

From Rivals to Champions: Evaluating Pakistan's Denim Industry Competitiveness through the GEM Model

 Muhammad Ibrahim Shahid¹

 Sajjad Ahmad Baig²

 Muhammad Abrar³

How to cite this article:

Shahid, M. I., Baig, S. A., & Abrar, M. (2024). From rivals to champions: Evaluating Pakistan's denim industry competitiveness through the GEM Model. *Journal of Excellence in Management Sciences*, 3(2), 82–101.

Received: 9 March 2024 / Accepted: 11 April 2024 / Published online: 19 May 2024

Abstract

The textile industry is the linchpin of Pakistan's economy, constituting 58% of total exports and employing 45% of the workforce. Despite its significance, textile exports have plateaued, urging strategic interventions to unlock untapped potential. This research focuses on the denim sector, a vital yet underexplored niche. Leveraging the Analytic Hierarchy Process (AHP) and the Grounding, Enterprises, and Markets (GEM) model, the study assesses the competitiveness of Pakistan's denim industry. Findings from structured questionnaires targeting industry professionals and experts reveal a GEM Score of 377, surpassing the national average and indicating national competitive advantages. The results highlight strengths in resources, infrastructure, and external markets while emphasising the need to bolster local market engagement. The study not only underscores the current state of the denim industry but also charts a course for strategic initiatives, fostering growth and competitiveness on the global stage. Future research avenues explore causality, broaden the geographical scope, and adapt the GEM model for diverse textile sectors. This research offers practical insights for industry stakeholders, governments, and researchers to navigate the dynamic landscape of Pakistan's denim industry.

Keywords: Textile policy, Competitiveness, Denim industry, GEM model.

1 Introduction

The textile industry plays a pivotal role in shaping the economic landscape of Pakistan, predominantly relying on textile exports. Accounting for 58% of total exports, contributing 5.8% to the GDP, and providing employment for 45% of the workforce, the textile sector is a cornerstone

¹National Textile University, Faisalabad, Pakistan

Corresponding author: ibrahim.wahla50@gmail.com

²National Textile University, Faisalabad, Pakistan

³Government College University, Faisalabad, Pakistan



of Pakistan's economic structure (Tasneem & Khan, [2024](#); Khan et al., [2017](#)). Despite its significance, textile exports have stagnated at \$14 billion over the past decade, highlighting the need for strategic interventions to unlock untapped potential (Chitonge, [2021](#)). According to the International Trade Center, Pakistan possesses a substantial untapped export potential of \$12.2 billion, with \$7.0 billion attributed to textile and garment exports (Abbas & Bhutto, [2022](#)). Diversifying markets and enhancing the branding of Pakistani manufactured products are crucial steps towards unleashing this untapped potential. Currently, Pakistan is a significant exporter of raw materials, with Cotton (HS code 52) being the primary export (Javed et al., [2021](#); Kamal et al., [2022](#)). The global market for articles made from cotton amounts to \$55 billion, with Pakistan ranking as the second-largest exporter of denim fabric, reaching \$3.25 billion (Junayed & Akter, [2023](#)). Noteworthy export destinations for Pakistani denim fabric include Bangladesh, Turkey, Italy, and India (Frederick et al., [2019](#)).

Pakistan contributes 1.5% to the total global export volume of \$21.5 billion in denim garments, holding the 14th position worldwide. In contrast, Bangladesh leads the pack with \$4.8 billion and a 22% share, followed by China at \$3.3 billion and a 15% share. Bangladesh's consistent increase in denim exports, especially to the European Union, highlights the competitive challenges faced by Pakistan (Razzaque et al., [2020](#); Surjit et al., [2024](#)). Pakistan's denim export figures to the European Union lag, with 105.6 million pairs in 2023, representing a mere 2% increase over three years (Surjit et al., [2024](#)). A considerable gap exists in the export numbers between Pakistan and Bangladesh, emphasizing the urgent need to explore and exploit the export potential of the Pakistani denim industry in the international market. This research endeavors to investigate and uncover this potential, aiming to enhance the competitiveness of the Pakistani denim industry.

To assess the export potential, the researcher employs the Analytic Hierarchy Process (AHP), complemented by the "Grounding, Enterprises and Markets" (GEM) model to evaluate competitiveness. Competitiveness, derived from the Latin word "competitor," pertains to participating in commercial competition across various firms and markets. At the firm level, competitiveness signifies producing goods and services at optimal value, surpassing local and global competitors (Akhuand & Abbas, [2023](#)). This research seeks to address the existing gap in the literature on the textile industry in Pakistan and position it competitively on the global stage, considering the rich resources in cotton. Despite Pakistan's vast cotton resources, it lags in global market share, holding less than 1%, while regional competitors, including India, Bangladesh, China, South Korea, Malaysia, and Thailand, dominate the international textile markets (Rahman, & Moazzem, [2022](#); Ridley & Devadoss, [2023](#)). The study recognizes the need for Pakistan to enhance its competitiveness in the global textile industry, acknowledging the significant labor-intensive nature of the textile business. Historically, major textile-producing nations like China, India, Pakistan, and Bangladesh have integrated into the global economy since the 1980s, with Pakistan emerging as a primary supplier of textile goods globally. The internal demand for textile items and denim within Pakistan is expanding, potentially contributing to increased income sources (Frederick et al., [2019](#)).

The denim sector in Pakistan is the subject of this study, which can potentially increase denim exports to foreign markets. Pakistan's competitiveness position was quite depressed compared to new rising nations, which resulted in poor performance on the international markets by Pakistani denim industry specialists (Abdullah et al., [2021](#); Manzoor et al., [2020](#)). The competitiveness of the denim industry in Pakistan has not been studied or published. Therefore, this study aims to use the GEM Model to evaluate the present competitiveness of the Pakistani denim sector. The researcher designed a structured questionnaire with two stages to gather comprehensive insights. In the first stage, data was collected from marketing professionals with at least 5 years of experience in the Pakistani denim industry, utilizing a 10-point Likert scale. The second stage involved the distribution of a questionnaire among experts and scholars, utilizing a 7-point Likert

scale to assess the importance of various factors. The cumulative score from the GEM model reached 377, indicating that the denim garments industry in Pakistan is outperforming the national average and possesses national competitive advantages. This research aims to catalyze strategic initiatives, fostering growth and competitiveness in the Pakistani denim industry on the global stage.

2 Literature Review

The good news is that one of Pakistan's largest and most well-known textile manufacturers is running at total capacity in its hosiery division and half capacity in its denim production facility, indicating that export statistics will improve in the coming months. After all, Pakistan's textile industry is the country's largest export earner, accounting for about 60% of total exports of \$21.39 billion in the previous fiscal year (Siddiqui, 2020). The US-China trade war and the subsequent decline in trade between the two nations have led US importers to go to countries like Vietnam, Bangladesh, India, and Pakistan, so South Asian countries are now at an advantage. Pakistan could have been better positioned to take advantage of Western importers' lean towards the region if it had effectively solved some structural challenges the textile sector has experienced for decades.

Pakistan's textile sector primarily focuses on fabric manufacturing, which includes cotton and synthetic fiber spinning, weaving, and processing (Abbas, & Halog, 2021; Aneel, & Gyarmati, 2022). This is why Bangladesh, which was severely hampered when it broke from Pakistan in terms of competing with regional competitors, is today the world's second-largest supplier of JMU, behind China. For Pakistan's textile exporters, business as usual is a good business (Shahid et al., 2023).

2.1 Leading exporters of denim fabric worldwide in 2024 (in million USD)

The export value of denim fabric globally in 2020 by top nations is shown in Figure 1. Around \$436.94 million was exported from China that year, making it the world's top exporter of denim fabric.



