Chem PetroChem Pakistan

January - February 2020 | Issue 2

MAKE IN PAKISTAN CHEMICALS

Paints and Coating Industry is estimated at

50 BILLION PKR

and expected to reach 65 Billion PKR by 2025

Pakistan Chemical Forum 2020

National News Wall Painting | **PCMA Activity** GPCA Forum | **Innovative Project** Bio-Based Chemicals | **Country Report** Japan as Chemical Partner

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PCMA Pakistan Chemical Manufacturers Association

www.pcma.org.pk

Diamond Paints

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Why PCMA

Chemicals are integral to the modern way of life in the 21st century where consumers buy thousands of chemical products every single day ranging from household detergents to automotive paints; from fertilizers to crop saving pesticides and from pain relieving medicines like Disprin to life saving drugs and vaccines. Pakistan is blessed with a diverse and vibrant chemical industry having the potential to become a regional/global player. PCMA is facilitating its members by providing latest information on the developments in chemical industry world-over besides introducing best practices through regularly organized events e.g. seminars, workshops, trainings, exposure visits etc. We are keeping regular liaison with government ministries, regulatory bodies, international agencies, fora etc. Our work with government focuses on imports substitution efforts. Discussion on establishing first ever naphtha cracker complex in Pakistan is also, that would be a potent source for producing raw-material and inputs used for chemical manufacturing domestically and thereby substituting the imports.

Pakistan Chemical Manufacturers Association

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500/- Pkr

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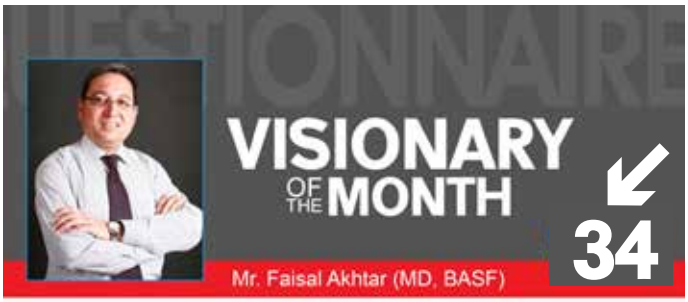

Editorial

The Balancing Act of Building for the Future and Diversification of Existing Strengths: Advancing to Make in Pakistan

The enthusiasm with which our membership has responded to the first issue of Chem Petrochem, and the support from the broader readership, provide us with the energy to both explore the still new pastures of petrochemicals, and, at the same time, to look at approaches for consolidation of our existing industries.

While the current national mood and stated Government policy of reinvigorating local manufacturing extends across all sectors, for the chemical industry there is an enhanced urgency, in view of the growing imbalance between exports and imports: statistics for the 2018 are sufficient to highlight the need for an immediate focus, with imports of chemicals at US $ 10 billion and exports of US $ 708 million.

Following our first issue, readers' feedback indicates an intellectual curiosity in browsing an array of topics, covering industry news, both global and domestic/ technology descriptions/ thoughts from industry pathbreakers/ PCMA activity, and other diverse matters.

In the current issue, we therefore continue our inclusive approach of engaging the spectrum of our readership, discussing varied subjects such as technologies from various chemical and process industries, tasks in plant operations, drawing lessons from the experience and thoughts of our members, national and international industry news.

By continuing to sustain the engagement of industry professionals and corporate management, and by reaching out to policy makers as well, we hope to contribute towards the upward trajectory of our chemical industry, in terms of investments, production growth, enhancement in technical standards, increased awareness of and commitment towards social responsibility, and other parameters reflecting a vigorous sector of the economy.

In the current issue we discuss building blocks for the petrochemical sector, since there is a growing awareness of the need for domestically produced olefins, to accelerate the development of downstream industry. As the discussion unfolds, we look forward to the clarification of concepts such as feedstocks/ location of crackers/ desirable capacities/ downstream products targeted. Towards this end, our Chairman & Secretary General attended the recent edition of the GPCA conference in Dubai, interacted with international players and made the requisite effort to absorb and bring back relevant information for the growth of the petrochemical sector, and, as an immediate target, to help us in our own planning for similar events.

For future issues of Chem Petrochem, we envisage similar analyses of existing sectors, such as chloralkali/ ethanol from molasses/ organic intermediates/ pharma ingredients/ polymers & plastics, and others to be proposed by our readership. It is clear, however, that there is a synergy between the petrochemical projects envisioned and the growth of the existing chemical industry, for the utilization of which PCMA, as an industry association, will continue its effort.

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CEng FIChemE (U.K.), PE (P.E.C.)
Technical Consultant

MAKE IN PAKISTAN CHEMICALS

PCMA

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LenderAG	ALKA ALKA (PVT) LTD.	Sitara Chemical Industries Ltd.	CosChem	Ghani Gases	AZHAR

INTERNATIONAL NEWS

Asia | Europe | Rest of the World

Asia

BASF Inaugurates 2nd Phase of Shanghai Antioxidants Manufacturing Plant

The plant will have an annual capacity of 42,000 tons.

BASF begins construction on $10bn petrochemicals project in China.

Production capacity of 60,000tpa will increase BASF's total capacity of engineering plastics and thermoplastic polyurethane (TPU) in the Asia-Pacific region to 290,000tpa. First phase will be launched in 2022, while entire project will be completed by 2030. BASF said this increased capacity will enable it to meet with the growing demand in the automotive, electronics and new energy vehicles (NEV) industries.

China's Annual PTA Capacity Edges Toward 50M-Ton Mark

Group of 20-Plus Japanese Chemical Firms Plan Joint Database for Utilizing Patent Information in MI. As part of their efforts here, these companies will extract experiment data and other such beneficial information so that it can be used with AI.

TOKUYAMA

Tokuyama Looks to Utilize Hydrogen to Cut CO2 Emissions. The company is targeting full-scale technological development that would allow the company to utilize renewable energy as a power source for its manufacturing sites. By applying water electrolysis technology to store energy as hydrogen

AsahiKASEI

Asahi Kasei Corp. looks to convert CO2 into chemicals e.g. CO2-derived isocyanates present qualities like high reactivity and low viscosity and it can be use as an automotive paint additive, allowing for drying temperature to be lowered and helping to reduce CO2 emissions during the coating process.

Europe

Axalta Expands Global Bonding Capabilities for Metallic Effect Powder Coatings

Axalta is investing in bonding capabilities for metallic effect powder coatings. The investment will enhance Axalta's new bonding production line in Landshut, Germany, and the upgrade of bonding equipment and capabilities in Houston and Shanghai.

BIO4SELF

On 4th December 2019, Bio4Self won the annual Global Bioplastics Award for their self-reinforced composites based on PLA fibres. This bioplastic can be used in automotive and electrical household appliance sectors.

BASF is now offering its graphitic expandable polystyrene (EPS) granulate Neopor® in a biomass-balance version, Neopor® BMB. In accordance with the balancing method certified by redcert, 100 percent of fossil raw materials are replaced by renewable raw materials - bio naphtha or biogas.

Researchers at the University of Birmingham, UK have developed biodegradable polymer inks based on aliphatic polycarbonates. These 4D Medicine's biodegradable polymer inks can be 3D-printed, useful for pediatric applications, such as treating musculoskeletal problems.

French Company named Carbiolice was the runner up for annual Global Bioplastics Award for developing an enzyme which increases biodegradability of PLA based bioplastic.

EU Chemicals Output Expected to Stabilize in 2020 due to Slowing Global Economy and Decline in Manufacturing Industry Growth.
Pierre Barthélemy, (Cefic's Executive Director for Research and Innovation) said low-carbon electricity and CO2 valorisation are potential game changers for Chemical Industry. Recycling carbon from CO2 (and CO from industrial waste gases) is one of the options the chemical industry can be considered to reduce the environmental footprint of chemicals and polymers, develop the use of alternative carbon feedstock, and improve carbon circularity.

Artificial Intelligence, Big Data and European Industries

Susana Solis Perez (Member of the European Parliament) said that Europe must access data, build a legislative framework, provide access to funding (such as Horizon Europe) to create a digital single market to fill the skills gap.

Rest of the world

IGL Coatings Awarded Malaysian Government's National Mark
IGL Coatings said it was certified with the National Mark of Malaysian Brand in October. Acquiring the National Mark of Malaysian Brand requires SMEs to go through a strict seven-step process

Grieve Introduces No. 942 Walk-in Oven
New is No. 942, a 350°F (177°C) special walk-in oven from Grieve, currently used for curing epoxy at the customer's facility. Workspace dimensions of this oven measure 84" W x 144" D x 108" H. 400,000 BTU/hour

PPG Completes $15.5 Million Investment in Burbank, CA, Research & Technology Center
PPG marked the completion of a $15.5 million investment at its aerospace research and technology (R&T) center in Burbank, California. Upgrades to the 39,524-square-foot (3,672-square-meter) facility include increased laboratory and testing space
PPG announced an investment in a 2,100-square-foot automotive adhesives and sealants laboratory on the company's existing 42-acre manufacturing and research complex in Cleveland, Ohio.

P&G
P&G is moving forward steadily with its pursuit of environmentally friendly operations. Using plastic waste recovered from the ocean, the company has begun selling limited-edition kitchen detergents in bottles made up of 25 percent recycled polyethylene terephthalate (PET) resin in Europe, the U.S. and Japan.

ICCA Joins Global Alliance to Strengthen Sound Management of Chemicals and Waste Beyond 2020.
Sulfur oxide

Demand for vacuum gas oil (VGO) and low-sulfur fuel oil (LSFO) is expected to increase after the implication of International Maritime Organization's (IMO) new sulfur oxide (SOx) regulations for 2020.

AkzoNobel
A new project to help rid the seas of plastic waste has been launched by The Ocean Cleanup, with AkzoNobel providing coatings technology for the garbage-gathering system. The latest venture is focused on the Interceptor, a floating device that can extract plastic debris from rivers – preventing it from adding to the build-up in our oceans. Already tested in the Netherlands and South East Asia, the plan is to place Interceptors in 1,000 rivers over the next five years.

CHT Pakistan Private Limited

CHT
SMART CHEMISTRY WITH CHARACTER.

Health & Safety

Recently CHT Pakistan has made successful transition from OHSAS 18001:2007 standard to ISO 45001:2018 Occupational health & Safety Management System.

It improves individual safety as well as organizational. ISO 45001 has been widely anticipated by the global business community because it addresses the personal health and safety risks to the individual of any process or use of machinery within an organisation. This relates both to their mental health and physical safety within workplace.

"Dastan Shahr-e-Lahore Ki"

Pakistan is blessed with a rich cultural heritage that needs both preservation

and revival simultaneously. When it comes to performing arts, Dastan Goi or Urdu storytelling has been a highlight of our culture. To revive this legacy, CHT Pakistan arranged an evening "Dastan Shahr-e-Lahore Ki" written and performed by the renowned artist Mr. Badar Khan. It was an informative story of the City of Lahore, striking the cords of history and memory in a nostalgic way.

Safety First

A cross functional team from CHT Pakistan participated in the 3rd Professional Development Conference organized by American Society of Safety Professionals (ASSP, Pakistan Chapter) from 15th & 16th November 2019 at Lahore. This event was a great opportunity to learn from the professional insights of exceptionally experienced guest speakers and panelists.

BASF

BASF
We create chemistry

- 1- BASF commences its smart Verbund project in Zhanjiang, China Milestone for BASF's US$10 billion investment project in China
- World-class smart Verbund site with latest technologies and highest safety and sustainability standards
- First plants to produce engineering plastics and TPU serving a range of key industries Today, BASF officially launched its smart Verbund project in Zhanjiang, Guangdong province, China, and commenced building its first plants. It marks a milestone of the company's US$10 billion investment project announced in July 2018. The first plants will produce engineering plastics and thermoplastic polyurethane (TPU) to serve the increasing needs of various growth industries in the southern China market and throughout Asia. "We are pleased to see our mega-investment project in China is progressing," said Dr. Martin Brudermüller, Chairman of the Board of Executive Directors, BASF SE. "We are determined to support our customers in southern China drive growth with innovative products and sustainable solutions." "By utilizing the latest digital technologies and applying the highest safety standards, the new Verbund site will be a role model for sustainable production contributing to the development of a circular economy in China," added Brudermüller. "Zhanjiang is a perfect location for BASF to further strengthen our footprint of local production in China," said Dr. Stephan Kothrade, President Asia Pacific Functions, President and Chairman Greater China, BASF. "The smart Verbund site will form a Page 2 P403/19e solid foundation for a world-class industrial cluster in Zhanjiang and establish stronger business connections between South China and other Asian countries." By 2022, the new engineering plastics compounding plant will supply an additional capacity of 60,000 metric tons per year in China, bringing BASF's total capacity of these products in Asia Pacific to 290,000 metric tons per year. The new capacity will enable BASF to meet the growing demand of its customers, particularly in the

automotive, electronics and new energy vehicles (NEV) industries. BASF plans to implement a comprehensive smart manufacturing concept at the Verbund site based on cutting-edge technologies. The new site will utilize automated packaging, high-tech control systems, and automated guided vehicles. With the Zhanjiang Verbund site, BASF will also contribute to the advancement of the local community. The company is forming strategic partnerships with several local technical institutions to develop young technical talents. BASF Integrated Site (Guangdong) Co. Ltd, BASF's new wholly-owned subsidiary, has also been officially formed. This entity will oversee the operations of the new Verbund site, underlining BASF's commitment to the China market. BASF signed the first Memorandum of Understanding for the Verbund site with the Guangdong Provincial Government in Berlin, Germany, in July 2018. In January 2019, the company signed a Framework Agreement setting out further details of the plan. The Verbund site in Guangdong would be BASF's largest investment, estimated up to US$10 billion upon completion, and would be operated under the sole responsibility of BASF. The integrated value chain will connect upstream and downstream plants from basic chemicals to more consumer-oriented products and solutions, serving growth sectors like consumer goods and transportation. The site would ultimately be the third-largest BASF site worldwide, following Ludwigshafen, Germany, and Antwerp, Belgium. The first plant producing engineering plastics compounds is expected to be operational by 2022, and the whole Verbund site is planned to be completed by 2030.

December 23, 2019

Lone Star Funds to acquire BASF's Construction Chemicals business

BASF and an affiliate of Lone Star, a global private equity firm, signed a purchase agreement for the acquisition of BASF's Construction Chemicals business. The purchase price on a cash and debt-free basis is €3.17 billion. The transaction is expected to close in the third quarter of 2020, subject to the approval of the relevant competition authorities.

"Our aim was to find a new home for our Construction Chemicals business where it can leverage its full potential," said Saori Dubourg, member of the Board of Executive Directors of BASF SE and responsible for the Construction Chemicals business. "Under the umbrella of Lone Star, the Construction Chemicals team can focus on a growth path with an industry-specific approach."

"BASF's Construction Chemicals business fits very well with our portfolio, complementing our investments in the construction materials industry," said Donald Quintin, President of Europe at Lone Star. "We highly value the industry-wide recognized knowledge and competence of BASF's Construction Chemicals experts, backed by a strong track record in innovative products and a compelling R&D pipeline. We look forward to jointly pursuing a growth-oriented business approach."

With more than 7,000 employees, BASF's Construction Chemicals business operates production sites and sales offices in more than 60 countries and generated sales of about €2.5 billion in 2018.

Berger Paints

BERGER
Trusted Worldwide

DEPARTMENTAL ACTIVITIES

Training & Development

EHS Department EHS department conducted practical fire fighting training and fire prevention sessions at Lahore factory for all the employees, especially labor, instructing them to take precautionary steps to avoid fire and heat.

