge are emerging as non-negotiable requirements for future competitiveness. The industry is gradually addressing SCM skill demands

but significant challenges exist, especially in hi-tech adoption and sustainability.

The research confirms the literature's emphasis on the transformative potential of digital technologies in supply chain management. AI, automation, IoT, and blockchain are not merely trends but fundamental directions in sustaining competitiveness and effectiveness in the international and green economy. SCM professionals who master these competencies will be well-positioned for success in the coming decade.

The study also highlights the importance of continuous professional development and the role of industry-academia collaboration in preparing the next generation of SCM professionals. Practical experience, internships, and industry linkages are essential for transitioning from theoretical knowledge to functional competence.

6.2 Recommendations

Based on the findings, the following recommendations are proposed:

1. **Enhance Technological Proficiency in SCM:** Organize educational initiatives that include training in the use of artificial intelligence, automation, big data, and related technologies. Promote the use of financial capital to instrument changes in supply chain practices and adopt new digital technologies.
2. **Promote Sustainable SCM Practices:** Apply environmentally friendly third-party logistics and conform to sustainable resource use. Comply with local and international sustainable regulations.
3. **Address Global Supply Chain Challenges:** Gain insight into international markets and cross-border supply chain management. Implement risk management strategies to limit disruptions.
4. **Foster Continuous Learning and Skill Development:** Support career growth, certification, and various training sessions on current and upcoming trends in SCM. Promote lateral transfers and training to develop multi-skilled employees.
5. **Strengthen Industry-Academia Collaboration:** Sign cooperation agreements between industry organizations and academic institutions for proper training offerings. Provide internships and apprenticeships to enable candidates to gain practical training in SCM.
6. **Leverage Data-Driven Decision Making:** Embed data analytics in SCM to improve forecasting and inventory management. Maintain records of KPIs to recognize shortcomings.
7. **Adaptation to Changing Market Demands:** Build

agility in SCM systems to adapt to market challenges and consumer needs quickly. Enhance cooperation with suppliers and buyers.

8. Ethical Sourcing and Supplier Audit: Conduct exhaustive audits on suppliers to check compliance with ethical sourcing. Strengthen transparency and confidence in the external environment.
9. Invest in Supply Chain Innovation and Research: Promote financing of new and advanced SCM research and development initiatives. Use new technologies and methods to influence decisions and anticipate future advancements.
10. Improve Customer-Oriented Supply Chain Strategies: Emphasize improving supply chain processes to match customer requirements closely. Implement ideas to enhance and sustain customer satisfaction.

6.3 Areas for Future Research

Future research should explore several areas identified by this study:

- Evolving SCM roles and their implications for activities and company hierarchy
- Changes in educational systems to match demands observed in the experience world
- Impact of new technologies on priority SCM competencies and educational developments
- Assessment of current state of green logistics and ways of improving current status
- Evaluation of newer systems of route planning, fuel conservation, and sustainable packaging
- Investigation of global factors relating to SCM activities and their relation to local training requirements
- Examination of AI and blockchain technologies in the context of SCM and their impact on skills requirements
- Discussion of shifts in responsibilities in SCM brought about by technology

6.4 Final Remarks

Pakistan's auto-parts industry is on the verge of drastic change over the next ten years. SCM professionals must be ready to advance in the development of digital SCM, increase their awareness of the global supply chain, and apply effective sustainable strategies. These are no longer trends but fundamental directions in sustaining competitiveness and effectiveness in the international and green economy. The prospects for professionalism in SCM will largely

depend on the ability to learn and improve skills continuously.

The future belongs to those who are capable of combining high technologies with eco-friendly processes. All stakeholders must work to equip SCM professionals with the requisite skill and knowledge set to succeed in the next decade. This combined action will serve the interests of professionals working in the industry as well as strengthen and progress the auto-parts industry of Pakistan.

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