Figure 1: Leading exporters of denim fabric

2.2 Top 10 Global importers of denim in the last 5 years (USD Million)

Table 1: Top importers of denim in last 5 years

Country	2019	2020	2021	2022	2023
World	2631	2720	2845	2591	1782
Bangladesh	623	603	624	594	480
Turkey	231	312	289	196	153
Viet Nam	65	76	120	145	130
Egypt	126	125	208	197	99
Tunisia	194	208	221	196	98
Hong Kong, China	209	196	206	147	81
China	140	156	150	138	74
Korea, Republic of	84	81	79	73	64
Italy	94	81	82	69	48
Nicaragua	33	43	53	49	45

2.3 Top 10 Global exporters of denim in last 5 years (USD Million)

Table 2: Top exporters of denim in last 5 years

Exporters	Export in 2019	Export in 2020	Export in 2021	Export in 2022	Export in 2023
World	2726.6	2792	2846	2600	1904
China	499	517	591.3	558	436.9
Pakistan	461.8	483	501	498	388.2
India	222.6	241.7	251	238	211.5
Turkey	275.9	282.8	252.5	243.9	194
Egypt	110.6	131	117	104.6	90.4
Hong Kong, China	243.7	220	216.4	152.8	87
Italy	140	144.8	132.5	111	86
Mexico	68	61	69.7	70	53
Japan	81	87.8	77	80	53
Thailand	49	51.7	75.6	84	48

World met highest-ever export figure in 2018 with \$2.8 Billion but just in two years world experienced a difference of almost \$1Billion. Similarly, like other countries Pakistan's highest export value was in 2018 which is \$501 million and in 2020 Pakistan exported lowest-ever value in last five years.

2.4 Cotton Denim Fabric: Pakistan as a major player in the world

Just like the textile and garment industries are highly fragmented, so is the denim sector (Zhao et al., [2021](#)). Denim jeans have also proven that they can be worn by people of all ages and sexual orientations. Denim sales based on styles and fits are largely reliant on street fashion and celebrity fashion trends (Lodi, [2020](#)). After China, Pakistan is the world's second-largest supplier of denim textiles. Pakistan's denim industry has over 40 key firms. Specialized textile products such as the Pakistani denim cotton fabric supply exhibit a rise in many application sectors such as jeans, fancy and stylish clothing, curtains and bed sheets, canvas and uniforms for all seasons of the year and people of any age (Aslan, [2023](#)).

China exported more denim fabric than any other nation in 2021, while Bangladesh imported more denim fabric than any other country. Denim demand is expected to rise by 5 to 6 percent, while supply is expected to rise by about 8 percent, indicating a buyer's market for the product. Denim

jeans are most popular in the United States, where an estimated 450 million pairs are worn annually (Fidan et al., [2021](#)). Chinese, Turkish, Italian, Pakistani, Indian, Spanish, and Brazilian denim fabric exports are in the world's top ten (Shahid et al., [2023](#)).

2.5 Export of cotton denim fabrics from Pakistan

Pakistan has a rich textile history and a plentiful cotton crop, which have contributed to the country's thriving textile sector. Perhaps the most important part of Pakistan's textile industry is denim (Khan et al., 2020). The value of Pakistan's exports of cotton denim fabrics jumped 37% from \$462 million in 2016 to \$498 million in 2019, reaching 521 million square meters (Arshad et al., [2022](#); Rana et al., [2020](#)). However, COVID-19 hampered this increase adversely by dropping the export value to \$388 Million, which is an all-time low in the recent decade. Exports of cotton denim textiles from Pakistan are mentioned in Table 3.

Table 3: Export Values of Pakistani denim fabric

Year	Exported Value/Million USD	Quantity/Million square meters	Exported unit value, US Dollar/1000 square meters
2016	462	323	1388
2017	483	386	1252
2018	501	452	1108
2019	498	521	956
2020	388	593	796

Denim fabric exports from Pakistan mostly go to Bangladesh, Turkey, Egypt, Sri Lanka, and Vietnam. Cotton denim fabric exports to Bangladesh dropped from \$253 million in 2019 to \$201 million in 2020. Pakistan relies on this market. In Table 4 you can see Pakistan's cotton denim textile exports broken down by country.

Table 4: Country-wise Export of Cotton Woven Denim Fabrics from Pakistan (million USD).

Country	2016	2017	2018	2019	2020
World	461.84	483.24	501.20	498.35	388.25
Bangladesh	251.14	237.49	242.87	253	201.10
Turkey	64.55	107.54	98.20	87.36	79.78
Egypt	35.17	31.56	36.56	45.54	30.28
Sri Lanka	9.18	10.65	15.33	15.55	9.75
Viet Nam	9.49	8.23	9.78	9.49	5.73
Morocco	2.59	3.16	2.69	4.84	5.72
Italy	11.68	10.65	11.87	9.05	5.67
United Arab Emirates	8.11	4.87	3.46	8.23	4.91
South Africa	0.26	0.11	7.90	6.41	3.24
Tanzania	1.01	1.02	2.76	2.41	3.08

Despite the small size of the Turkish denim market (around 85 million square metres in 2019), it is a promising indicator of the sector's potential and suggests that it will grow in importance in the next years, making Turkey an increasingly important market for Pakistani cotton denim textiles. Textiles from all over the globe are finding their way into Turkey's garment industry, thanks to the country's more aggressive marketing efforts. Pakistan, along with India, Pakistan, and Italy, is quickly becoming a vital supplier to Turkey's export market (Akram et al., [2021](#); Islam, [2020](#)).

Denim textile manufacturers in Pakistan will be hard-pressed to find new markets if supplies to Turkey dwindle. A contributing reason to the competitiveness of Pakistan's industry is the country's permanently decreasing currency, although this cannot be depended upon indefinitely.

Some mills in Pakistan have made a concentrated effort to spend substantially on product development and innovation, and this is most likely the best method to ensure the industry's long-term existence (Abbas, & Halog, [2021](#); Shahid, [2023](#)).

Denim has undergone several reimagining over the previous few decades, with each repetition essential to the market's continued growth. Newer designs, styles, and fits are being prioritized by manufacturers in response to shifting customer tastes and fashion trends. The hottest styles now in fashion are jeggings and faded denim. While Jeggings, a hybrid of a legging and a jean, have become popular among female clients, particularly among the younger demographic. Similarly, the distressed denim which may be faded, shredded, tea-dyed, splashed with paint and acid-washed to give the jeans a well-aged look is also popular among men and women. The rising popularity of premium denim jeans is also predicted to offer fuel to further the market expansion. Market share belongs to Europe, which is the world's largest region (Shahid et al., [2023](#)). Markets in the United States and Europe are mature, but they nevertheless account for a large portion of the global market. During the analyzed period, the Asia-Pacific market is projected to grow at the quickest rate of 9.4 percent. Increasing disposable income, rising GDP, an increase in the number of women working, fast urbanization, a westernization of lifestyles, and growing fashion consciousness are driving this steady expansion in the area.

According to the country's top denim exporters, denim exports to the United States decreased by 3.3% in 2016. Other exports to the European Union and Scandinavian nations are not rising. The Chinese government offered three years of free power to new units to their producers, and India did the same. A lot of nations were offering zero-rated services to their exporters, while in Pakistan, tax officials were imposing a variety of taxes such as export development surcharge and withholding tax. Global denim players are absorbing price hikes from denim fabric manufacturers throughout the globe since current market conditions do not allow them to raise consumer pricing. Due to Pakistani denim producers' cheap pricing and in-house improvements, the country has become a significant supplier of this in-demand fabric.