Technical Department:

An interactive session of Non - Retail sales team was arranged for Center and North region, which was focused on better complaint handling techniques and measures. Such training is essential for addressing complaints in a better and timely manner for increased customer satisfaction.

Sales Department:

Training session for Deco-back selling team and Deco-trade team was conducted for Center region in which sales simulations and role plays are briefly explained to sales team. This session was focused towards improving sales knowledge of our sales team and enhance skills.

Wall Painting – Karachi Zoo

Berger Paints again instigated the movement and joined hands with KMC to effectuate the beautification of Karachi city. Newly constructed Karachi zoological garden's boundary wall which is approximately 30,000 sq.ft in area was brought to life by painting wildlife murals. To make this project a success, Berger Paints again fulfilled their commitment and showed the spirit for making the rehabilitation work successful.

Rudolf Group

RUDOLF GROUP
BETTER CHEMISTRY

RUDOLF has launched its LASER PRIMER technology that is one- of-a- kind igniter used to improve the laser fading of denim. On denim, over the years, many techniques have been used to create abrasion (brushing, sandblasting, chemical spray, scraping). Some of these techniques have been either banned (sandblasting) or are highly questioned (PP spray). Today, laser burning is being increasingly adopted world-wide. Through the application of RUDOLF LASER PRIMER, technology on continuous processing (fabric finishing), manufacturers can now make the most of laser machines magic. That is either through the creation of enhanced aesthetics on indigo and sulphur dyes, or the achievement of important energy savings.

SRC

Our Innovation Center for leather leadership, best practices, research, support and training to our clients and industry partners. Innovation Center meet the demand for high performance products and solutions with a better environmental impact. SRC Innovation Center is a team shared facility or entity and focuses on a global industry specialism or serves as a generalist knowledge hub for a region. We invited our valuable clients to Innovation Center to showcase our Autumn Winter 2020-21 leather trend collection.

Paints Sector An Overview

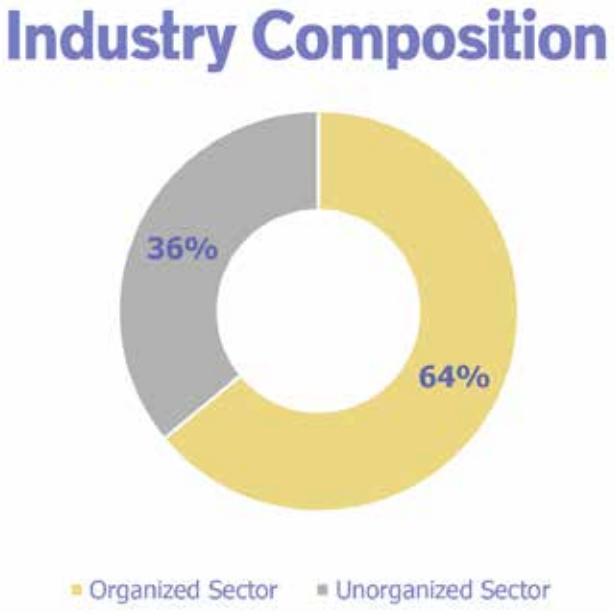
Industry Growth & Drivers

- Paints industry of Pakistan has depicted CAGR of 6-7% in the past five years (BR Research).
- **Paints and coating industry is estimated at 50bln (Industry estimates and revenues of listed paint companies)**
- Recent CPEC activity has been a major growth driver however, construction activates has been slowed down since change in government
- Demand continues to outpace supply, with imports increasing to bridge the gap (SBP)

Industry Features

- Unorganized sector consists large number players based on various estimates
- The unorganized sector caters to the vast market of semi urban and rural areas, with most price sensitive consumers
- Organized sector suffers not only due to lost market share, but lowered quality bar in the paint industry

Composition



Major Industry Players

The industry comprises multinational players in addition to various local players

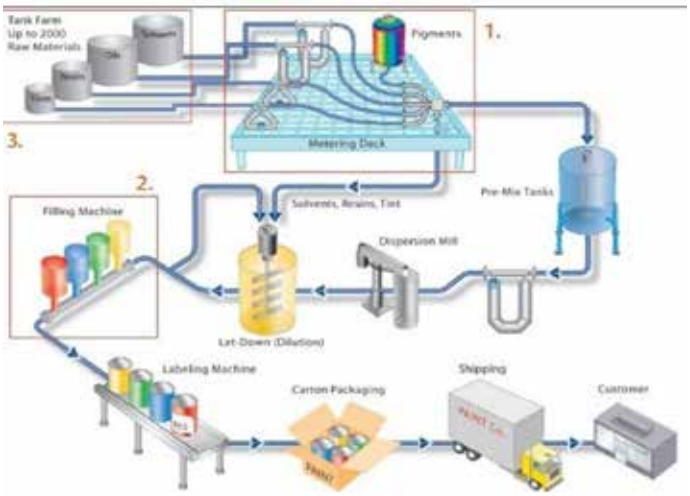
Multinationals

- AkzoNobel
- Pakistan
- Berger Paints
- Jotun
- Nippon
- Kansai

Local

- Master
- Brighto
- Happilac
- Diamond
- Buxly
- Nelson

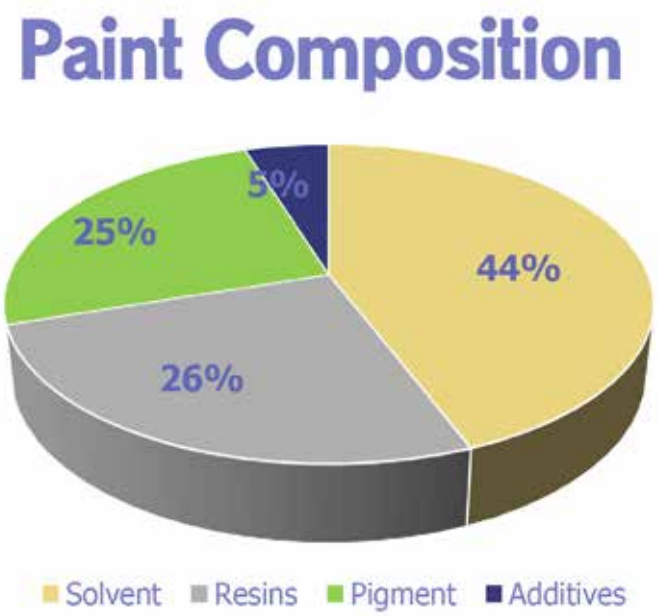
Process



The main raw materials involved in the process are:

- Pigments (including titanium dioxide)
- Solvents (to disperse pigments and resins for desired consistency)
- Resins (to bind pigment particles together)
- Additives (to modify properties of the product)

Composition



- Composition of paints depends on their proposed use
- Generally, solvent comprises majority of the mixture followed by resins, pigments and additives

Paint Categories

Decorative Paint

Primer : Used on new surfaces to protect the material underneath. Helps to even out color and smoothen the surface
First Coat : Used to help build up the opacity, applied before color can be applied.
Flat Paint : best used for walls and ceilings.
Eggshell : Usually, two coats of eggshell are required on top of a primer or first coat to achieve the true color.
Gloss and Satin Finishes: less prone to yellowing and stand up well when cleaned.
Varnishing : A hard transparent protective finish or film.

Industrial Paint

Solvent Based Paints: High quality topcoat paints to give a strong and durable coating to various industrial equipment.
Aquatic Paints: These paints offer fade resistance and help in color retention.
Powder Coat Paints: Offer protection and add beauty to the industrial equipment along with thickness and protection.
Anti Fouling: Provides long lasting tin free coating to the equipment, Durable and bright.

Custom duty on major raw materials used in the paint industry

Raw Material	2018-17	2017-16	2016-15
Titanium Dioxide	3%	3%	5%
Ethylene Glycols	3%	3%	2%
Varnishes	20%	20%	20%
Plasticizers	16%	16%	15%
Emulsion Grade	11%	11%	10%
Resins	20%	20%	20%
Driers	20%	20%	20%
Alkyd resins	20%	20%	20%
Poppy Oil Seeds	3%	3%	5%
Fungicides	3%	3%	2%

Finished Goods i.e. Paints & Emulsions have 20% custom duty

Key Challenges

- Levy of high regulatory duty on imported raw materials
- Highly price sensitive market
- High production costs
- Intense competition posed by foreign players and unorganized sector
- Economic slowdown
- Inflationary pressure and rupee devaluation are posing a major threat, since the paint industry is not export oriented.

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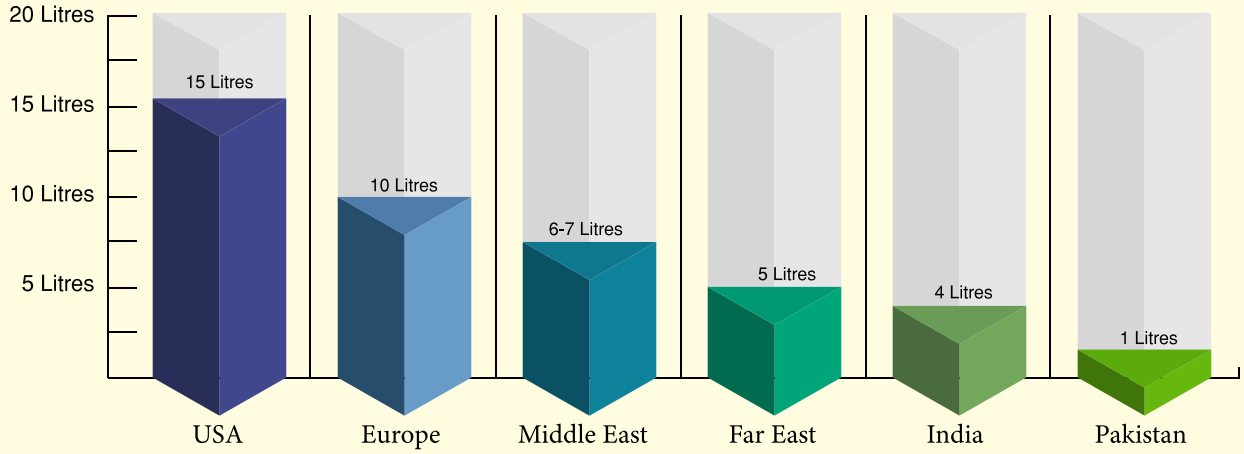
- Growel.com

Source: PACRA

Per capita consumption is approximately



- Expected GDP growth of Pakistan paint industry is projected at about **2020:2.3%, 2021:2.9%, 2022:4.0%, 2023:4.5%, 2024:5.0%, 2025:5.7%**
- Almost all the new developments are capitalized by leading players like Berger, Akzo Noble etc., but market is highly price sensitive as well as lack of general understanding besides low GDP hampers the introduction of new/ high end products
- Domestic Production of major raw materials like **Titanium Dioxide, Acrylates, Pigments, Specialized Resins** etc would certainly a great help to Paint & Coatings sector
- Major players are already discussed Generic paint formulations and part of various curricula in universities. Chemists and Chemical Engineers are regularly engaged for various projects
- Major players in Paint Industry are partner with **Punjab Tevta, PSDF, PITAC** and NGOs to develop required skill set in workers through courses of various tenor

Source: Berger Paint

Import of major raw materials for Pakistan's Paint industry and their major exporters in world

1 HS code: 320611 — Pigments and preparations based on titanium dioxide

Trade Volume : $9.4 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	82.8	11%	30,132	8%	2.7	China 64	Germany 9

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
China	2,290.0	24	908,773	15	2.5	24.4	0.04
USA	1,455.0	-1	512,189	-5	2.8	15.5	0.11
Belgium	1,125.8	10	361,012	5	3.1	12	0.16
Germany	951.7	7	288,382	2	3.3	10.2	0.05
UK	587.8	8	210,105	7	2.8	6.3	0.07

2 HS code: 390690 — Acrylic polymers, in primary forms (excluding poly"methyl methacrylate")

Total Volume: $15.7 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	67.573	12%	-	-	-	China 22	Singapore 17

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	2,212.0	-1	998,673	1	2.2	14.1	0.05
USA	1,794.8	-2	611,376	-1	2.9	11.5	0.14
Japan	1,412.7	3	585,469	5	2.4	9	0.12
France	1,375.9	1	695,645	6	2.0	8.8	0.07
South Korea	1,319.3	10	734,670	14	1.8	8.4	0.14

3 HS code: 320417 — Synthetic organic pigments & preparations

Total Volume: $5 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	30.8	5%	5,483	9%	5.6	China 38	India 36

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
China	1,061.6	-4	131,048	-3	8.1	21	0.06
Germany	732.0	-4	47,226	0	15.5	14.4	0.05
India	709.4	4	109,612	10	6.5	14	0.05
Belgium	388.3	4	35,763	8	10.9	7.7	0.11
Japan	276.8	10	7,707	3	35.9	5.5	0.24

4 HS code: 320417 — Xylol "xylenes" containing > 50% of xylenes (excluding chemically defined)

Total Volume: $3.3 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	24.1	2%	29,577	13%	0.8	Portugal 40	South Korea 30

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Japan	1,457.2	9	1,849,486	14	0.8	44.2	0.49
South Korea	433.3	-4	533,471	1	0.8	13.1	0.39
Belgium	402.1	72	505,786	83	0.8	12.2	0.87
Germany	253.0	39	365,423	41	0.7	7.7	0.42
Taiwan	194.6	-3	251,774	3	0.8	5.9	0.35

5 HS code: 391239 — Cellulose ethers, in primary forms (excluding carboxymethylcellulose and its salts)

Total Volume: $2.8 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	22.2	11%	-	-	-	China 49	USA 12

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	813.6	2	148,474	5	5.5	29.1	0.04
USA	494.5	6	42,850	5	11.5	17.7	0.1
Belgium	426.6	4	64,213	3	6.6	15.3	0.04
South Korea	254.3	4	48,452	5	5.2	9.1	0.06
China	212.6	3	52,681	6	4.0	7.6	0.05

6 HS code: 320890 — Paints and varnishes based on synthetic polymers or chemically modified natural polymers, dispersed or dissolved in a non-aqueous medium, organic solvents, containing > 50% solvent by weight

Total Volume: $8 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	17.5	4%	-	-	-	China 27	Taiwan 15

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	1,088.5	0	182,831	1	6.0	13.6	0.04
Japan	1,044.0	9	40,949	3	25.5	13.1	0.18
USA	763.7	0	99,371	-1	7.7	9.6	0.17
Italy	660.3	2	159,152	3	4.1	8.3	0.04
South Korea	375.5	-1	60,386	-4	6.2	4.7	0.27

7 HS code: 390730 — Epoxide resins, in primary forms

Total Volume: $6.7 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	30.8	5%	5,483	9%	5.6	China 38	India 36

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	1,061.6	-4	131,048	-3	8.1	21	0.06
South Korea	732.0	-4	47,226	0	15.5	14.4	0.05
USA	709.4	4	109,612	10	6.5	14	0.05
Taiwan	388.3	4	35,763	8	10.9	7.7	0.11
Japan	276.8	10	7,707	3	35.9	5.5	0.24

8 HS code: 291614 Esters of methacrylic acid

Total Volume: $3.1 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	12.4	19%	4,399	15%	2.8	China 31	Japan 28

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
USA	420.3	1	162,327	-2	2.6	13.5	0.12
Japan	395.9	2	129,667	-5	3.1	12.7	0.22
Germany	325.2	0	114,847	-3	2.8	10.4	0.08
Thailand	324.1	5	135,637	-2	2.4	10.4	0.22
Singapore	322.6	-1	117,534	-9	2.7	10.4	0.22