2.6 GEM Model Factors of Competitive Advantages

The GEM model affects the competitiveness of the business and the industry as a whole via its six classes (figure 1). All of the following components make it up: "resources," "infrastructure," "supply & related industries," "enterprise structure, strategy, and rivalry," "local market," and "external market." (Safeer et al., [2018a](#)).

The six classes are organized into three major groups:

Factor pair I, which consists of groundings, is infrastructure and resources.

Factor II includes suppliers and related industries, firm structure and strategy, and competition, as well as enterprises.

Similarly, *factor pair III* consists of markets that include external and internal markets.

2.6.1 Groundings Factor Pair I

Groundings consist of resources and infrastructure, which are supposed to provide raw materials to organizations. The following are the details of these factors.

Resources

Resources are developed in the country naturally, instinctively, or established. Normal resources include land, forests, labor supply, patents, expertise, stock exchanges, financial markets, and the state's intended environmental posture (Khan et al., [2024](#)).

Infrastructure

Infrastructure encompasses physical buildings as well as administrative arrangements that aid in speeding up resource mobilization, support, and efficiency. Corporal infrastructure consists mainly of highways, airports, seaports, and communication infrastructure. Moreover, incorporeal infrastructure comprises R&D laboratories and institutions, vocational training institutes for labor,

business associations like APTMA, business marketplaces, tax collection bodies, financial markets, and laws-implementing institutions (Shafiee, [2024](#)).

2.6.2 Enterprises Factor Pair II

Organizational structure, strategy, and rivalry are the internal and external physical and nonphysical elements that impact the cluster's production efficiency; enterprises include suppliers and associated industries.

Supplier and related industries (SRI)

Products and services utilized by other industries in the country are included in the supplier and related industries. Factors contributing to the success of companies' operations and the growth of linked businesses include the quality of connections between buyers and suppliers, the pricing of goods and services, and the performance of products. (Marwah & Ramanayake, [2024](#)).

Firm structure, strategy, and rivalry (FSSR)

Firm structure, strategy, and competition refer to a firm's hierarchical levels, strategies in different fields, product and service production arrangements among companies, management style, and proprietary rights structure, as well as the sizes of businesses and numbers in the government's cluster. The firm's structures influence the competitive tactics and strategy routes throughout the company cluster (Castro-González et al., [2024](#)). The size of the company and excellent production management may make a cluster's value chain agile. As a result, the overall management style and the proprietary rights structure of companies in a specific cluster considerably influence whether enterprises have prospered due to cost savings, differentiation, and so on. These positive attributes are far too encouraging to represent the organization's planning and strategy for operating well in home and international marketplaces (Castro-González et al., [2024](#)).

2.6.3 Markets Factor Pair III

The product and service demand circumstances in domestic and worldwide marketplaces of companies in the clusters are referred to as a market.

Local Markets

National markets are also referred to as local markets. Region markets, district markets, and national markets are local markets. Local markets vary by province and city across the country. Internal and international markets differ in that international markets are extensive; however, local markets are limited to a single state. Among the many local market indicators that should be considered when assessing the level of national sourcing customers, product quality standards, and the distinctiveness of national demand within the native cluster of an industry market size, growth, share, and prospects. (Jin et al., [2020](#)).

External Markets

External markets differ from domestic markets. (Porter, [1990](#)) emphasizes the need to distinguish internal markets or clusters that are primarily export-focused. The external market method is highly careful from the exterior buyers for additional clusters (Holmes & Sharp, [1989](#)). Different areas face a consistent structure of outside business sectors, except for local marketplaces. Different areas have distinct approaches to targeting overseas markets. It covered market size, market share globally for a certain cluster, market intimacy, market size, market growth rate, market entrance hurdles, and other trade obstacles for other businesses and organizations (Wang, [2021](#)).

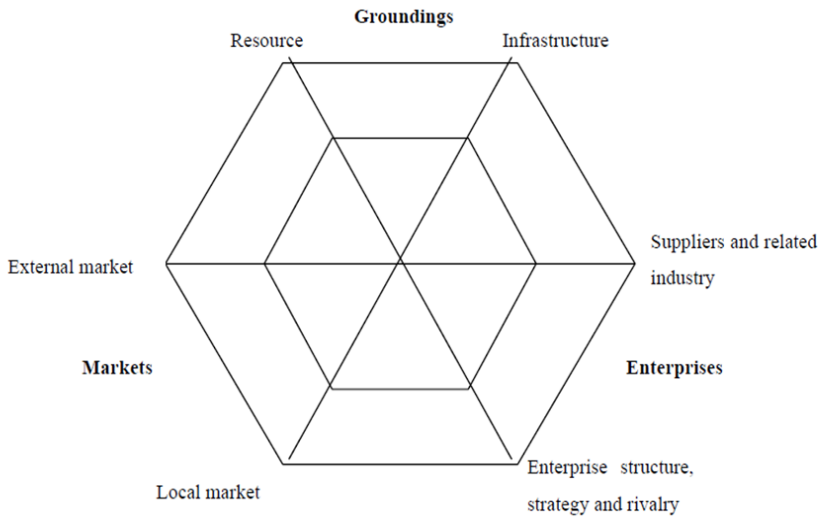


Figure 2: GEM Model, Source (Padmore & Gibson, [1998b](#))

3 Research Methodology

To conduct this research, researchers applied a quantitative approach to find the GEM score. Two structured questionnaires were used to collect the data (Safeer et al., [2018a](#)). Questionnaire 1 is used to test the score of each determinant in the Pakistani market and Questionnaire 2 is used to test the importance of each determinant in Pakistan and the global market. First, the Pakistani denim industry is evaluated using the Analytic Hierarchy Process (AHP). Then, the GEM model is used to determine the sector's competitiveness. Following the revolutionary work of two Canadian researchers (Padmore & Gibson, [1998b](#)) a team of researchers developed the GEM model and beautifully explained its results using Porter's diamond model (Porter, [1990](#)). In this model, the competitiveness is checked by Groundings, Enterprises, and Markets. These three factors are further divided into six determinants (Padmore & Gibson, [1998b](#)). Previously GEM model has been tested in other developed countries like Canada and the UK (Aiginger, [1998](#); Levie & Autio, [2008](#); Padmore & Gibson, [1998a](#)). This model helps the denim industry to test their competitiveness by applying the fuzzy AHP technique and analyzing results that show the path to make good decisions to strengthen the denim industry in local and international markets. In this research, researchers used the Convenience sampling technique to collect data from real respondents working in well-known denim industries.

Questionnaire 1 consists of a 10-point Likert scale to test the score of different determinants under study (Safeer et al., [2018a](#)). The questionnaire was distributed among 150 experienced professionals with at least bachelor's degrees, working for more than 5 years, and having diverse production and marketing experience for denim garments from small-scale, medium-scale, and big-scale industries in Pakistan. Researchers collected data by visiting the respondents physically, sharing the link of Google Docs, and using email sources depending upon the feasibility of respondents. Researchers eventually got 99 usable responses from legitimate and actual respondents after putting in a lot of work.

Questionnaire 2 consists of a 7-point Likert scale to test the importance of each determinant in Pakistan and the global market (Safeer et al., [2018a](#)). This questionnaire was designed for industry professionals, researchers, and consultants across Pakistan and collected primary data. To complete this research, the research team approached approximately 25 industry experts,

researchers, and consultants to collect data and after much effort, with an average response rate of roughly 84 percent, researchers were able to collect 21 completed structured surveys from legitimate and authentic respondents. Responses to structured questionnaires are scored and weighted by the actual state of the problems in the sector. The process of scoring entails a subjective evaluation of actual replies based on the presumption that they have a thorough comprehension of the topic (Wang et al., [2005](#)).