9 HS code: 390799 Saturated polyesters in primary forms (excluding polycarbonates, alkyd resins, PET and poly"lactic acid")

Total Volume: $9.7 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	10.8	23%	3,224	16%	3.4	China 63.5	EU Nes. 7.7

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	1,448.4	4	457,823	6	3.2	15	0.06
USA	1,055.0	3	235,201	3	4.5	10.9	0.14
China	880.3	12	426,870	14	2.1	9.1	0.06
Taiwan	788.1	4	381,375	6	2.1	8.1	0.11
Italy	614.6	2	227,202	4	2.7	6.3	0.08

10 HS code: 321490 Non-refractory surfacing preparations for facades, inside walls, floors, ceilings, etc.

Total Volume: $2.2 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	7.7	19%	1,956	25%	3.9	Japan 24	China 19.5

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	494.8	2	770,867	6	0.6	22	0.07
USA	172.3	-3	74,541	-3	2.3	7.7	0.19
Austria	141.8	9	491,249	10	0.3	6.3	0.11
France	105.4	3	134,189	-2	0.8	4.7	0.09
UK	104.2	4	41,128	10	2.5	4.6	0.04

11 HS code: 290542 Pentaerythritol

Total Volume: $273 Million

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	6.6	7%	4,148	9%	1.6	China 47	Taiwan 43

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
China	107.2	9	54,501	4	2.0	39.2	0.07
Germany	60.2	2	32,423	1	1.9	22	0.16
Taiwan	36.5	-2	22,721	-2	1.6	13.4	0.11
Saudi Arabia	28.9	4	16,975	3	1.7	10.6	0.47
Russia	20.9	4	13,722	4	1.5	7.7	0.15

12 HS code: 270750 — Aromatic hydrocarbon mixtures

Total Volume: $9.3 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	4.5	13%	-	-	-	Singapore 44	South Korea 28

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Netherlands	1,576.4	6	2,189,933	12	0.7	16.8	0.16
Malaysia	726.7	26	1,010,098	32	0.7	7.7	0.98
Belgium	638.1	-6	953,834	2	0.7	6.8	0.45
Spain	602.8	-4	921,923	4	0.7	6.4	0.43
Germany	601.2	-11	950,891	-6	0.6	6.4	0.45

13 HS code: 391190 — Polysulphides, polysulphones and other polymers and prepolymers produced by chemical synthesis, in primary forms

Total Volume: $5.2 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	3.5	9%	1,210	42%	2.9	India 25	China 18

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	1,089.0	3	197,773	3	5.5	20.8	0.05
USA	1,007.9	0	190,907	1	5.3	19.2	0.11
Japan	643.5	5	95,101	9	6.8	12.3	0.13
Belgium	413.2	7	42,136	7	9.8	7.9	0.18
China	384.5	18	94,732	20	4.1	7.3	0.08

14 HS code: 391110 — Petroleum resins, coumarone, indene or coumarone-indene resins and polyterpenes, in primary forms

Total Volume: $ 2 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	3.2	32%	869	23%	3.7	China 87	Japan 7

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
China	342.8	7	219,288	14	1.6	17	0.05
South Korea	316.9	-2	138,845	3	2.3	15.7	0.07
France	267.3	-6	103,317	-2	2.6	13.3	0.15
USA	255.3	-1	116,537	4	2.2	12.7	0.12
Netherlands	215.7	-3	81,202	-2	2.7	10.7	0.12

15 HS code: 321290 — Pigments, incl. metallic powders and flakes, dispersed in non-aqueous media, in liquid or paste form, for retail sale

Total Volume: $ 1.5 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	3.0	13%	619	25%	4.9	China 24	Romania 15

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	316.5	-3	22,579	-2	14.0	21.3	0.04
Japan	190.8	8	6,366	6	30.0	12.8	0.23
USA	149.0	1	12,055	-8	12.4	10	0.14
France	96.4	-2	9,535	-1	10.1	6.5	0.11
India	86.1	-10	31,167	-8	2.8	5.8	0.4

16 HS code: 321100 **Prepared driers** Total Volume: $238 Million

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	2.3	12%	627	14%	3.7	UK 34	Thailand 21

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	25.8	21	3,076	20	8.4	10.8	0.07
Belgium	23.0	-8	3,932	-6	5.9	9.6	0.11
Thailand	22.9	13	4,990	7	4.6	9.6	0.06
Spain	19.7	0	4,395	-5	4.5	8.3	0.08
India	18.0	9	4,572	4	3.9	7.6	0.06

17 HS code: 293110 **Tetramethyl lead and tetraethyl lead** Total Volume: $4.9 Million

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	0.5	18%	55	21%	9.8	Japan 86.5	South Korea 13

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
USA	2.4	-29	514	-16	4.7	49.1	0.28
Italy	0.5	78	423	191	1.3	11.1	0.91
Finland	0.4	3	1	-7	414.0	8.4	0.99
Belgium	0.4	-35	158	-8	2.4	7.7	0.13
Netherlands	0.3	-17	82	4	3.1	5.1	0.82

18 HS code: 382490 **Chemical products and preparations of the chemical or allied industries, including mixtures of natural products** Total Volume: $ 36 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	134.9	-6%	37,325	-14%	3.6	selected product Thailand 47%	selected product UK 11%

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
Germany	5,197.4	4	2,177,395	2	2.4	14.4	0.04
USA	4,226.8	0	1,038,959	-1	4.1	11.7	0.07
Japan	3,905.3	1	357,694	-1	10.9	10.8	0.14
China	3,539.5	6	3,305,068	3	1.1	9.8	0.05
Ireland	2,607.9	0	69,052	-3	37.8	7.2	0.07

19 HS code: 390760 **PET, in primary forms** Total Volume: $ 15.6 Billion

Pakistan's Imports	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in Pakistan's import in %	
	26.6	-13%	11,894	-19%	2.2	selected product Thailand 47%	selected product Japan 44%

Major Exporters in the world	In USD Million	CAGR in Value 2014-18 (%)	In Tons	CAGR In Quantity 2014-18 (%)	In USD/KG	Share in world's export (%)	Concentration of importing
China	3,829.4	7	3,176,270	8	1.2	24.5	0.03
Taiwan	1,426.2	9	1,156,701	11	1.2	9.1	0.2
India	1,322.1	27	1,084,762	28	1.2	8.5	0.05
South Korea	1,269.1	7	937,435	7	1.4	8.1	0.09
Netherlands	757.4	3	615,841	6	1.2	4.8	0.12

Source: ITC Trade map, 2018

Pakistan Paint Industry

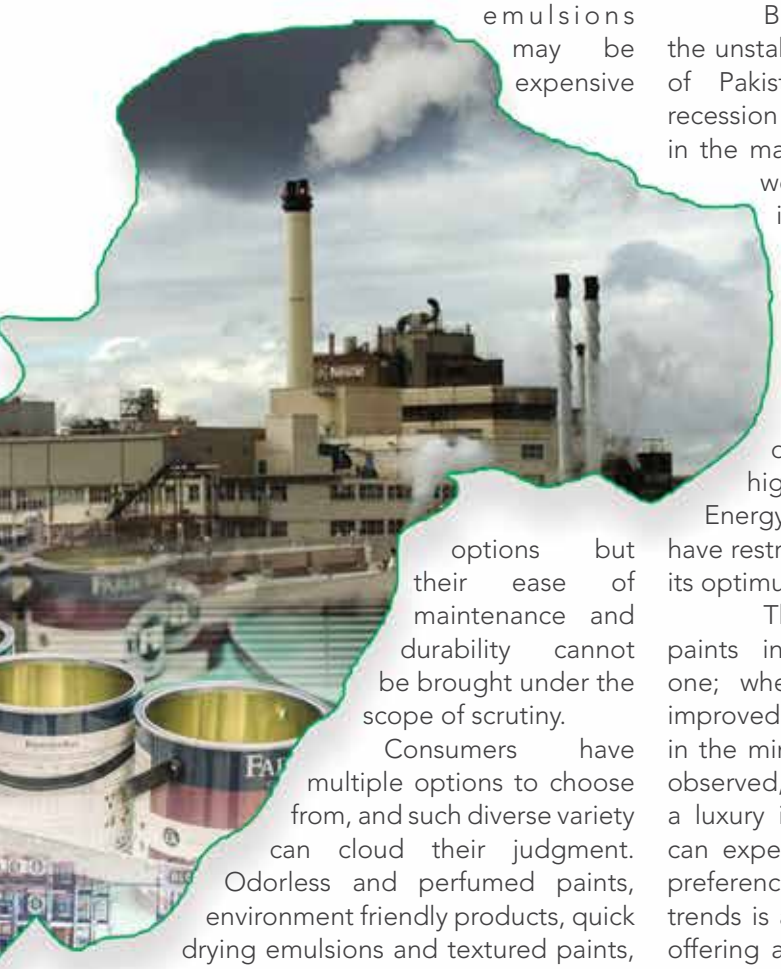
One of the earliest industries that started operations in Pakistan happened to be that of paint. This industry has significantly evolved over the course of time with numerous modern facilities functioning in full swing, manufacturing different categories of paint with varying uses. Technological advancements along with modern processes have enabled Pakistan to not only fulfil its domestic needs but also exports paint to neighbouring nations which in recent yearshas exhibited promising growth.

Paint industry's growth is directly linked with the construction industry which generally is estimated at 1.5 times of the country's GDP.Over recent years the industry has grown by5% annually with a potential customer base of 540 million.

Collectively it is estimated thatthe paint industry produces 210 million liters of Decorative finishes catering to all segments of the potential customer base. The paint industry of Pakistan like all other major industries of the country can be divided into two sectors namely the organized & the unorganized on. Organized sector comprises mainly of manufacturers who are publicly or privately registered and are recognized players with established brands. Whereby the unorganized sector mainly comprises of small to medium sized manufacturers producing paint items that are of average quality and are generally sold at costs devoid of taxes/duties etc. It is estimated that the organized sector produces a total of 73 million liters of decorative paints while the latter producing around 137 million liters per annum.

Pakistan Paint Manufacturers Association (PPMA) overlooks the entire paint industry. The organized sector constitutes of 22 paint producing units whereas the unorganized sector consists of more than 350 units. The unorganized sector is not affected by the hurdles of excise and taxation the way the organized sector is, hence proving to be a prominent rival in the domestic market spectrum. The market for decorative paints branches out into two distinct categories. The interior category relates to paints and related products used for the purpose of indoor coatings while the exterior category relates to outdoor uses of paint. The exterior paints market exhibits an output of 7 million liters; the market dominated by the weather resistant paint as it stands out among other rival products and leads to an output of 4.2 million liters out of the entire 7 million. The weather resistant paint stands out in the industry and is considered as a product of utmost importance since it's highly practical in terms of usage for cities such as Karachi where conventional paints fail to work effectively due to the breeze and winds that originate from the sea. The Weather protective paint provides an effective

solution, being unaffected by wear and tear and also acts as a dust repellent. Adding to its effectiveness, weather resistant paints come with multiple options of colors to choose from, as well as offering matt emulsions. Matt emulsions may be expensive options but their ease of maintenance and durability cannot be brought under the scope of scrutiny.



Consumers have multiple options to choose from, and such diverse variety can cloud their judgment. Odorless and perfumed paints, environment friendly products, quick drying emulsions and textured paints, all can be found in the Pakistani markets, each coming with a different set of offerings.

The dynamics of a highly competitive market along with the prevalence of multiple rival brands force companies to take into account moves that would earn them a place above their competitors. Such scenarios lead to domestic manufacturers pairing up with foreign players in order to strive for competitive advantage and innovative products that fall in accordance with global standards.

Pakistan is a country that finds itself on a strategically important place on the map with Central Asian and Middle Eastern markets nearby. As the socio-political events have turned out in recent times, a huge opportunity awaits Pakistani paint exports. A staggering 90 percent of Afghani needs in relation to paint are met by Pakistani producers. Facilitating the opportunity that lies at hand already, the well knitted road network of Central Asia make trading much easier.

But on the other side of the tracks, the unstable political and economic scenario of Pakistan alongside times of global recession have forced a 10 percent decrease in the market share for the industry. Further worsening the situation, the increase in taxes and duties has turned into financial hurdles for the paints industry, affecting it negatively. PPMA has tried repeatedly to step in to control the financial burden on the paints industry as there lies a huge global opportunity as demand of Pakistani manufactured paint is high, due to its high quality standards. Energy related crises and political turmoil have restricted the industry from operating at its optimum level of efficiency.

The evolution of the Pakistani paints industry has been an interesting one; where not only have manufacturers improved production but a notable change in the mindsets of consumers has also been observed, where paint has transformed from a luxury item to a product that consumers can experiment with according to personal preferences. The positive wave in consumer trends is a good sign for the paints industry, offering an incentive for brands to continue with their business endeavors, alongside the market opportunities presenting themselves in Central Asian markets. Rapid globalization, with decreasing transportation costs have uplifted the industry greatly.

Last but not the least, Paint industry in Pakistan may flourish further if adequate level playing field is offered to registered manufacturers to overcome the menace of cottage production behind the tall wall of tax evasion and this will not only facilitate the government to increase revenue from this sector, increase employment to educated youth but also the value addition done in terms of bringing in new technologies with hi-tech coatings.

Source: Berger Paints Pakistan Ltd.

POWDER COATINGS MARKET

Powder coatings provide a more durable finish than liquid paints can offer.

The global powder coatings market is forecasted to exceed $17 billion by 2025, according to a report by Global Market Insights, Inc. T**he growth will be owed to environment-friendly properties, cost-effectiveness, high quality, swift paint applicability, and easy usability over conventional paints**, according to Global Market Insights.

"General economic growth, as well as the ongoing adaptation of powder coatings as an alternative for liquid coatings in the market place, will keep pushing the healthy growth path," said Daniela Vlad, AkzoNobel business unit director, powder coatings.

"The global powder market is still growing at a low single-digit. We see headwinds in different parts of the world," Robert Roop, Axalta's VP and chief technology officer, said. "Most end-use segments in North America did not do well in 2019 and the total market decreased by two to three percent.

"The European market has also been challenging in terms of growth and profitability. The main powder suppliers worked heavily on closing the price cost gap created after two years of continuous raw material increases," Roop continued. "In 2020, despite signs of market slow down, restoring and maintaining margins will remain an area of focus for the industry."

Roop noted that the powder market keeps evolving. "More environmentally friendly solutions, improvements in quality and efficiency, better services, and new technology advances are continuously being added on the market. This provides the customers with significant added value in both existing and new fields of applications," he said.

Added Tabitha McLeich, global product director powder coatings for Sherwin-Williams: "2019 showed continued growth in powder coatings around the globe as manufacturers and applicators continue to realize the operational efficiencies, lower environmental impact, and color and texture options that powder coatings provide for their finished goods."

Powder over liquid

Powder coatings are available in an almost limitless range of colors and textures, and technological advancements have resulted in excellent performance properties, according to the Powder Coatings Institute.

"Customers increasingly aim to reduce environmental impact and demand sustainable coatings solutions," Vlad said of the advantages of using powder over liquid. "Powder coatings contain no volatile organic compounds (VOC) and no toxic heavy metals such as lead or chromium (VI), which makes them a very viable solution in this age of environmental awareness.

"Powder coatings have a high utilization of material – up to 99 percent – and any overspray can be recycled, minimizing waste," she continued. "Wider color options and textures reinforce powder as a strong substitute for liquid coatings. Powder coatings are sustainable, clean, safe, have excellent performance characteristics and offer significant cost benefits compared to alternative coatings."