3.1 Validity

Validity is defined as the degree to which the investigation is based on measurement, and if the conclusions of the investigation are, by all accounts, what they appear to be. Fundamentally, validity refers to the accuracy of a judgment. The researcher had a lot of problems with the authenticity of the exploration. The subjective scoring system is like the major test. If the information provider's responders are unconcerned about the strength of the speculations/ideas, they may provide inaccurate data, which might deceive the results. As a result, it was focused on how difficult it was for respondents to think about their thoughts or how best to complete structured questionnaires based on reliable input on Pakistan's denim sector.

3.2 Reliability

The reliability quality refers to how research considers the net outcomes of the entire study and to what extent these outcomes are suitable and dependable for the intended benefit. Whether findings are provided routinely or not, reliability is a concern. If the conclusion is not based on objective data, it is critical to review the entire research study for consistency. To obtain great and genuine inputs from respondents, researchers first perpetual the competitiveness components by organizing structured questionnaires, and then settle on the denim garment industry as a whole to obtain similar information from analysts, specialists, advisors, and in addition industry experts. This can provide the most reliable and best results for all research challenges.

3.3 Analytic hierarchy process (AHP)

Three well defined steps make up the Analytic Hierarchy Process.

- 1) Hierarchy structure
- 2) Comparative assessments
- 3) Prioritizing tasks or constructing a list of priorities with full ranking.

Researchers, professionals, and denim sector participants from Pakistan were surveyed to collect primary data, which was primarily analysed using an AHP score matrix. After its inception by (Saaty, [1986](#)), the Analytic Hierarchy Process (AHP) has grown into one of the most popular decision-making systems based on several indicators. When it comes to research and decision-making, AHP is second to none.

The term "Analytic Hierarchy Process" refers to a system of measures that includes two assessments, and it also relies on the expert's judgement in selecting the priority gauges. Analytic Hierarchy Process (AHP) offers a variety of hierarchical ranking characteristics, allowing governments and corporate experts to concentrate on the most important issues. All evaluations are created by applying a scale that explains how one aspect affects another compared to its primary factors. AHP not only supports specialists in making sensible decisions but also coordinates a fair justification for the decision-makers.

4 Results

This quantitative research comprises three stages. The first stage entailed calculating subjective scores for sub-factors that influence denim industry competitiveness. According to the GEM model, all factors are assessed on a Likert scale from 1 to 10.

The factors, which ranged from 1 to 10, are itemized as follows:

10 = Extremely Excellent indicates the position of 1st or 2nd in competitiveness at the international level.

9 = Excellent indicates the position of at least the top five with good competitiveness at the international level.

8 = Very good, which indicates that it has an exclusive level of competitive advantage throughout the country.

7 = Good indicates that it has a competitive advantage in the country.

6 = Not bad, which indicates that it has no competitive advantage but surpasses the country at an average level.

5 = Mean level indicates that it has an average level of strength at the national level.

4 = Limited level indicates that this number has a slightly low average strength at the national level.

3 = Minimal level indicates that different gaps concerning national average strength impacted the denim industry's competitiveness.

2 = Poor refers to significant gaps that influence the competitiveness of the garments industry.

1 = Extremely poor refers to a significant strength deficit concerning the national average, which has hampered the denim industry's development.

In this research, an analysis is performed using the AHP technique.

The GEM Model provided the basis for a comprehensive study that used the AHP approach and a quantification procedure. Moreover, the relevance of each sub-factor with its conforming components must be determined. In the second section, each component is grouped into a series from 1 to 7 that illustrates the relative relevance of its sub-factors to its core factors. In the second stage to calculate results and convert them to factor pairs a quantification process is started. Some specific formulas are used adopted from the study of Safeer et al., (2018) for the required calculations:

According to the principle of the GEM model, two components could be replaced with each other. For example, in certain industrial clusters, well-developed infrastructures could make up for missing resources, and vice versa. Step three involves computing the (LCS) Linear Cluster Scores for each component pairing in order to arrive at the final competitiveness score for Pakistan's denim sector. To find out this score the formulas are extracted from the study of (Safeer et al., 2018a). Multiple factors, such as combining all three-factor pairings, can be derived from the linear cluster score (LCS). This indicates that each was significantly impacted by those circumstances. For instance, if one or both factors in a factor pair have low scores, the cluster may go to its least competitive level. One or two-factor pairs with high scores indicate that they may advance to the most competitive level within a cluster (Abrar et al., 2019).

In practice, the total score would be greatest for factor pairs such as supplier and related industry, firm structures, strategy and competition, local markets, and overseas markets, and lowest for factor pairings such as resources and infrastructure. The denim cluster couldn't have an advantage in any market since its resources and infrastructure scored lower than its competitors in that sector. All these factor pairs would have balanced competitive advantages for the best possible use of the potential of the denim sector.

Table 5: Statistical Results and Calculations

Factor	No.	Sub Factor	Avg. Score (1-10)	Weights	Importance Score (1-7)	(Average Score) * (Weight) = Final Score
Resources (R)	R-1	Availability of Labor force resources in the denim sector	7.565	0.3447	6.3218	2.6077
	R-2	Talent Resources Availability	5.181	0.3286	5.5942	1.7029
	R-3	Geographic Location of Pakistan	7.979	0.3267	5.8409	2.6070
	I-1	Infrastructure of Transportation	4.939	0.1365	6.1832	0.5948
	I-2	Communication infrastructure	7.969	0.1543	6.6824	0.9901
Infrastructure (I)	I-3	Infrastructure of Market Infrastructure	6.404	0.0889	5.9241	0.6363
	I-4	Trade's Associations	4.343	0.0951	4.9167	0.3972
	I-5	The environment of Doing Business	6.515	0.1453	5.5908	0.7292
	I-6	Associated laws and rules	4.494	0.1653	6.1832	0.5413
	I-7	Financial Market of Pakistan	6.252	0.1741	5.6824	0.6537
	I-8	Research & Development Institutions	4.393	0.1224	6.2590	0.5173
	I-9	Impact of Vocational Training	4.616	0.1635	5.3417	0.5074
	SRI-1	Availability of Denim related Raw material	7.757	0.3555	6.8325	2.7578
Supplier & Related Industries (SRI)	SRI-2	supplier service	6.575	0.3367	6.5091	2.2144
	SRI-3	Development of related industries	5.686	0.3078	5.7667	1.7502
	FSSR-1	Skills of Managers	7.010	0.1629	5.8409	1.1422
	FSSR-2	Clarity in the rights of property	4.596	0.1400	5.2590	0.6433
	FSSR-3	Value addition level	6.232	0.1737	6.7582	1.0826
	FSSR-4	Brand name worth	6.798	0.1610	5.1758	1.0946
Firm Structure, Strategy & Rivalry (FSSR)	FSSR-5	Equipment related to Production	7.030	0.1751	6.4424	1.2310
	FSSR-6	Product Quality of denim	8.131	0.1873	6.9167	1.5226
	LM-1	Local market distinctiveness	4.171	0.3299	5.7582	1.4136
	LM-2	Local market share	4.262	0.3257	4.4259	1.3430
Local Markets (LM)	LM-3	The potential of the Pakistani market	5.373	0.3963	5.6824	1.8598
	EM-1	Features related to foreign consumers	6.393	0.2444	5.7676	1.5624
External Markets (EM)	EM-2	Barriers in trade	5.697	0.2526	5.1758	1.4392
	EM-3	Share in the global market	6.232	0.2422	5.0916	1.5096
	EM-4	Relations with the Foreign market	7.383	0.2608	6.6740	1.9257

4.1 Collected Primary Data's Statistical Calculations

Table 5 explains that the scores of all six determinants of the denim industry were calculated using the formulas from the study of (Safeer et al., [2018a](#)):

$R = 6.9176$

$I = 5.5673$

$SRI = 6.7223$

$FSSR = 6.7164$

$LM = 4.6164$

$EM = 6.4369$

$Avg\ Score = 6.1628$

The component pair score (PS) is determined after all the other variables have been computed.

(PS) 1 = $(6.9176 + 5.5673) / 2 = 6.2424$

(PS) 2 = $(6.7223 + 6.7164) / 2 = 6.7194$

(PS) 3 = $(4.6164 + 6.4369) / 2 = 5.5266$

Finally, The Linear Cluster Score (LCS) was used to assess the degree of competition in the denim clothing industry:

LCS = 6.1628 (Avg Score)

GEM = $2.5 \{ \sum_{i=1,3} (D2i-1 + D2i) \}^{2/3}$

After completing all other calculations, the GEM Score of Pakistan's denim garments sector, which is 377, was computed using the formula below:

$GEM = 2.5 \times \{ \sum_{i=1,2,3} (D2i-1 + D2i) \}^{2/3}$

$GEM = 2.5 \times \{ (6.9176 + 5.5673) \times (6.7223 + 6.7164) \times (4.6164 + 6.4369) \}^{2/3}$

$GEM = 2.5 \times \{ (12.4849) \times (13.4387) \times (11.0533) \}^{2/3}$

$GEM = 2.5 \times \{ (1854.5318) \}^{2/3}$

$GEM = 2.5 \times 150.9464$

GEM SCORE = 377

Based on primary data collected from the small to large-scale denim industry, the Pakistani denim garments industry has a GEM Score of 377. Because denim manufacturing firms in Pakistan enjoy the same facilities and benefits and face the same issues as the other industries of Pakistan, this study might be applied to the entire country. As a result, this research may classify as Pakistan's whole denim industry. As the GEM Score 377 lies between 250 and 640 (table 6), the denim garments industry in Pakistan is outperforming the national average and has national competitive advantages. The following GEM Model shows the accurate factor scores of the GEM determinants:

Pakistan denim industry GEM Score = 377

Table 6: Gem Scores

Score range	Score explainer
0 - 249	Below the national average level
250 – 639	Above the national average level
640 - 1000	Extremely good position

4.2 Graphical Representation

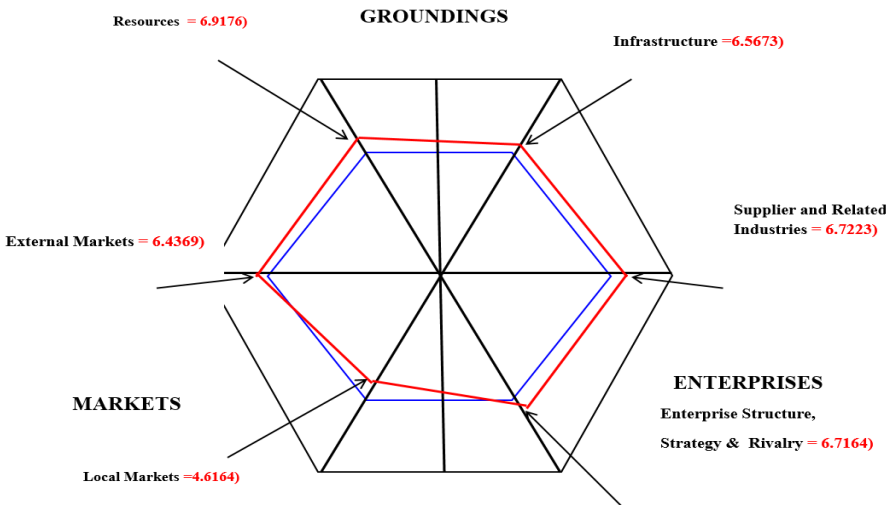


Figure 3: The average score of all determinants in the actual GEM model (Padmore & Gibson, 1998b)

Figure 3 shows two lines, outward lines (red) indicate the true average scores of the Pakistani denim industry, while inward lines (blue) represent the traditional 5 scores, with outward lines signifying more than 5 scores and inward lines representing less than 5 scores.

Denim industry primary data shows that Resources has an average score of 6.9176 and Infrastructure has an average score of 6.5673, both of which are decent but not great. It shows that denim is doing better than before, with several benefits over competitors nationwide. There is a sizable pool of potential workers and skilled workers in Pakistan's denim sector, so new business ideas may take root and grow. Nevertheless, to guarantee that businesses have access to qualified workers, the denim industry should prioritize the development of staff training programs. The sector in Pakistan benefits from a well-developed network of roads, transportation options, and communication systems, all of which contribute to increased exports. New and innovative technologies, such as Skype, mobile phones, Vibor, and WhatsApp, make it easier to communicate with overseas consumers quickly and at a reasonable cost. Many textile groups in Pakistan are trying to support the growing denim sector.

The average score for suppliers and related sectors, as well as enterprise structure strategy and rivalry, is 6.7223 and 6.7164, respectively, which isn't bad but not great. It shows that the denim industry is improving, with national strength above average across the board. Several spinning mills in Pakistan offer high-quality yarns and good customer service at reasonable prices. Beyond the spinning business, Pakistan's denim industry is supported by a variety of other sectors like accessories, packaging, and so on.

Local Markets' average score is 4.6164, which indicates that the Pakistani denim sector is weaker than the national average and is transitioning to a mean level, which refers to moving to the national average length across the country. Pakistan's denim sector is mostly export-oriented, with little attention paid to local markets and little exposure to them. Because the denim industry has not concentrated on local markets, local markets have received a low grade. The denim sector should focus on new product development since new and innovative clothes will appeal to local purchasers, who will demand more of the same, which will aid in the creation of long-term commercial connections with clients.

The external markets have an adequate and increasing average score of 6.4369. It shows that Pakistan's denim exports are becoming better and that the nation is gaining a competitive edge. GSP Plus also facilitates the denim industry's growth in exporting to global markets. However, the government must also aid industry in developing and exploring new markets across the world.

Table 3: Ranking based on strongest to weakest average score.

No.	Sub-Factor	Avg. Score (1-10)	Standard Deviation	Avg. Importance Score (1-7)	Standard Deviation
FSSR-6	Product Quality of denim	8.131	0.1873	6.9167	1.5226
R-3	Geographic Location of Pakistan	7.979	0.3267	5.8409	2.6070
I-2	Communication infrastructure	7.969	0.1242	6.6824	0.9901
SRI-1	Availability of Denim related Raw material	7.757	0.3555	6.8325	2.7578
R-1	Availability of Labour force resources in the denim sector	7.565	0.3447	6.3218	2.6077
FSSR-5	Equipment related to Production	7.030	0.1751	6.4424	1.2310
FSSR-1	Managerial skills	7.010	0.1629	5.8409	1.1422
EM-4	Relations with the Foreign market	7.383	0.2608	6.6740	1.9257
FSSR-4	Brand name worth	6.798	0.1610	5.1758	1.0946
SRI-2	supplier service	6.575	0.3367	6.5091	2.2144
I-5	Environment of Doing Business	6.515	0.1119	5.5908	0.7292
I-3	Infrastructure of Market	6.404	0.0994	5.9241	0.6363
EM-1	Features related to foreign	6.393	0.2444	5.7676	1.5624

	consumers				
I-7	Financial Market of Pakistan	6.252	0.1045	5.6824	0.6537
FSSR-3	Value addition level	6.232	0.1737	6.7582	1.0826
EM-3	Share in the global market	6.232	0.2422	5.0916	1.5096
EM-2	Barriers in trade	5.697	0.2526	5.1758	1.4392
SRI-3	Development of related industries	5.686	0.3078	5.7667	1.7502
LM-3	The potential of Pakistani market	5.373	0.3461	5.6824	1.8598
R-2	Availability of Talented Resource	5.181	0.3286	5.5942	1.7029
I-1	Infrastructure of Transportation	4.939	0.1204	6.1832	0.5948
I-9	Impact of Vocational Training	4.616	0.1099	5.3417	0.5074
FSSR-2	Clarity in the rights of property	4.596	0.1400	5.2590	0.6433
I-6	Associated laws and rules	4.494	0.1204	6.1832	0.5413
I-8	Research & Development Institutions	4.393	0.1177	6.2590	0.5173
I-4	Trade Association	4.343	0.0915	4.9167	0.3972
LM-2	Pakistani internal market share	4.262	0.3151	4.4259	1.3430
LM-1	Local market distinctiveness	4.171	0.3388	5.7582	1.4136