Roop cited "excellent coverage on three-dimensional objects; limited waste (high recycle capability); a wide range of colors and appearance (gloss, matte, even wrinkle); excellent durability (scratch, chip, wear); and no VOCs."

"Powder coatings offer advantages over liquid coatings at every point on the lifecycle," added Shelley Verdun, PPG business manager, powder coatings – Americas. "Powder coatings have enhanced durability, exceptional chip and abrasion resistance, are low in VOC and cost-efficient due to high transfer efficiency and reclaimability.

"From an applicator perspective, powder coatings offer low cost-of-entry to the market, low PPE requirements, do not use solvent for clean-up and have minimal impact on the environment. In addition, there are no special storage or transportation

requirements and in powder coating processes, no hazardous waste is generated."

Powder coatings provide a more durable finish than liquid paints can offer, while still providing an attractive finish, according to the Powder Coatings Institute.

"Powder coatings offer numerous advantages for applicators: Improved part coverage, transfer efficiency, and the ability to reclaim powder on a manufacturing line are all key advantages," McLeich said. "Powder offers a wide variety of color and technology options that allow applicators and manufacturers to dial in their coating to the needs of their customers or end-users. Whether it is an exterior building product that needs to hold up to the elements and UV light or a part for office furniture that needs to hold up daily wear and tear of the user, powder coatings offer the right protection for a specific environment."

Markets

Key markets, the Powder Coatings Institute reports, include agriculture and construction; appliances; architectural; automotive and transportation; electrical; functional; general metal; HVAC; and lawn and garden.

Powder coatings represent more than 15 percent of the total industrial finishing market, per the Powder Coatings Institute.

"The architectural, appliance, automotive and furniture markets are all showing steady growth," Verdun said. "While powder has traditionally been used in these areas, confidence in powder coatings is growing. Powder has demonstrated exceptional durability and corrosion performance [and] advances in the technology have demonstrated that powder coatings are capable of higher appearance standards, lower and faster cure rates, thinner films and extended metallic color space."

"For powder coatings, there is an over-arching growth theme of replacing alternative finishes in the areas where it will provide comparable or better appearance, protection and functionality," Vlad said. **"Regionally, we are looking at emerging growth areas, such as China and South Asia. In China, we see a large wave of powder applications in various industrial applications, such as commercial vehicles and construction equipment. Specific sectors also bring new innovations, such as the automotive sector, where sustainability is a key factor in the decision process."**

Added Roop: "A wide range of markets will experience growth in powder coatings, including automotive parts, appliances, furniture, architectural, and ACE."

Regions

Global Market Insights reported that the Latin America powder coatings market will be led by Brazil and Mexico.

Production is projected to exceed 250 kilotons by 2025,per the report.

Mexico is expected to witness strong growth in the furniture industry as numerous companies have shifted certain segments of their production operations in the country, Global Market Insights said.

"Asia Pacific has been the fastest-growing coatings market for powder with an estimated growth rate of roughly five percent,

followed by Europe," Verdun said. "The key drivers of growth include GDP, residential and architectural construction, industrial and automotive production."

"China still is the No. 1 market, followed by North America," Vlad added.

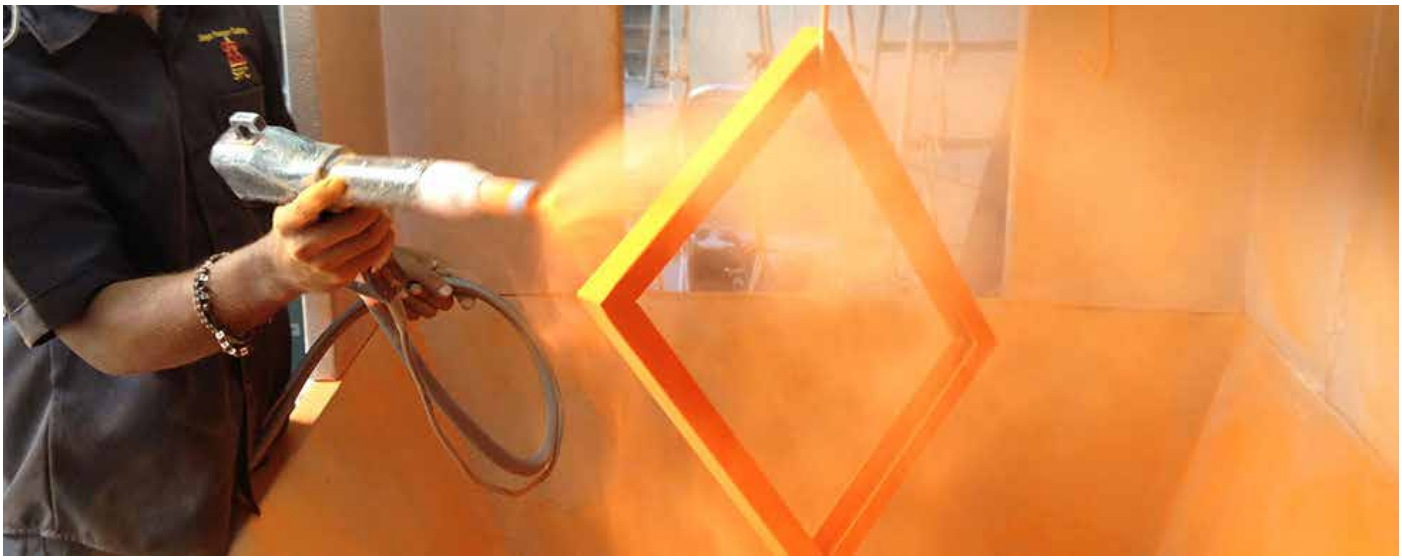
The Indian powder coatings market accounted for a revenue of $896.7 million in 2017 and is anticipated to generate revenue of $1.5 billion by 2025, according to Allied Market Research.

In the news

In October, Axalta acquired a manufacturing site in Çerkezköy, Turkey, for its powder coating business.

The facility, which is currently being upgraded, will host the production of all Axalta's premium powder product ranges, including Matt (AE30 & SD30), Fine Textured (AE03 & SD03) and Semi-Gloss (AE70 & SD70) Collections, all specifically designed for architectural applications.

"By purchasing an established powder manufacturing site, we will be able to service that market very quickly. Our customers in Turkey



and the surrounding regions will enjoy even quicker responses to their increasing demand for high-quality products," said Klaus Gast, business director for Axalta's powder coatings business, EMEA.

The company also expanded its Landshut, Germany, site, creating a second production facility in the region for bonded metallic powder coatings alongside Axalta's Montbrison plant in France.

The second production facility will enable Axalta to better respond to the increasing demand for high-quality metallic powder coatings, which are used specifically in architectural and design applications. Axalta's powder coatings product portfolio includes the ICONICA, Optimum Fine Textured, Anodic and Timeless collections as well as more than 150 currently available, off-the-shelf metallic powder coatings.

In July, AkzoNobel announced plans to add three new production lines at its Changzhou powder coatings plant in China – the company's largest facility of its kind in the world.

The €3 million investment will support additional supplies of acrylic powder coatings, metallic powder coatings and powder primers for the automotive sector, strengthening AkzoNobel's ability to deliver more locally produced premium products.

"China is a high priority region for us and the booming powder coatings industry in China will help to optimize our production and investment strategy," CEO Thierry Vanlancker said.

"Given emerging market trends and customer needs, we are fully aware of the importance of manufacturing and delivering locally," added Mark Kwok, president of AkzoNobel China/North Asia. "The Changzhou site plays a strategic role in supporting our business development in China. The new production lines will further our localization strategy to create more value for both ourselves and our customers with efficient and customized solutions."

Going forward

As we move into the next decade, powder coatings manufacturers continue to work on new technologies. According to Roop, Axalta is crafting next-generation hyper durable products to extend the mechanical and weathering durability to the next level; new bonded metallic products with unique appearances; and new thermoplastic products to extend the range of application for thermoplastic powder coatings.

"At PPG," Verdun said, "we are committed to innovating in powder and focused on developing benchmark technologies that will solve our customers' most pressing problems while being ahead of regulatory needs."

"Everything we do is driven by market needs and providing more sustainable solutions for our customers around the world," added Vlad. "Whether that's offering scratch resistance, combining superdurability and flexibility, improved material usage through lower applied film builds or adding more functionality to the coatings, providing the ultimate powder solutions and helping our customers to reach their sustainability goals are at the core of our work. Our ambition is to make powder coatings available to as many markets as possible."

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Publish in coating world's December, 2019 edition.

Pakistan Chemical Manufacturers Association

PCMA
Pakistan Chemical Manufacturers Association

on behalf of chemical industry of Pakistan
welcomes and extends profound gratitudes to

Mr. Anjum Nisar

on his election as
President Federation of Pakistan Chamber of Commerce & Industry
for 2020.

This is a matter of great pride for PCMA that
Mr. Anjum Nisar is third President FPCCI, in a row,
who belongs to chemical industry & one of the member companies of PCMA.
Esteemed names of his predecessors include
Mr. Muhammad Adress & Zubair Tufail

We hope Mr. Anjum Nisar will contribute in developing the industry of Pakistan in general & making the chemical industry compatible & sustainable, in particular.

SAFETY MANAGEMENT SYSTEM IN PAINT INDUSTRIES

Industrial sectors are moving towards age of innovation and new technology. Progressively improved design strategies have been developed reducing human interaction and enhanced automation in production facilities. Production plants are becoming fairly complex in nature, requirement of skillful working personnel have grown high. These complex facilities imposes more hazardous environment because operational conditions are more rigorous. Consequently, many fire accidents originate from these industrial sectors, instigating loss of assets and precious human life. Significant portion of researches believe that a significant percentage of all accidents are foreseeable, conclusively and hence they are preventable. [1-2]

One of the most significant entities in fire incidents is combustible or flammable source, undoubtedly flammable solvents serves as most aggressive fire catching element and a vital source of fire incidents in many different industrial sectors.[3-4] Paint industry is rich in consuming similar raw materials for the manufacturing of different products, like pigments, extenders, binders, additives, and solvents (toluene, xylene, ketones, alcohols, esters, and glycol ethers). Many of these raw materials possess high potential to initiate a catastrophic event which will endanger the asset integrity of the manufacturing facility thus requiring better safety management system, trained workforce and state of the art fire extinguishing systems to deal with any untoward incident.

In this article we will study a similar incident and apply Fault Tree Analysis technique to the Top event / incident to identify underlying causes. [5–7]

FAULT TREE ANALYSIS

FTA is a "backward" analysis: a system hazard or top event (e.g. the hazardous event placed at the top of the fault tree), is the starting point and the study traces backwards to find possible causes of the hazard. Analysis is restricted to identify system elements and events that lead to the specified failure or accident. [8]

A Fault Tree Analysis (FTA) is deductive graphical techniques that display combinations of equipment failures and human errors that can result in an accident. AIChE states that FTA is well suited for analysis of highly redundant systems. For systems vulnerable to single failures that can lead to accidents. FTA employs Boolean logic: this requires that any statement, condition, act or process be described as only one of the two possible states, such as on/off, fully open/not fully open, etc. [9-10]

Three steps are needed to conduct FTA thoroughly and accurately:

Step-1: Define TOP event;

Step-2: Thorough understanding of the system to be analyzed including process design, equipment specifications, literature and operational procedures etc.

Step-3: Construct Fault Tree using standard symbols. It starts from TOP event and will address any possible equipment failure, human error or environmental factors that could result in the TOP event.

INCIDENT SEQUENCE

Manual transferring of solvent (toluene) from drum to mixing pot > improper handling of drum > collision of drum with metallic pots > spark generation on impact > solvent vapors within flammable range > catastrophic fire

Fault Tree Analysis has been applied and summary is as follows,

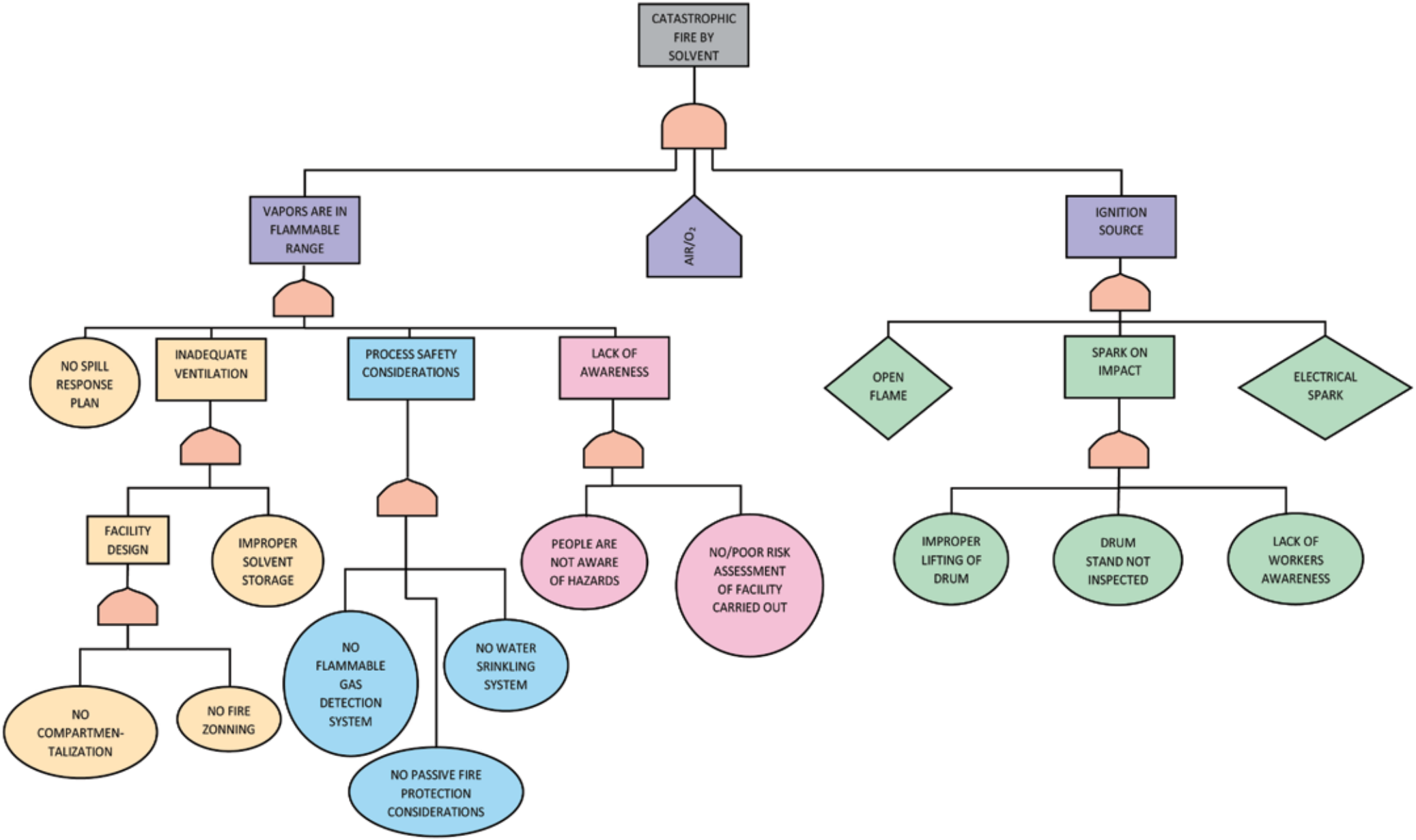
On the basis of FTA study in Figure 1.

Following causes of incident has been determined:

- There was no compartmentalization of facility carried out; due to which fire immediately spread out and occupied all other areas, this could have been prevented by proper fire zoning of whole plant facility.
- No Fire zoning / violation of fire zones causes the spread of fire and immediately it went out of control;
- No flammable gas detection system was available
- Passive fire protection did not consider in design which caused catastrophic losses;
- No water spray sprinkling system was present for quick auto response to fire;
- People were not aware of fire hazards;
- No or poor risk assessment of facility carried out;
- Manual handling procedure not prepared;
- No inspection record found.

Local paint industry operates both in organized and unorganized sectors in Pakistan. According to an estimate, over 350 small and large units of paints and varnishes operate in the unorganized sector. Their products are substandard; though their cost of production is comparatively low. Apart from few renowned paints manufactures that have implemented proper safety management systems, a vast majority of paint manufacturers lack proper processes and safety management system that result in fire incidents both minor and major. Fire incidents occur regularly in various paint industries, although they have not led to a major event but indicate that lack of safety management system contribute and the current measures are inadequate to address this challenge.

FAULT TREE ANALYSIS MODEL



Fire incidents, data and their contributing causes along with their cumulative percentages are summarized in following Table [11].

Sr. No	Category	No. of Appearances of causes	%
1	Operating Procedures	44	22
2	Training & Awareness	38	19
3	Mechanical integrity system	28	14
4	Poor Risk Assessment	28	14
5	Improper electrical wiring	19	9.5
6	Preventive Maintenance	9	4.5
7	Heat	9	4.5
8	Static Spark	6	3
9	Hot pipe lines	3	1.5
10	Water Seepage	3	1.5
11	Job Safety Analysis	7	3.5
12	LPG Gas leakage	6	3

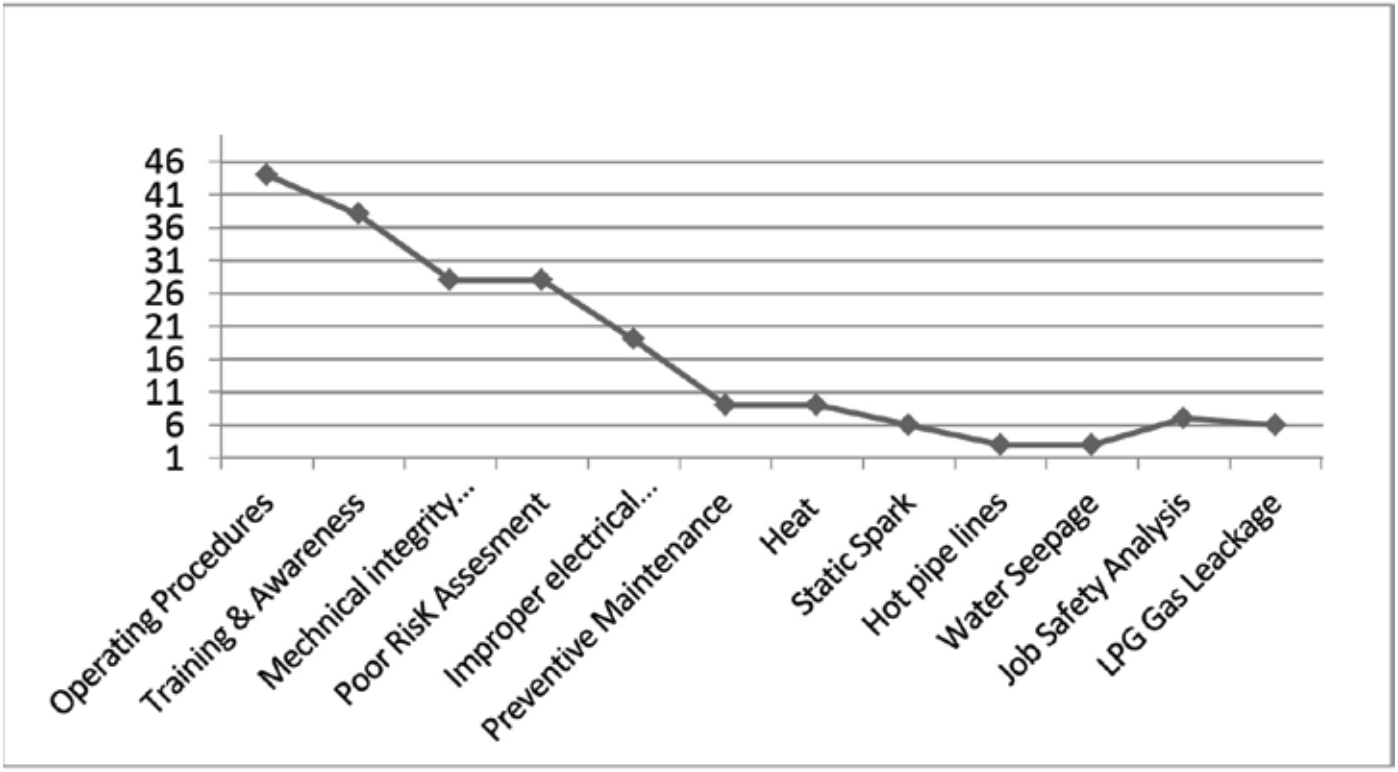


Figure 2. Cumulative percentage chart indicating categories, count of appearance of causes, and cumulative percentage

CONCLUSION:

On the basis of Fault Tree Analysis (FTA) results and incident investigations of various similar incidents. It is evident from the results that major focus should be given to make the process inherently safer. Proper considerations in design to make the whole process safer is a must to avoid explosions. The analysis fortifies the opinion that paint manufacturing facilities, being major consumer of flammable chemicals, is more prone to industrial fires and special attention should be given to implement risk assessments and safety management system.

Above findings also indicates that lack of operating procedures, trainings, awareness campaigns,

mechanical integrity, poor risk assessments and poor job safety analysis are a few but notable major causes of various incidents.

The four main methods for achieving inherently safer designs are:

- **Minimize:** Reduce the amount of hazardous material present at any one time, e.g. by using smaller batches.
    1. Use standard batch sizes of 150 – 2000 Liter as per product requirement.
    2. For solvent base paint it is necessary to use close lid mixing vessels, lid lined with copper plates to avoid impact spark.
    3. Warehouse areas should have proper segregation base on reactivity of solvents; i.e. acids and alkalis should be store separately with approx. 20 feet clearance.
    4. Furthermore, highly hazardous chemicals like strong acids, Ammonia, flammable solvent, Nitrocellulose should be stored separately in designated area. Should be stored away from reactive chemicals and as per MSDS guidelines.
- **Substitute:** Replace one material with another of less hazardous nature, e.g.
    1. Nitrocellulose chip form (flash point 4.4 oC) should not be stored inside production facility. It is preferable to use NC in resin form (flash point 29 oC) to avoid any fire hazards.
    2. Moreover, sparking metals e.g. iron made equipment for solvent drums handling/ opening must be replaced with brass to reduce chances of spark by collision.
    3. Each material that may cause static spark, fabric or paper should be avoided near solvent storage or handling.
- **Moderate:** Reduce the strength of an effect, e.g. having a cold liquid instead of a gas at high pressure, or using material in a dilute rather than concentrated form.
    1. It is incumbent to have separate production buildings for enamel and emulsion base paint to reduce possibility of any fire escalation hazard.
    2. Installation of air handling units and auto mist spray systems to reduce the overall VOC levels in flammable solvent rich areas.
- **Simplify:** Eliminate problems by design rather than adding additional equipment or features to deal with them. Only fitting options and using complex procedures if they are really necessary.
    1. Proper fire zoning of the whole paint manufacturing facility based on inventory of hazardous chemicals.
    2. Electrical installation, equipment requirement should be according to the nature of the zone.
    3. Fire water demand should be individually calculated for each plant to provide 110 % capacity of fire water. Moreover, for flammable solvent handling areas sprinkler system with AFFF foam injection unit is preferable.
    4. Equipment earthing is critical necessity for safe operations. Preferable to have sufficient earthing pits essentially for solvent handling building to prevaricate accumulation of static spark that may further lead to fire hazard.

Additionally, Paint manufacturing facilities must certify to international management systems certification e.g. Environmental management system, Health and Safety management system and Quality management system. These certification covers policies, procedures and work instructions to standardize working environment. Policies and procedures must be made to enforce safe working environment. Management contribution should be highlighted at all levels to promote a safe culture.

Consistent consideration should be given to training and development of workforce. Only an informed worker can identify risks associated with their working environment and may also take necessary actions to prevent an incident before happening. Trainings need analysis is also a vital part of management systems for a similar reason.

Work Permit systems, contractor management systems, emergency response plans, job safety analysis and risk assessments should be made and communicated to everyone.

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CUSTOMIZATION, DIGITALIZATION IN EUROPEAN COATINGS SECTOR GROWING

Along the coatings value chain, companies are striving to satisfy the individual needs of customers.

Customization, particularly by raw material and additives suppliers, is accelerating in the European coatings sector as companies seek ways to differentiate their products and services. Along the coatings value chain, companies are striving to satisfy the individual needs of customers, which often stem from new opportunities presented by technological advances or a tightening up of specifications due to the introduction of stricter standards. Meeting more precise requirements may relate just to the quality, safety and functional features of products. But it can also apply to services, such as the provision of more specialized technical support.

A major force behind customization is the growth of digitalization – defined as the **transfer of virtually every function in business from administration, selling and marketing to manufacturing, recycling and waste disposal into the binary language of a computer.** This results in vast amounts of data being collected, stored and hopefully evaluated to improve the operations of a business, including its responses to customer demands. However, to be effective, digitization has to cover the whole of a business operation. The company has to undergo a "digital transformation," according to Mike Bach, chief executive of Prisma, a German software provider specializing in the needs of the coatings sector.

This can often mean a change in corporate culture so that departments no longer retain their own databases but instead have to merge them with a company-wide network. Even data from production processes should be fed into this network. Digitalization is expected to gradually take over much of the European coatings sector as well as most of its customer sector. But it may be a lengthy procedure.

Surveys show that at present only a relatively small proportion of process industries in Europe, including coatings producers and their raw material suppliers, have become fully digitalized. An even smaller percentage has started to adopt advanced digital technologies, such as the use of artificial intelligence (AI) and machine learning.

Most companies in the coatings sector appear to be struggling in the adoption of all key aspects of digitalization – data collection, data processing, network building and above all evaluation.

As a result, they are not creating the flow of information – in value or volume terms – necessary to make digitalization work properly.

Most of the pace-setting in digitalization has been – although not exclusively – done by large companies that have a proportion of their portfolios in coatings products and/or raw materials.

They have digitalization schemes covering all the different business segments in their companies.

Evonik, which has now

become a major global player in coatings additives, has an ambitious digitalization program extending into some pioneering computer technologies.

Two years ago the company announced it was putting €100 million ($110 million) into digitalization schemes, which included a strategic partnership with IBM and the University of Duisburg-Essen in Germany.

Christian Kullmann, Evonik's chairman, explained that digitalization brought with it "a world of possibilities."

"These would be tested to see if the company could "put them to good use," he added.

In Evonik's coatings additives business, the objective behind digitalization was to shift the focus to "customer-centricity."

Digitalization was not just about data and technology but also services to customers, according to Henrik Hahn, Evonik, chief digital officer.

Next year Evonik is due to display its expertise in coatings formulations with the introduction of a voice-controlled digital laboratory assistant called COATINO. It will help formulators in the laboratories of customer companies to research and chose the right ingredients for their coatings.

COATINO will use a pool of data created by an Evonik high-throughput experimentation unit in Essen, Germany, for testing formulations.

The development of the digital assistant has been a tough task. If 10 curing agents, 10 binders and 10 additives are considered in the development of a coating recipe that translates into 10,000 possible combinations. COATINO will initially concentrate on information on existing formulations but it may in the future suggest entirely new ones.

"[It might] become an artificially intelligent entity," explained Gaetano Blanda, head of coatings additives at Evonik. "But we will have a long, long way to go until then."

BASF, which is both a producer of finished coatings and coatings raw materials, is probably among the most adventurous in digitalization initiatives in the European coatings sector.

Last year it installed a super-computer, called Quriosity, at its headquarters in Ludwigshafen, Germany, which increased by 10 times the overall computing power previously available to BASF researchers.

The company's coatings business has focused on creating capacity for meeting the tough specifications imposed on suppliers to the OEM auto and aerospace sectors.

In November 2019, BASF Coatings opened a new laboratory at Langelsheim, Germany, for its Chemetall surface treatment business with the objective of being able to "continuously and precisely meet the demands and specific requirements" of the aerospace industry, according to Christophe Cazabeau, senior VP of surface treatment.

"Approvals and specifications are essential for the international aerospace industry," said Steffen Boberg, Chemetall's spokesperson for Europe, Middle East, Africa and South America. "Our products cover thousands of global specifications and approvals."

In the OEM auto sector, BASF Coatings has digitalized its 600 colors for car applications into 3D parameters so that auto designers can use the data for computer-aided design of auto models.

For laboratory work, the business has also developed work processes for fostering customer-specific product development.

However, the big international companies are not the only ones which are active in digitalization. SMEs are becoming aware of the necessity of digitalization for the future of their businesses.

"Digitisation is a requirement for coatings companies to remain competitive," said Ruth Winghart, Prisma's commercial director. "They need special digitization software for all their processes – in production, sales, R&D and laboratory work – so that they can meet the specific needs of customers better."

"Small and medium-sized coatings companies with 200-2,000 employees are among the most active in investing in digitization," she added. "They are more flexible than larger companies and find it easier to move to more complex processes."

SMEs will play a crucial role in the European coatings sector in expanding digitalization because of market pressures. "We are now seeing even the smaller companies with a small number of employees adopting digitalization because they recognize that it helps them to be more competitive," said Winghart.

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Green Solution to the Bright Metallic Effect Coatings

This article is an argument & appeal to stop using hexavalent chromium (Cr+6) compounds due to their carcinogen effect.

NIOSH (National Institute for Occupational Safety and Health) is a reputable centre for Disease Control and Prevention in United States.

NIOSH evaluation of critical health effects studies of occupational exposure to hexavalent chromium (Cr+6) compounds provides recommendations for controlling workplace exposures including a revised RELs' (Recommended Exposure Limits). This REL's are derived using current quantitative risk assessment methodology on human health effects data. The document supersedes 1975 Criteria for a Recommended Standard: Occupational Exposure to Chromium (Cr+6) and NIOSH Testimony to OSHA on the Proposed Rule on Occupational Exposure to Hexavalent Chromium [NIOSH 1975a, 2005a]. Cr+6 compounds include a large group of chemicals with varying chemical properties, uses, and workplace exposures. Their properties include corrosion-resistance, durability, and hardness. Sodium dichromate and/ or chromic acid are the most common chromium chemical from which other Cr+6 compounds may be produced.

The compounds containing chromium hexavalent (Cr+6), are a well-established occupational carcinogen associated with lung cancer and nasal and sinus cancer. NIOSH considers all Cr+6 compounds to be occupational carcinogens. NIOSH recommends that airborne exposure to all Cr+6 compounds be limited to a concentration of 0.2 µg Cr+6/m3 for an 8 hours exposure. The REL is intended to reduce workers' risk of lung cancer associated with occupational exposure to Cr+6 compounds over a 45-year working lifetime. It is expected that reducing airborne workplace exposures to Cr+6 will also reduce the non-malignant respiratory effects of Cr+6 compounds, including irritated, ulcerated, or perforated nasal septa and other potential adverse health effects. Because of the residual risk of lung cancer at the REL, NIOSH further recommends that continued efforts be made to reduce Cr+6 exposures to below the REL.

A hierarchy of controls, including elimination, substitution, engineering controls, administrative controls and the use of personal protective equipment should be followed to control workplace exposures.