As shown in Table 3, given the importance of quality to customers on a global scale, the product quality sub-factor achieved the highest score of 8.131. Customers are prepared to pay a premium for Pakistani apparel simply because of its exceptional quality, which is a result of the country's excellent cotton dyeing skill. Regardless of how cheap or bad the clothes is, no one will purchase it.

In contrast, the local market's distinctiveness scored the lowest of all the sub-factors at 4.171, suggesting that the Pakistani denim industry is too concerned with exports and neglects or under-exposes local markets. The dispersion of all sub-factors with respect to the average score of the factor is shown by its standard deviation. With a population of over 220 million, Pakistan is a great place for textile firms to focus on local markets offering unique products.

5 Discussion Conclusion

The denim industry is a much-diversified sector that produces commonly used products. Pakistani denim manufacturing sector is good in multiple factors, but this sector is reported weak in their local market. The count of denim industries is very low on this low capacity they are selling their products in a few international markets. Whereas a lot of export potential is untapped by Pakistani manufacturers/exporters in the world. Recently, competitiveness has been a very hot issue. For example, Japan is competing in the electronics industry and Japanese manufacturers/exporters are at a top position in the world. Due to this reason Japanese economy is one of the top economies in the world. Similarly, Bangladesh's denim industry is one of the top manufacturing industries in the international market. All Pakistani denim manufacturers should focus on the dynamics of competitive advantages to enhance their business volume. Numerous consultants and scholars have already investigated competitiveness on several scales, including industry, national, and, more narrowly, company. The GEM model has been extensively used for cluster analysis and industry benchmarking in this study, both domestically and internationally. After a thorough examination, this model was used to analyze and explain the advantages and disadvantages of the Pakistani denim sector. This research shows that Pakistan's denim business is thriving in every important way right now. However, certain major issues may be resolved to help the sector grow both locally and internationally. Although Pakistan has a large pool of available laborers, some of them are inexperienced or just partially skilled. However, labor costs are still lower than in other nations, therefore these variables may help a country to compete in international markets. Infrastructural improvements in communication and transportation have benefited Pakistan's denim industry. To communicate, up-to-date technology is accessible to approach customers all around the globe, and strong integration lowers the cost of manufacturing. In Pakistan, indigenous businesses mostly own privately held denim enterprises and are eager to grow and explore the denim industry by employing various tactics by the state of the local and international markets'

level of competition. There is a strong chance that local demand will be met in Pakistan because most local businesses are devoted to exporting denim to other parts of the world and working with different brands to produce clothing that meets their specifications. The modern consumer purchases goods and services not just to have them but also to express his personality, brand, and even social standing. Today, the brand provides all these added benefits for the product (Popa & Pelau, [2016](#)).

Companies in the denim industry must try to establish their brands in both home and foreign markets and grow their businesses appropriately. This would promote fresh innovation in both the new and existing denim products, as well as manage consumer demand appropriately. With more than 220 million people, Pakistan is the sixth most populated country in the world, providing a sizable opportunity for local manufacturers to seize and develop their businesses in home marketplaces. According to the analysis, Pakistan's denim sector has a GEM Score of 377, which is based on primary data collection. Our 377 indicates that the denim sector is doing better than normal and has a competitive edge on a national scale, since this score typically falls between 250 and 640. All the denim industry's determinants have an average score factor of 6.070. Except for local markets, all three factors—groundings, enterprises, and markets—have nearly identical scores. This is because the denim sector of Pakistan is mostly focused on exports. However, considering the research's findings, the Pakistani denim sector should concentrate on regional markets to grow its share in those markets as well. Competitive advantages would be helpful in this circumstance to become viable in both domestic and foreign markets. Additionally, the importance of foundations and companies for the best usage of available resources needs to be emphasized (Safeer et al., [2018b](#)).

5.1 Future research scope

The competitiveness of Pakistan's denim sector in international markets has been evaluated by the GEM Model. It would be worthwhile to assess this model further. This study report has primarily examined practically all the variables influencing Pakistan's denim industry's competitiveness. Therefore, it would be interesting to investigate the connections between various factors and the competitiveness of Pakistan's denim sector. For example, the link between salaries and competitiveness, and the association between clusters and competitiveness. It is also feasible to apply the existing GEM model of competitiveness to other areas of textiles, such as spinning and weaving, as well as knitted garments, to discover additional characteristics that impact cluster-level industrial competitiveness. For benchmarking purposes, the GEM model has seen heavy application in analyzing clusters both at home and abroad. Once all of the relevant factors have been considered, the GEM model can evaluate the textile industry in Pakistan and identify its strengths and weaknesses.

5.2 Practical implications

In terms of evaluating the competitiveness of the denim sector, this study's findings will have far-reaching practical implications for denim associations, regional governments, denim companies, and research and development centres. The model helps the organisation assess its relative strengths and weaknesses in relation to the level of competition, which aids in decision-making. This study effort also offers advice to industry managers, consultants, researchers, and specialists on how to manage many issues like talent force resource availability, geographical location, communication infrastructure, adoption of technology and operational management tools, strategies for export, compliance management, supporting the small and medium (SME's) industries to improve the denim sector's competitiveness.

5.3 Limitations of this study

Although this study is very valuable providing the competitiveness of the Pakistani denim industry.

Even then it is mandatory to acknowledge certain limitations to enhance the robustness of this study. Firstly, the sample size for both questionnaires seems relatively small. A larger and more diverse sample could provide a more comprehensive understanding. Moreover, the use of convenience sampling may introduce bias into the results. Those who voluntarily participated may have different perspectives compared to those who did not participate. A more random and representative sampling method could strengthen the external validity of your findings. Furthermore, while the study concentrates on the denim sector only, it might be beneficial to acknowledge that the competitiveness of the broader textile industry could impact the denim industry. Consider discussing how findings might generalize or differ in the context of the overall textile industry. Additionally, The GEM model has been applied to assess competitiveness, but the generalizability of this model to other textile sectors or industries in different countries might be limited. Discuss the external validity and potential adaptations needed for applying the model in diverse contexts. Lastly, relying solely on the AHP and GEM model might limit the comprehensiveness of your study. Consider incorporating multiple research methods or triangulation to provide a more holistic view of the competitiveness of the Pakistani denim industry.