As an environment friendly coating, there might be some safer procedures for similar metallic effects, i.e.

1. Physical Vapour Deposition (PVD)
2. Silver nano-coating by electroless spray plating onto an organic basecoat
3. Highly Reflective Powder Coating

Physical vapour Deposition (PVD)

This is being done by vacuum metallization process that is Chrome free, highly reflective and very close in appearance to real Chrome Finish. A smooth finish Epoxy-Polyester hybrid glossy base coat was applied by electrostatic / corona powder coating process. The base coat powder was provided by 'Diamond Paint Industries Private Limited (Pakistan). The said base coating was cured at 200 °C metal temperature for a period of 10 minutes as per provided technical data sheet. The aluminium was deposited by 'Vacuum Metallization Process'.

Figure 3. Base coat of Epoxy-Polyester Hybrid Powder Coating

Figure 4. Aluminium layer by PVD process on Powder Coated base

The work piece may be any of the materials that can be powder coated (mostly metals). The unbeatable combination of powder filler, powder primer, metalized layer, and powder clear coat passes the toughest testing requirements of the OEM wheel industry.

Nano-chrome by electroless spray plating onto an organic basecoat

The equipment cost of this procedure is less than second but the raw material cost is higher due to expensive salts like AgNO3, pdCl2 and SnCl2 used in compositions.

This was done by electro-less spray silver plating process which is Chrome free, highly reflective and very close in appearance to real Chrome Finish. The work piece may be any of a number of materials including wood, plaster, glass, metal, plaster, fiberglass, ceramic, cement or polystyrene etc. The object is intended to represent a section of any of a number of items made from the above materials including various parts of automobiles, boats, motorcycles, airplanes, jewellery, household appliances, trophies, picture frames, building materials, art work, musical instruments and many others.

A process for electro-less silver plating of a work piece that overcomes the aforementioned shortcomings includes simultaneously spraying a

silver nitrate solution and a reducer on a work piece to form a reflective layer on the work piece, applying a water-based urethane coating on the reflective layer and applying either a solvent-based top coat or a clear powder coating on the water-based urethane coating. The PU glossy base coat was applied on ferrous sheet panels and silver metal was deposited by spray metallization process.

Figure 1. Base coat of urethane paint (PU) on metal steel panel

Figure 2. Nano Coating of Silver on PU base by Spray Metallization Process

The stages / steps of the spray type electroless plating process were as under,

1. Application of Base Coat (Polyester / polyurethane / Acrylic / Alkyd)
2. Degreasing / wetting with surfactants
3. DI Water Rinse
4. Surface Activation
5. DI Water Rinse
6. Spray Silver Plating
7. DI Water Rinse
8. Water Based PU Sealing
9. Air Blow Drying
10. Clear Top Coat of PU / Transparent Powder CoatinG

Highly Reflective Powder Coating

Highly reflective powder coating named as 'Super Chrome' is a basecoat with a gloss level in the range 450 to 550 GU @ 60° incident angle i.e. very high as compared to 90-95% in case of normal high gloss powder coating. This however, requires a clear top coat powder coating as shield to avoid oxidation of overlying aluminium flake pigment. This top coat can be clear with no prominent shade or may be a transparent effect colour as per 'TransLac Series' powder coating that result as a highly lustrous powder coating range.

Conclusion & future tasks to proceed

Although electroplating chrome finish on to the nickel plated basecoat is very bright, hard and scratch resistant coating so, it is tough enough but its carcinogen property in the form of hexavalent chrome forbids its use in the processing industries. The upcoming 'temperature resistant basecoat' and 'scratch-resistant topcoat' will further gear-up the alternative route to a chrome look finish. However, some of the parts & items can easily be replaced with any of the above- mentioned types without hazardous effects.

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VISIONARY OF THE MONTH

BASF
We create chemistry

Mr. Faisal Akhtar (MD, BASF)

Please give brief overview of yourself, with 03 key accomplishments in your life, and your organization along with the detail of the companies / Groups, working under your umbrella.

I have been working as Managing Director of BASF Pakistan since Feb 2014 and having 29 years of management experience with large multinational organizations. I am also elected as President of the German-Pakistan Chamber of Commerce and Industry, and as a Director at the Pakistan Institute of Corporate Governance. In the past, I also held the position of Sr. Vice Chairman of Pakistan Chemical Manufacturers' Association and an Executive Committee member of Federation of Pakistan Chamber of Commerce and Industry (FPCCI) in 2018-19. I hold a postgraduate degree in Chemistry from the University of Karachi. I am married and have two daughters. During my professional career, I take pride in delivering significant results in devising and implementing a business strategy, Leadership and Change Management.

Please share the influence of a leading person or event, in chemical industry, that shaped you for who you are today?

My pursuit for success, through the heights and plains of my career has molded who I am today. Soon after completion of my education, I joined an innovative progressive company that allowed me the opportunity for advancement. Catering to diverse industries, the company afforded many opportunities to move from one position to another, one business and one industry to another, broadening my horizon and enhancing my areas of expertise. I couldn't imagine my life any other way, and I'm extremely thankful for the circumstances and people who supported me along the way.

Being a part of the chemical industry has opened my eyes to the endless opportunities it has to offer, and I am grateful for the organizations that have taught me about the business thus far. I want to encourage the youngsters to get involved and see for themselves how beneficial the chemical industry is and experience the once in a lifetime opportunity it has to offer.

What are the key strengths of your organization? Also, share the arguments / facts & figures for describing those particular areas as strength?

BASF is world's leading chemical producer. Our portfolio is organized into six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions. Growing demand due to surging global population is resulting in an increasing strain on our planet. We already consume more than the Earth can regenerate. Sustainability is, therefore, crucial for our future. We need to balance economic, environmental and social needs to ensure a more sustainable development. With a portfolio of high value products and innovative solutions, BASF is in a position to address megatrends and make a contribution to sustainable development.

BASF has been associated with Pakistan for over five decades and ever since its foundation, has been evolving and innovating to make our country a better place to live. Pakistan is one of the fastest growing population in the world, exceeding 210 million, and will become the fourth most populous in years to come. Products and solutions from BASF help tackle challenges such as nutrition, mobility, housing, climate protection and energy efficiency. BASF offers a wide range of agriculture solutions that help optimize agricultural production, increase farm profitability, and improve quality of life for the growing population and provides solutions to industries such as construction, automotive, health & nutrition, agriculture, pharmaceuticals etc.

There is hardly any industry in Pakistan that is not serviced by BASF with its products. To give you an example, pick up any cosmetic or personal care product from large FMCGs and there will be a strong likelihood that BASF is a supplier of raw materials in its manufacturing. You name any industry in Pakistan and we are at the back-end. We are a major stakeholder in the development of the chemical industry in Pakistan.

Please share your thoughts on how the lives of Human Beings are being affected by the Chemical Industry, particularly in terms of environment?

The chemical industry is virtually much more varied than any other industry in Pakistan. The industry produces an abundance of products not usually seen or used directly by consumers but are essential components of, or are required to manufacture, nearly every consumer and industrial product. As Pakistan grows and continues its journey towards industrialization and urbanization, it surges pressure on the environment, and if mismanaged, can pose enormous problems that can become increasingly difficult to solve with time. The challenge is to maintain the human and economic benefits of chemicals while minimizing their side effects. Government together with the industry must work on several fronts to protect the environment and citizens. Legislations must be implemented, and a strategy must be framed to ensure a safer environment. Efforts must be channeled towards building knowledge about the issue of chemicals' impact on the environment and human health and about waste prevention and management in the economy.

BASF acts responsibly in everything we do and never compromise on safety. We apply the same stringent standard in Pakistan as done worldwide. BASF focuses on product stewardship workshops for customers to raise awareness on the management of hazardous chemicals.

For BASF, acting responsibly means improving safety, health and environmental protection and fostering awareness for these issues among our employees, customers and suppliers.

What key change you want to bring in your organization in coming 5 years and how would you facilitate that change to take place?

I believe that future holds a promise, and I look forward with great fervor. Our ambition is clear; we want BASF to remain the leading global company in the chemical industry and want to be the first choice of our customers. Market conditions will not get any easier in 2020. Political and economic risks have grown. The geopolitical tensions and trade conflicts, especially between the United States and China, Brexit, etc. will continue. But I believe that for every challenge there is an equal if not bigger opportunity. Driven by our purpose, we will create value for our society and our innovations will address all three dimensions of sustainability including economic, environmental and social aspects. In our new strategy, we have identified additional priorities including operational excellence, digitalization, innovation, portfolio management and employees. In each of these action areas we want to raise the bar and be a trendsetter in our industry. We want to become faster, more efficient and more effective. This is our vision of internal collaboration aimed at benefiting our customers. With simpler and more flexible processes and more agile structures, we will be even better able to meet our customers' expectations.

Please share your experience of having observed any other country's Chemical Industry. Also, please specify 03 key factors / practices that impressed you the most.

For me, China is a good reference as they are set to remain the fastest-growing major chemical market in the world. Chinese government actively engaged in deepening human capital, developing countrywide R&D networks, providing variety of tax incentives, improving access to raw materials, financing and encouraging the borrowing and integration of technology, investment in productive assets and leading manufacturers assisted by clusters of smaller suppliers. Today, with government's support, the country's chemical industry growth rate has outpaced by far, other major chemical producing regions. However, based on the new phase of development, shift towards specialty chemical growth and government imposition of new and stricter environmental regulations on the industry, China's chemical-market players need to embrace new set of strategies to prosper sustainably.

What is your definition of Leadership? What are your strong areas as a leader and what leadership traits you practice to keep your team in high spirits?

There are thousands of books written on subject defining Leader. If I am asked to explain "Leader" in simplest words, I would like to reproduce definition used by some wise people and defined by using the event of playing an orchestra. Role of a person who waves his arms in front of orchestra and commonly called "conductor" can be used to understand basic role of leader. Similar to this example, I try to develop trust and empathy with my team and collaborate with them to define vision and purpose and lead them in achieving it.

Do you think 4th Industrial Revolution will affect our industry? If yes, how are you and your organization gearing up to meet the potential needs?

Each revolution has had a profound impact and has fundamentally altered the way we live and work. Keeping in mind its scope, scale and complexity, the transformation will be unlike anything anyone has ever experienced before. Industry 4.0 brings together numerous digital and physical advanced technologies and can potentially transform the chemicals industry by promoting strategic growth and streamlining operations. **On the path towards transformation, BASF in Pakistan is using digital technologies and data, creating additional value for customers and increasing the efficiency and effectiveness of company processes. We are working on improving customer experience by creating passion throughout the organization. We actively ask for regular customer feedback, make this feedback transparent and engage our entire team to find solutions and take timely actions. We want to strengthen our relationships with strategic customers, improve our customer experience and identify further growth opportunities.**

Are there any plans of expansion for your organization? If yes, please describe briefly?

As I discussed earlier, the soaring middle class and overall demographics of the population are critical factors driving growth in our country. If you compare the urbanization rate in Pakistan with other developing countries, you will see that we are getting urbanized faster than others. This opens a huge window of opportunity for companies like BASF to expand offerings and address challenges related to resources, environment and climate, food and nutrition and quality of life.

10. In your opinion, what are the potential growth sectors in our industry?

Pakistan is on the path of steadily moving up the ranks in the global arena and is becoming a business magnet for investment. Key drivers for success in the chemical sector include proximity to strong growth markets, improved ease in doing business, and continued development of chemicals and investments. The future looks bright for Pakistani chemical industry.

One of the strongest drivers of the nation's economy is the population that is rapidly becoming larger, younger, more middle class and more urban. These demographic trends will support increased demand for appliances, housing, healthcare items, new automobiles, clothing, and a better-quality diet. It is encouraging to see that the new government is supporting a number of reforms designed to encourage business growth by eliminating unnecessary laws and regulations, simplifying bureaucratic processes, and making the government more transparent, responsive and accountable. In light of this progression, the future seems promising for industries including agriculture, automotive, FMCG, textile, pharma, personal care and construction.

How PCMA, as a platform, could contribute towards creating better opportunities for our industry?

It is heartening to see PCMA's contribution towards enhancing the economic health of the Pakistan chemical industry and its related businesses. Over the years, PCMA has evolved into a movement exemplifying the goals, concern and achievements of the chemical industry in Pakistan.

Our country is blessed with a diverse and vibrant chemical industry having the potential to become a regional and global player. In my opinion, PCMA as a platform could further contribute towards creating better opportunities for the industry by keeping regular liaison with government ministries, regulatory bodies, international agencies and providing support to member companies in obtaining resolution. Channel efforts towards making the local chemical sector a self-reliant industry and effectively represent all sectors with an aim to transform the industry from an import oriented to an export-oriented industry. Lastly, also encourage work studies, research, investigations and experiments with the aim of improving the manufacture of chemical products, cost reduction and enhanced productivity.

14 TH ANNUAL gpca FORUM منتدى جيبكا السنوي

GCC CHEMICAL INDUSTRY ACHIEVES REVENUE OF USD 84.1 BILLION IN 2018

GPCA Pulse of the Chemical Industry Report' featuring the key achievements of the region's chemical industry was released at the 14th Annual GPCA Forum

Saudi Arabia is among world's top 10 exporters of chemicals

Against the backdrop of positive price trends in fertilizer and polymer products, revenue in the UAE increased by 28.4%

Oman's chemical sector has the highest contribution to GDP among the GCC countries, with 5.1% in 2018, which is double that of the region

Bahrain's chemical sector achieved record revenue growth in 2018 of 39%

Chemical revenue in Kuwait has increased by 32% in 2018

Dubai, United Arab Emirates, December 4, 2019 – The Gulf Petrochemicals and Chemicals Association (GPCA), the voice of the chemical industry in the Arabian Gulf, has highlighted the growth and success of the chemical industry in the Arabian Gulf following the release of 'GPCA Pulse of the Chemical Industry Report' today at the 14th Annual GPCA Forum, which took place from December 3-5, 2019 at Madinat Jumeirah, Dubai. The report highlights chemical production, export, sales, job creation and investments made in the Arabian Gulf in 2018.

This year, the forum themed 'Winning through Strategic Partnerships' was inaugurated by His Excellency Dr. Mohammed bin Hamad Al Rumhi, Oman's Minister of Oil and Gas. It included a prestigious speaker line-up that consisted of senior industry leaders, representing some of the world's largest chemical firms.

The report outlined that the GCC chemical industry achieved a revenue of USD 84.1 billion in 2018, with production capacity reaching 174.8 million tons, signaling an increase of 2.8% in terms of contribution to the regional GDP. Due to the increased demand of chemicals by the GCC producers across the globe, the production capacity of the GCC chemical industry was also added by 13.3. million tons in 2018.

The report has revealed that Oman's chemical sector has the highest contribution to GDP among the GCC countries, with 5.1% in 2018, double the figure in the region. This achievement is attributable in part to the manufacturing sector being inscribed within the top five sectors identified by Oman's National Program for Diversification.

Saudi Arabia has maintained its exceptional standing in 2018, retaining its spot in the top ten exporters of chemicals today globally. It is also the region's powerhouse, with the largest volume output and chemical sales revenue. In 2018, Saudi producers generated USD 62 billion in revenue. The Saudi chemical industry is also a champion in terms of portfolio diversification, with GPCA member companies in Saudi Arabia producing as many as 126 products with a total capacity of 119.2 million tons.

Dr. Abdulwahab Al-Sadoun, Secretary General, GPCA, commented, "The chemical industry in the GCC is consistently scaling new heights in terms of production, portfolio diversification and job creation. Such success is driven by visionary regional leadership which is driving economic diversification initiatives that are focused on developing the non-oil sector. This is supported by several government initiatives such as Oman's National Program for Diversification. Saudi Vision 2030 is also playing a role in supporting economic diversification.

GPCA 2019 – Dubai

December 3-5

As it pertains to the UAE, the chemical sector is situated mostly in Abu Dhabi, where the industry is developed in line with Abu Dhabi's Economic Vision 2030, which in turn is creating new employment opportunities."

He further added, "The employment in the GCC chemical industry increased by 157,000 in 2018 with the UAE being the second largest employer gaining approximately 18% market share in regional employment in the chemical sector."

Against the backdrop of the positive price trends in fertilizer and polymer products, revenue trends in the UAE have increased by 28.4%. The petrochemicals sector in the UAE was characterized by rapid development, with 77% of the current production capacity being launched in the last decade (2008-2018). In 2018, the UAE chemicals output was 14.5 million tons, with basic chemicals representing one third (33%), followed by polymers (28%) and fertilizers (30%).

Bahrain's chemical sector achieved the highest revenue growth of 39% in 2018, attributed primarily to higher revenue from fertilizer products. Bahrain's production capacity reached 1.4 million tons and achieved a revenue of USD 327 million in 2018.

Kuwait achieved the second highest chemical revenue growth of 32% in 2018. With industrial expansion being a top priority as part of the long-term development priorities in Kuwait's 2035 strategy, this achievement further cements its position as a global center for petrochemical production.

Following Oman, with 4.1% in 2018, Qatar's chemical sector has the second highest contribution to the GDP among the GCC countries. The production capacity reached 19.1 million tons and achieved chemical revenue of USD 7.3 billion, an increase by 14% in 2018. The fertilizers represent 51% of Qatar's share in the country's total production capacity, highest in the country so far.

GPCA is the trusted source for regional chemical industry information, with over 130 reports published to date. Attended by over 2,000 delegates form 50+ companies each year, the forum serves as an ideal platform for the exchange of chemical and petrochemical-related knowledge, providing access to exclusive market intelligence and unrivalled networking opportunities.

Gulf Petrochemical and Chemical Association is the prime association of petrochemical producers in the GCC countries.

It is a great meeting point for producers, customers, Govt. dignitaries and technology providers. My objective was to learn about this sector and create linkages with important people for technology transfer and investors. PCMA is working with Govt of Pakistan to select chemical sector as a strategic growth sector and allow Chemical industry zones in Sindh and Punjab. We are interesting for us to connect with technology providers.

Engro Vopak Terminal Ltd- Mr Syed Ammar Shah (Business Development head).

Vopak is a world renowned company specializing in Storage terminals for chemicals. They have built one terminal at Port Qasim for Engro.

Oman Gas Company- Ahmed Sohail Hashim (Investment Manager)

Oman Gas is building 3 Naptha crackers in Oman and interested in investing in Pakistan

GPCA - Mr Abdul Wahab Al Sadoun (Secretary General of GPCA)

also in touch with prime minister's initiative of "Make in Pakistan"

Pakistan imports chemicals worth more than usd 12 billion and our effort is to create awareness for import substitution. This can save a lot of foreign exchange and create many downstream industries and jobs etc.

Met people from following companies;

- SADARA – A usd 20 billion joint venture of Exxon and Aramco to produce Chemicals directly from Oil.
  Mr Saad Anwar - Director Strategic Planning
  Mr Manzoor Sultan – Product Director Polyurethanes
  Fortunately both are Pakistani expats and showed willingness to help Pakistan in building Petchem sector.
- Oxford Economics (Consultants) –Miss Mirium Okumu. Discussed to develop an economic impact assessment of Naptha Cracker in Pakistan. They will send a proposal.
- BCNP Consultants – Mr Holger Bengs. They have founded an association in Germany by the name "European Chemical Partnerships". Its objective is to bring all chemical experts at one platform to share their strengths and find people who can help each other in utilizing resources and technology. This can be

TOTAL Chemicals- Miss Wenxin Sun (Business Development Manager) Discussed possibility of TOTAL to invest in Naptha Cracker in Pakistan .

SIPCHEM- Mr Shahid Maqbool (General Manager Basic Chemicals).

Sahara International Petrochemicals Co is one of the largest petrochemical companies in Saudi Arabia.

He is a Pakistani Expat and agreed to provide input wherever needed.

Also visited stands of important petrochemical consultants like IHS, ICIS and Nexant.

They provide services for economic studies, feasibilities, trainings and technology partnerships.

Abrar Ahmed
Chairman PCMA

PAKISTAN Chemical Forum

PCF 2020

Surfing The New Waves

Event Plan

Date
17th – 18th April, 2020

Venue
Marriot Hotel,
Islamabad
Pakistan

Aims & Objectives

- Defining the chemical industry as a strategic sector for growth.
- Creating an attractive environment for investments in Pakistan for chemical mega projects.
- Introduction of leading sources of technological support, including chemicals producers, consultants, contractors and licensing companies.
- Highlighting targets such as US $ 5 billion import substitution in short run, growth in domestic manufacturing thereby resulting in export surplus, job creation, poverty alleviation.

Proposed Topics & Sessions

1. **Plastics**
2. **Petrochemicals**
3. **Organic chemicals**
4. **Inorganic Chemicals**
5. **BioTech**
6. **Performance chemicals**
7. **Technology Sourcing**
8. **Responsible Care**
9. **HR**
10. **World without chemicals**
11. **Nylon & acrylic yarns**
12. **Industry academia linkage**
13. **Indigenous technology development**
14. **National Department of chemicals**
15. **Potential Import substitution & export of chemicals**
16. **Economic impact of chemical sector**
17. **Coal to chemicals**
18. **Regional development models in chemical industry**
19. **Climate change**
20. **EHSS**
21. **Chemical Security**
22. **Leaders of Tomorrow**
23. **Recognition Awards**
24. **Chemical value parks**
25. **Impacts of CPEC on oil & chemicals**
26. **Where the Pakistan's chemical industry shows a promising growth in next 5 year?**
27. **Forecast on feedstocks for petrochemicals**
28. **Polypropylene outlook- preparing for a changing market**
29. **Chlorine Tree**
30. **Petrochemical Tree**
31. **Overview of OXO Alcohols & Acrylic acid derivatives**
32. **Road Map 2040**

Note: there will be parallel sessions in 3 halls to cover the topics.

SRC is a member of Siddiq Shafi Group. With over 60 years of industrial experience, we are focused on delivering innovative and technology based solutions while maintaining its commitment to honesty & consistency. Our leading portfolio of specialty chemicals delivers a broad range of technology based products and solutions to clients for Leather, Shoe, Textile, Adhesive and Construction. We have extensive portfolio of over 350 products.

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Improving Environmental Stewardship

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OUR COMMITMENT TO SUSTAINABILITY

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Asian Interest in European Chemical Firms

The chemical industry is a highly international sector with activity dominated by cross border transactions. Chinese and other Asian firms have been particularly busy expanding their global footprint and taking advantage of the quality assets for sale.

Globally, Merger market shows that deal value more than tripled to $31 billion in Q3 2018 compared to the same period in 2017, while the average deal size for Q3 2018 increased by more than 10% from its two-year historical average of $216 million. North America continued to be the main target region although Asian companies are beginning to shift their attention to Europe. Chinese Interest in European Chemical Companies Chinese companies – active buyers in the sector for the past few years – are increasingly looking to Europe to offset the trade disputes with the US. Overall, from the beginning of 2018 through mid-October, there were 61 Chinese outbound M&A deals in Western Europe, worth $45 billion – up from $35.93 billion in the whole of 2017, according to figures from Mergermarket. Chemicals and industrials have topped the chart with 23 transactions compared to ten in consumer or a respective seven in business services and energy, mining & utilities.

The motives, however, behind European transactions are the same as those driving other global purchases – to close the gap through acquiring technological prowess as well as expertise, proprietary formulations and products. One example is the roughly €200 million sale of European engineering plastics specialist Elix Polymers by Sun European Partners to Beijing-based Sinochem. The deal supports the ABS producer's strategy to expand its activities in Asia, a region in which it is currently underrepresented. At the same time, it will boost Sinochem's presence in the plastics industry beyond chemicals trading and fertilizer production. Sinochem is rumoured to be in discussions to merge domestically and consolidate with ChemChina in order to create a global giant in the chemicals industry. It is expected that Chinese companies will continue to look for opportunities in these traditional chemical segments, but they are also interested in buying organizations involved in pollution, water and waste treatment solutions as well as green and sustainable chemicals and plastics. This is being driven by the government's new environmentally friendly laws under the 12th Five-Year Plan (5YP) which aims to clamp down on unsustainable industries and incentivize clean and green energy businesses. Chinese Government Influence While the flow of deals has mainly been from China to the West, the tide has not been just one way: Global conglomerates are divesting Chinese operations as well. As always, high quality assets are constantly in demand, such as the Hovione/IMAX deal. But it is tighter government regulations that have increased costs for companies and spurred divestment discussions. The Chinese government has clearly stated it intends to standardize chemical parks along the lines of global industry best practice. Currently, only about half of the chemical production plants in China are in dedicated chemical parks, but is expected to increase drastically by 2020, with some provinces having set targets of 90% or more. Western companies, especially those who do not obtain a permit to increase capacity, are increasingly exploring all options for their assets instead of moving to one of the new parks.

Author
Bernd Schneider
Head of Chemicals, Alantra
Source: https://www.chemanager-online.com

Make in Pakistan Initiative

Pakistan Chemical Manufacturers Association

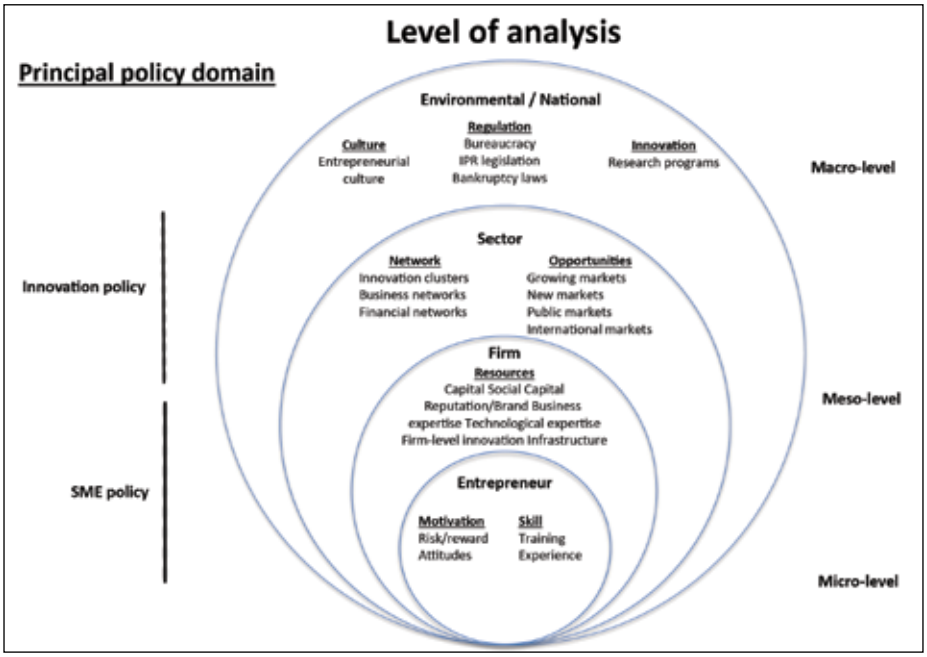
The nation enjoys and responds positively to the Food Panda campaign, "Kitchen ko taala lagao – Food Panda Karo". The state of our industry is no different and one can witness that Pakistan is gradually locking its kitchen. In the agricultural and the industrial sectors, our basket has reduced to few items as easier option of import coupled with weak policy framework to support self reliance pushes the nation to buy lentils from Australia, Oils from Malaysia, Cheese from Europe, electronics from China and municipal services from Turkey. The present government felt the need to break status quo and revive industry and agriculture and hence one can hear sweet symphony of "Make in Pakistan".

This white paper is written with intent to initiate discussion, identify key impediments and suggest roadmap for "Make in Pakistan" initiative. This document is by no means exhaustive and should be treated as the first step to a long but fruitful journey. The success of Make in Pakistan Initiative would require significant changes to the economic, societal and cultural landscape of the country. **Pakistan has to focus on entrepreneurship and innovation, a route frequented by many developed and developing countries including China, Taiwan, India, Brazil, Korea, Thailand, etc, in the past 4 decades. The success of Make in Pakistan Initiative is dependent on strong and sustained political will of the current government, general perception of government and its policies, and quality of entrepreneurs. A lot of interesting papers and policy recommendations are formulated annually; lack of political will coupled with low to no accountability of proposing organizations result in poor to no implementation of these five yearly plans.** This failure triggers poor perception among masses. All governments are judged on perceptions, their actions help create, and serious efforts are required to address perception biases. On the other hand; our third ingredient, entrepreneurs, are blessed souls with a natural talent and these gifted individuals in a conducive environment are likely to create high growth organizations.

Entrepreneurship is an opportunity-oriented behavioral process initially driven by individuals and teams. This process takes place in a given national, cultural, and industry context, and the process ideally result in a successful growth firm. This implies numerous levels of application and analysis for entrepreneurial growth policy. Each level carries its own constraining and enabling factors. An overview of the different levels of analysis in entrepreneurship support policy is provided in Figure 1.

by available social referents (Wiklund, 1998). Whether or not growth will be successful will depend on the firms' resources, capabilities and strategy (firm-level) but also external market factors (sector and national-level) and technological externalities will affect this process. Internationalization depends on the same factors, but typically requires even greater (firm-level) resources and capabilities than domestic growth does.

Pakistan has an innovation policy that falls in the domain of Ministry of Science and Technology while the SME policy is championed by Ministry of Industries and Production under SMEDA. Apart from the above two possible implementation contenders; from Fig 1, one may clearly identify role of other elemental contributors.



Starting up a new firm is most often the decision of an individual entrepreneur(s), and primarily driven by individual motivations, skills, and behavioral inclinations. Growth motivation is the result of management team's and individual's attitudes and cognition, which are heavily influenced

Horizontal Policy Program

As concerns policy design, the multi-faceted nature of the entrepreneurial process means that a single policy department, or a single policy initiative, is unlikely to produce lasting results. To comprehensively address high-

growth entrepreneurship, broad-based collaboration between multiple policy departments and ministries is essential. This implies that policies targeting high-growth entrepreneurial processes should be targeted horizontally, rather than vertically. High-growth entrepreneurial policy design should be organized in the form of governmental policy programs for high-growth entrepreneurship, extending across multiple policy departments and involve active participation across SME; innovation; education; labor, and fiscal policy departments.

Such a broad-based policy design requires active supervision and monitoring at the highest level of government. Government departments often exhibit resistance to broad-based policy initiatives that cut across policy departments. To effect the requisite collaboration across policy departments for an effective program, the horizontal program should be supervised by a board consisting of high-level government ministers, chaired by the Prime Minister, and involving high-level participation from key government agencies responsible of implementing SME, innovation, education, fiscal, and labor policies. The program should be made a central element of the standing government's policy program, and the board should have sufficient influence over the government budget in order to push through broad-based policy initiatives. Sufficient political weight is also important because highly targeted policy initiatives are open to criticism by those excluded from their scope. It is clear that an initiative of this nature is not feasible unless sufficient political will is mobilized behind it.