5.4 Policy Recommendations

To address the multifaceted challenges facing Pakistan's denim industry, a comprehensive policy approach is imperative. The factor of talent resource availability got a low average score (5). This sector needs to be improved at the government and industry level to support it financially and technically. The new industrial estates with the necessary infrastructure will boost industry expansion, particularly the garment industry. The government should assist in establishing new industrial estates where land should be rented, and leases should be terminated if the organization renting the space cannot continue for any reason. Moreover, Pakistani denim organizations are trying to export all types of denim. Most denim organizations cannot decide their core competency and area of specialization in the jeans category. If Pakistan wants to make a specialized image in customer mind, we must determine our core competency at the country level as well as at the firm level. Furthermore, to ensure the long-term growth and sustainability of the textile industry, policymakers must implement measures that promote exchange rate stability and reduce uncertainty for exporters. So, the frequent and significant depreciation of the Pakistan rupee harms the textile sector. The stability of the government and its policies is mandatory. Also, it is recommended that Pakistan takes a closer look at its denim industry to help address the deficiency in related sectors such as the chemical industry and allied accessories like packing tapes, rivets, buttons, and more. By investing in this sector, Pakistan can reduce its reliance on imports from countries like China, which can significantly reduce lead times and increase the importance of Pakistani denim garments.

Despite the limited availability of denim brands in the local market in Pakistan, it is crucial to note that the current use and perception of denim in the country is hindering its potential for export competitiveness. The existing challenges include the hot climate, cultural preferences, and dislikes of the Pakistani people, and especially the rural population, where denim is not favored. Therefore, it is essential to create designs that cater to the local market while also addressing the existing barriers. Moreover, some international brands are also selling their products in the Pakistan market. In Pakistan, SMEs contribute more than 30 percent of GDP and generate 25 percent of its exports. To realize SMEs' full potential, we must implement policies that empower them. Access to financing, subsidized credit, and cheaper interest rates on loans should be provided. Providing low-interest loans to buy and import machinery, training skills, and development programs should be launched to improve small businesses' exports.

The collaborative approach among stakeholders, facilitated by the government and Textile Association, can foster innovation and address industry-wide challenges collectively. Finally,

implementing traceability mechanisms in cotton supply chains and promoting cooperative farming are essential for sustainable cotton production, requiring concerted efforts from the government, cotton industry, and farmers' associations. By implementing these recommendations holistically, Pakistan can unlock the full potential of its denim industry, driving growth, sustainability, and global competitiveness. Cotton, popularly known as "white gold," is a valuable cash crop. More than 20 percent of the world's fiber consumption is made up of cotton, and it provides livelihood to more than 250 million people. In Pakistan, the government's attention is not playing an active role in the uplift cotton crisis. In addition, environmental factors such as climate change, a lack of proper research by local research institutes, the absence of any cotton policy, and the shift of cotton zones from traditional areas to new zones are aggravating the situation. Therefore, efforts must be concentrated on techniques that will allow more and better-quality cotton production. Solutions of this problem could be following. New cotton varieties resistant to climatic and natural hazards should be developed. A facility of good quality certified seed tracked and traced should be provided to the growers. Pink Bollworm, White Flies, Locust, etc., should be controlled by taking appropriate measures. There is a need to explore opportunities for cotton production in Baluchistan and Khyber Pakhtunkhwa, where pest pressure is minimal, and cotton yields are supposedly better than in typical cotton-growing areas in Punjab and Sindh. It is also recommended that organic cotton production should be produced and used. Issuance of subsidies for pesticides, seeds, and fertilizers. The sugar industries have played an essential role in Pakistan in increasing sugarcane area and production, hence tackling the sugarcane. So, the textile sector should also take the initiative with the government to get rid of the cotton crisis in Pakistan. The blockchain should be assured to national and international purchasers to solve the problem of sustainability of the cotton supply chain and increase consumer and retailer transparency. Using blockchain technology, businesses can trace a cotton bale from its origins on a truck to its destination—a retailer—by following its journey from the field to the gin, thread, fabric, and beyond. Each of these occurrences may be documented on the blockchain as a transaction, allowing for audibility and traceability across the supply chain. Sustainability and the capacity to track cotton's origins go hand in hand. The government should formulate a policy to increase the traceability of cotton.

6 References:

- Abbas, S., & Bhutto, S. (2022). Macroeconomic determinants and potential markets for Pakistani textile-clothing and apparel industries: Evidence from gravity model analysis. *The Journal of the Textile Institute*, 115(1), 76–86. <https://doi.org/10.1080/00405000.2022.2157935>
- Abbas, S., Halog, A. (2021). Analysis of Pakistani textile industry: Recommendations towards circular and sustainable Production. In S. S. Muthu. (Ed.), *Circular Economy. Environmental Footprints and Eco-design of Products and Processes*. Singapore. https://doi.org/10.1007/978-981-16-3698-1_3
- Abdullah, I., Khattak, A., & Sumbal, S. U. K. (2021). The residual impact of offshore outsourcing on learning and innovation for emerging-economy suppliers: evidence from the apparel industry of Pakistan. In M. B. Rana. (Ed), *Upgrading the Global Garment Industry* (pp. 84–112). Edward Elgar Publishing. <https://doi.org/10.4337/9781789907650.00010>
- Abrar, M., Bashir, M., Safeer, A. A., Shabbir, R., & Baig, S. A. (2019). Pakistani Ready-made Garments Industry Export Competitiveness: Evaluation in The Context of Porter's Diamond Theory. *Revista Publicando*, 5, 228–246.
- Aiginger, K. (1998). A framework for evaluating the dynamic competitiveness of countries. *Structural Change and Economic Dynamics*, 9(2), 159–188. [https://doi.org/10.1016/S0954-349X\(97\)00026-X](https://doi.org/10.1016/S0954-349X(97)00026-X)
- Akhuand, A., & Abbas, S. (2023). Modeling determinants of competitiveness: A case of textile sector of Pakistan. *The Journal of the Textile Institute*, 114(1), 22–31. <https://doi.org/10.1080/00405000.2021.2020415>

- Akram, S., Pasha, M. I., & Siddiqui, M. S. A. (2021). Pak-Turk strategic framework and geoeconomic relations in post 9/11 era: A way forward for strong partnership. *Global Political Review*, 6(4), 63–72. [https://doi.org/10.31703/gpr.2021\(VI-IV\).07](https://doi.org/10.31703/gpr.2021(VI-IV).07)
- Aneel, M., & Gyarmati, G. (2022). *Competitive analysis of textile industry in Pakistan* [Paper Presentation]. FIKUSZ Symposium for Young Researchers (pp. 14–28). Óbuda University Keleti Károly Faculty of Economics.
- Arshad, M. U., Zhao, Y., Hanif, O., & Fatima, F. (2022). Evolution of overall cotton production and its determinants: Implications for developing countries using Pakistan case. *Sustainability*, 14(2), Article e840. <https://doi.org/10.3390/su14020840>
- Aslan, C. (2023). *Unravelling the Silk Road: Travels and Textiles in Central Asia*. Icon Books.
- Castro-González, S., Ayala-Godoy, J. A., & Calderón-Abreu, T. (2024). Caribbean's global competitiveness from a systemic and multifactorial perspective for the post-covid-19 period. *International Journal of Global Business and Competitiveness*, 1–10.
- Chitonge, H. (2021). *The agro-processing sector in the South African economy: Creating opportunities for inclusive growth* (Working Paper no. 25202021-4). Policy Research in International Services and Manufacturing (PRISM). https://commerce.uct.ac.za/sites/default/files/content_migration/commerce_uct_ac_za/869/files/PRISM%2520Working%2520Paper%25202021-4%2520-%2520Chitonge.pdf
- Fidan, F. Ş., Aydoğan, E. K., & Uzal, N. İ. G. M. E. T. (2021). An integrated life cycle assessment approach for denim fabric production using recycled cotton fibers and combined heat and power plant. *Journal of Cleaner Production*, 287, Article e125439. <https://doi.org/10.1016/j.jclepro.2020.125439>
- Frederick, S., Daly, J., & Center, D. (2019). *Pakistan in the apparel global value chain*. The World Bank Group. https://www.globalvaluechains.org/wp-content/uploads/Pakistan_Apparel_GVC_Report_2019.pdf
- Holmes, P., & Sharp, M. (1989). *Strategies for new technology: Case studies from Britain and France*. Philip Allan.
- Islam, N. (2020). Turkey, Asia anew and South Asia: A comparative assessment on bilateral relations and soft power policy with Bangladesh, India, and Pakistan. *TURAN-SAM*, 12(47), 379–398.
- Javed, A., & Atif, R. M. (2021). Global value chain: An analysis of Pakistan's textile sector. *Global Business Review*, 22(4), 879–892. <https://doi.org/10.1177/0972150918822109>
- Jin, X., Wu, Q., & Jia, H. (2020). Local flexibility markets: Literature review on concepts, models and clearing methods. *Applied Energy*, 261, Article e114387. <https://doi.org/10.1016/j.apenergy.2019.114387>
- Junayed, A., & Akter, F. (2023). *Economic Growth and Challenges of Readymade Garments in Bangladesh* [Doctoral dissertation, Centria University of Applied Sciences]. Thesus. https://www.theseus.fi/bitstream/handle/10024/804421/Junayed_Akter.pdf?sequence=2
- Kamal, M. A., Shad, S., Khan, S., Ullah, A., & Khan, K. (2022). Pakistan's trade performance and potential with ASEAN region: Recent trends and future opportunities. *Journal of Public Affairs*, 22(1), Article e2325. <https://doi.org/10.1002/pa.2325>
- Khan, M., Muhmood, K., Mahmood, H. Z., Khaliq, I. H., & Zaman, S. (2024). The health and economic burden of dust pollution in the textile industry of Faisalabad, Pakistan. *Journal of the Egyptian Public Health Association*, 99(1), Article e3. <https://doi.org/10.1186/s42506-024-00150-2>
- Khan, S., & Shah, S. M. A. (2017). Study on Key Empirical Factors of Competitiveness: Case of Textile Industry of Pakistan. *Journal of Managerial Sciences*, 11(1), 1–22
- Levie, J., & Autio, E. (2008). A theoretical grounding and test of the GEM model. *Small Business Economics*, 31, 235–263. <https://doi.org/10.1007/s11187-008-9136-8>
- Lodi, H. (2020). *Modesty: A fashion paradox. Uncovering the causes, controversies and key players behind the global trend to conceal rather than reveal*. Neem Tree Press.

- Manzoor, U., Baig, S. A., Malik, E., & Shahid, M. I. (2020). Consumer perceptions of brands in Pakistan's denim industry. *Pakistan Journal of Multidisciplinary Research*, 1(1), 1–13.
- Marwah, R., & Ramanayake, S. S. (2024). Pandemic-led trade shocks & supply chain disruption: Case studies of the readymade garments (RMG) sector in Sri Lanka and Bangladesh. *International Journal of Innovation and Sustainable Development*, 18(1–2), 45–70. <https://doi.org/10.1504/IJISD.2024.135274>
- Padmore, T., & Gibson, H. (1998a). Modeling regional innovation and competitiveness. In Mothe, J., & Paquet, G. (Eds), *Local and regional systems of innovation* (pp. 45–79). Springer. https://doi.org/10.1007/978-1-4615-5551-3_4
- Padmore, T., & Gibson, H. (1998b). Modelling systems of innovation: II. A framework for industrial cluster analysis in regions. *Research Policy*, 26(6), 625–641. [https://doi.org/10.1016/S0048-7333\(97\)00038-3](https://doi.org/10.1016/S0048-7333(97)00038-3)
- Popa, A., & Pelau, C. (2016). Differences in the clothing brand perception depending on generation. *Industria Textila*, 67(4), 260–264.
- Porter, M. E. (1990). The competitive advantage of nations. *Harvard Business Review*, 91, 73–93.
- Rahman, M., & Moazzem, K. G. (2022). *Enhancing global market competitiveness of textile and garment exports of South Asia* (Development Papers 22–04). United Nation ESCAPE. <https://repository.unescap.org/handle/20.500.12870/4420>
- Rana, A. W., Ejaz, A., & Shikoh, S. H. (2020). *Cotton crop: A situational analysis of Pakistan*. International Food Policy Research Institute.
- Razzaque, M. A., Abbasi, P., & Rahman, J. (2020). Partnering Up: Towards a Strengthened Bangladesh-US Trade Relationship. In M. Razzazue (Ed.), *Navigating New Waters: Unleashing Bangladesh's Export Potential for Smooth LDC Graduation* (pp. 129–154) Bangladesh Enterprise Institute.
- Ridley, W., & Devadoss, S. (2023). Competition and trade policy in the world cotton market: Implications for US cotton exports. *American Journal of Agricultural Economics*, 105(5), 1365–1387. <https://doi.org/10.1111/ajae.12370>
- Saaty, T. L. (1986). Axiomatic foundation of the analytic hierarchy process. *Management Science*, 32(7), 841–855. <https://doi.org/10.1287/mnsc.32.7.841>
- Safeer, A. A., Abrar, M., Baig, S. A., Basit, A., Zia-Ur-Rehman, M., & Hashim, M. (2018a). Export competitiveness analysis of Pakistan garments industry based on GEM Model. *Industria Textila*, 69(3), 219–229.
- Shafiee, M. M. (2024). Competitive strategy, organisational capabilities, industry structure and marketing performance. *International Journal of Procurement Management*, 19(1), 37–58. <https://doi.org/10.1504/IJPM.2024.135144>
- Shahid, M. I., Hashim, M., Baig, S. A., Manzoor, U., Rehman, H. U., & Fatima, F. (2023). Managing supply chain risk through supply chain integration and quality management culture. *Supply Chain Forum: An International Journal*, 25(1), 1–13. <https://doi.org/10.1080/16258312.2023.2178814>
- Siddiqui, S. (2020, July 25). Textile exports pick up pace: Denim segment is yet to escape Covid-19 triggered stress. *The Express Tribune*. <https://tribune.com.pk/story/2256521/textile-exports-pick-up-pace>
- Surjit, R., Shanruthi, H., Sruthi, V., Tarunvalavan, K.S. (2024). Natural Indigo Dyes: A Potential Dye for Sustainability. In Muthu, S. S. (Ed.), *Natural Dyes and Sustainability. Sustainable Textiles: Production, Processing, Manufacturing & Chemistry* (pp. 193–210). Springer. https://doi.org/10.1007/978-3-031-47471-2_9
- Tasneem, F., & Khan, M. A. (2024). Growth and structural transformation—Options for Pakistan. *Research in Globalization*, 8, Article e100190. <https://doi.org/10.1016/j.resglo.2023.100190>
- Wang, C. L. (2021). New frontiers and future directions in interactive marketing: inaugural Editorial. *Journal of Research in Interactive Marketing*, 15(1), 1–9.

<https://doi.org/10.1108/JRIM-03-2021-270>

- Wang, C. R., Wang, G. P., & Wang, M. L. (2005). *Analysis of the competitiveness of the Ningbo garment industry*. Kristianstad University College.
- Zhao, M., Zhou, Y., Meng, J., Zheng, H., Cai, Y., Shan, Y., & Yang, Z. (2021). Virtual carbon and water flows embodied in global fashion trade-a case study of denim products. *Journal of Cleaner Production*, 303, Article e127080. <https://doi.org/10.1016/j.jclepro.2021.127080>