Systematically Monitoring the Climate

An important aspect of getting entrepreneurship policies better focused on supporting high-growth entrepreneurial activity concerns monitoring of policy effectiveness. A typical metric for measuring the success of government entrepreneurship policy is the number of new firm births (sometimes balanced with firm deaths) over a given time period. Most governments still lack the ability to track unit-level firm growth over time, and virtually no government actively monitors numbers of high-growth policies. In the absence of publicly reported performance metric for high-growth entrepreneurship, there is a danger that policy measures will continue to focus on quantifiable outputs, such as overall numbers of firms created.

A complicating aspect of policy monitoring is that growth, even rapid, takes time. It takes even longer to determine whether a given growth case was a temporary burst, or whether the growth actually gave rise to a viable, sustainable business. This difficulty should not be cause for abandoning all policy-monitoring efforts. Even though producing unit-level growth may take time, and verifying the sustainability of growth certainly does, there are medium-term metrics that can be readily employed to monitor progress toward high-growth entrepreneurial environment. Entrepreneurial intent provides one such metric. Even though intent does not always lead to activity, it does provide one of the more robust predictors of it. Intent is a direct measure of entrepreneurial motivation, and it should also be associated with a higher alertness to entrepreneurial opportunity. Because entrepreneurial intent is the function of both social desirability, as well as perceived entrepreneurial skills, it should be directly influenced by policy initiatives designed to strengthen these two aspects of the entrepreneurial climate. Governments should continuously monitor entrepreneurial intent, particularly among population cells where the prevalence of high-growth entrepreneurial activity is particularly high (e.g., male; well educated; high income; 35 to 44 years old).

In addition to direct entrepreneurial intent, also the social desirability of entrepreneurship, as well as perception of entrepreneurial feasibility (or entrepreneurial skills) should also be continuously monitored, as well as addressed, by government policy. As a specific tangible measure, the effect of university education on the entrepreneurial intent of university students should be monitored at the university level, by monitoring students' perceptions both at entry and exit phases of university education. Basic knowledge on business start-ups and business plans should be integrally involved in university curriculum.

Monitoring efforts should also focus on existing entrepreneurial firms and regions. Governments should monitor both growth aspirations of existing entrepreneurial firms, as well as realized growth. This calls for the strengthening of capabilities in national statistics offices, as monitoring of unit-level growth requires longitudinal firm-level data. Such a capability already exists in many countries, but firm-level growth performance metrics are few and not consistently used. Overall, developing the capability of national statistics offices to monitor both growth intent and growth performance on a regular basis should be a priority for national policies that address high-growth entrepreneurship.

Policy Implementation

As concerns policy implementation, close collaboration between policy

	High Growth Entrepreneurship Policy
Policy Goals	
Objectives in relation to entrepreneurs	Entice right people to become entrepreneurs
Objectives in relation to entrepreneurial firms	Increase growth of entrepreneur firms
Objectives in relatipon to operational environment	Facilitate environment for entrepreneurial firm growth
Resource Provision	
Source	Combination of public and private sources
Type of financial resources	R&D loans and innovation grants, business angel finance, venture finance, IPO's
Dominant sevice	Experience based advice for venture finance, strategic planning, internationalization, organizational growth
Resource distribution principle	Select promising recipients (resource focus)
Regulatory Emphasis	
Life cycle focus	Remove bottlenecks to entrepreneurial firm growth
Compliance bottleneck addressed	Smooth compliance requirements for growing firms
Fiscal regulations	Accommodate dramatic changes in firm scale; treat share options neutrally
Attitude toward failure	Accept firm failure and bankruptcy, but reduce economic and social cost
Links to other policy domains	Industrial policy, innovation policy, labor policy

departments is again emphasized. The need for coordinated measures arises both from the multi-faceted nature of the high-growth entrepreneurial process, as well as from the time lags involved. Coordinated policy measures should span the entire spectrum from basic and applied research to venture growth and consolidation. Coordination is also required between different levels of policy action (i.e., measures targeted at individuals, teams, firms, regions, and the national context).

Need for Orchestration

All too often, innovation, SME, and educational policies are designed and implemented in separate policy silos, with little or no coordination between these. Administrative barriers create obstacles in knowledge spread and innovative collaborative solutions for policy implementation. A particularly relevant domain of collaboration involves SME, innovation, and educational policies. It is not uncommon for innovation policies to seek to address high-growth and innovative firms without collaborating with relevant SME support initiatives. As regards educational policies, even when these do address entrepreneurship, they tend to neglect high-growth entrepreneurship, and they fail to take a longitudinal view on the lengthy formative process of high-growth ventures. It is probable that a better coordination among policy initiatives would result in a more comprehensive and longitudinal coverage of the early phases of the process of creating innovative new firms, extending from research-based innovation to team building and to start-up activities. Policy measures should be orchestrated such that they address all stages of the entrepreneurial process from opportunity exposure to market launch to eventual growth and consolidation. Here, 'orchestration' means making sure that there are no gaps in policy coverage, the timing and objectives of different policy measures are complementary and consistent, undue overlap is removed, and the different levels of policy implementation (individual, firm, regional, national) are harmonized. This level of coordination can be achieved if coordination is taken seriously at a high enough level in the policy-implementing apparatus.

Focus on Universities

Universities provide one natural context for the implementation of orchestrated policy measures, because many processes involving the creation of high-growth firms tend to revolve within and in the vicinity of universities. Universities are where

much independent technological, biomedicine and all knowledge-based research activity take place. Founders of high-growth entrepreneurial ventures are likely to be well educated. Universities often participate actively in innovation policy initiatives, such as targeted R&D programs, which increasingly emphasize the creation of start-up firms as one explicit goal. This combination makes universities a natural focus point of high-growth entrepreneurship policy, even though not the only one. Measures are needed in order to increase opportunities for high-growth business start-ups in university contexts.

Meeting Demanding Needs

Implementing rapid organizational growth is difficult and often painful. Rapid growth implies rapidly increasing organizational complexity, the management of which requires significant managerial skill and time. Growing organizations face increasing compliance demands, and to address these they need to develop new control and governance structures. Because demands for managerial skills also increase as a function of growth, frequent changes in the firm's management team are often necessary in growing firms. One specific set of demands is imposed by early and proactive internationalization, which is often a necessity especially for technology-based new ventures. Because of the multitude of demands, growth brings about increasing resource needs (both human resources and financial capital), and profitable growth is rare. Finally, greater growth also means greater organizational volatility, and the firm's hazard rate is a positive function of its growth rate, at least during the early stages of the organizational growth. Because of their highly dynamic character, high-growth new ventures tend to be much more volatile than low-growth ventures, and spectacular successes are therefore likely to be accompanied by equally spectacular failures. Policy-makers, therefore, should be ready to accept casualties. High rates of survival may imply insufficient dynamism.

The volatile character, significant resource needs, and escalating organizational complexity of fast-growth firms means that they need highly sophisticated support. Quite often, the provision of the right kind of support requires intimate understanding and widely established contacts in the relevant business sector, which is something public sector support organizations can rarely offer. The contacts and business acumen required have to come from private-sector operators, such as venture capitalists, experienced managers, and more experienced peers. Private-sector participation is particularly important during the more advanced stages of the venture growth process, but it is also important during the very earliest stages of the innovation process, for validation purposes. An important role for the policy-maker is to facilitate the development of a business service infrastructure that is sophisticated enough to cater to the needs of fast-growth ventures. Overall, balancing public- and private-sector service provision is not easy, because overlaps and insufficient synchronization may give rise to crowding and market distortion.

Selectiveness and Pro-activeness

Because only small minority

of all new firms possesses significant potential and motivation for rapid organizational growth, policy measures should be selectively targeted. Even though; programs should not propose to 'pick winners', feasible criteria for selection do exist. First, for admittance, programs should require explicit orientation toward growth, narrow sectoral focus and product categories with high degree of import substitution. Even though growth orientation cannot guarantee growth, growth in the absence of aspiration for it is extremely rare. Therefore, support programs should require visible and credible commitment to growth as a key selection criterion. Second, the longer the venture has progressed in its development path, the more tangible proof of its growth potential should be required. In the early phases of new ventures, growth orientation and flexibility should be emphasized. In more advanced stages, tangible proof of market acceptance may provide a feasible selection criterion. This implies that supporting rapidly growing firms is more demanding than supporting SMEs in general. In addition to depicting more demanding needs, high-growth firms also have distinctive support needs that are seldom experienced by slowly growing SMEs.

Addressing and Motivating the Right People

Studies show that high-growth entrepreneurship, in essence, is a career choice, often made by individuals who possess significant human and social capital (Davidsson & Henrekson, 2002). Such a career choice can therefore involve significant economic trade-offs. Policy-makers should be mindful of the existence those trade-offs and address them as needed. Working partnerships for high potential individuals is a norm in European countries; owing to strong contractual arrangements. The same is exercised in technology-based firms even in Pakistan. Similar arrangements should be encouraged along with a swift and strong conflict resolution or redressal mechanisms. In presence of a robust contractual arrangement the next step could be industry spin-offs as a source of high-growth firms. Engaging established industrial companies is therefore important. Policy initiatives designed to facilitate spin-off formation, particularly from knowledge-intensive companies and research institutions, might prove useful in facilitating high expectation entrepreneurial activity.

Support for Internationalization

Echoing the notion of 'Born Globals', some studies suggest that early and rapid internationalization may not only be a necessity for high-growth firms, but it also may become a potent source of competitive and competence-based advantage in its own right (Autio et al., 2000; Sapienza et al., 2005). Traditionally, measures geared to supporting internationalization have tended to emphasize exports and advocate a cautious, incremental, and risk-minimizing approach to internationalization. If early and proactive internationalization is to become a source of competitive advantage in its own right, more proactive, sustained, and hands-on support initiatives are required. Ultimately, such policy initiatives may even involve cross-border collaboration in high-growth entrepreneurship support.

Remove Dis-Incentives

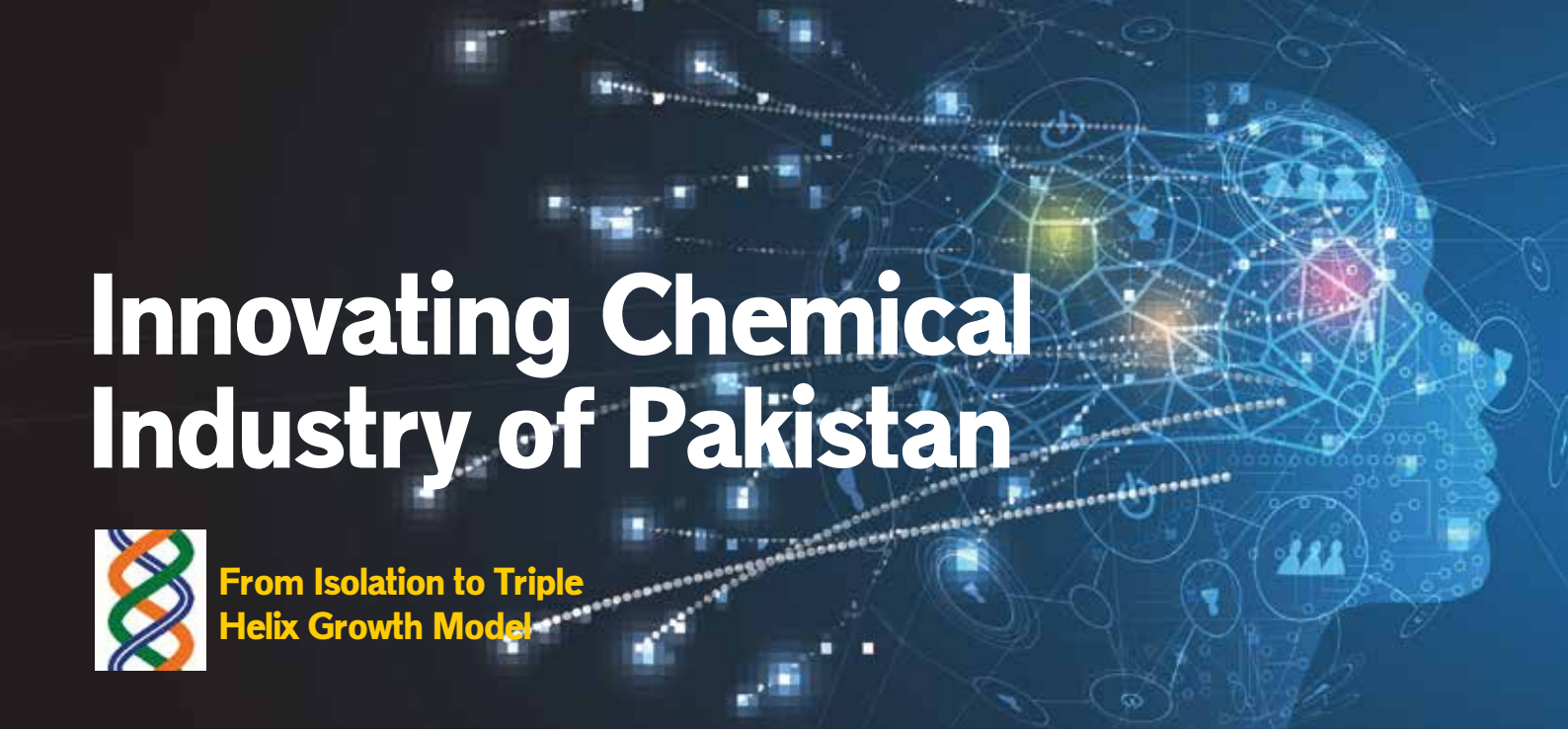
Finally, an important facet of high-growth entrepreneurship policy should address dis-incentives for entrepreneurial growth. For example, compliance requirements tend to increase progressively as firms grow. Therefore, lowering compliance requirements for small entrepreneurial firms may, if inappropriately applied, become a barrier to growth, if compliance requirements are not smoothened for firms that intend to grow rapidly. A phased introduction of compliance requirements; for example, involving sufficient honeymoon periods that enable the growing firm to consolidate before addressing compliance, might help smooth the path to growth.

Author
Kashif Chaudhry
CEO, Mian Chemical Industries

Conclusion:

Milestones are important especially in long journeys as they provide comfort to the convoy for being on track. Some of the milestones to indicate progress would include:

1. Prime minister level meeting with the task force on monthly basis
2. Clear announcement and ownership of key intervention areas (sectoral focus) by the government
3. Agree and disseminate publically reported monitoring matrix
4. Design and execute "Make in Pakistan" awareness campaign stirring national pride and patriotism
5. One window operation – Government can help entrepreneurs focus on addressing growth related challenges at the firm level and introduce a service oriented, one window operation for all regulatory requirements
6. Institute a conflict resolution mechanism
7. Allocation of substantial funds to the initiative
8. Tariff protection to key growth sectors
9. Inculcating a culture of entrepreneurship in schools, colleges and universities through trainings, seminars and real life projects. Students should be encouraged to take up entrepreneurial projects and successful ventures should be championed across Pakistan.
10. Grant special status to entrepreneurs and glamorize their achievements thereby giving impetus to youth
11. Develop and execute entrepreneurship based game shows at the city, district, provincial and federal levels.
12. Establishment of technology parks and innovation clusters
13. Cost of industrial land as well as construction cost is prohibitive for any economic and industrial activity and Government may establish industrial parks with complete infrastructure and utilities on rental basis
14. Make angel funds viable and raise awareness regarding their functionality and the options they brings to the table
15. Subsidize third party financial, organizational, managerial, compliance related services to entrepreneurs on need basis
16. No compromise and no leverage policy should be adopted on any financial misconduct of the entrepreneur
17. Assign subject specialist universities to address specific queries of entrepreneurs through one window R&D center
18. Task universities to develop technologies and products thereby reducing Pakistan's dependence on foreign imports
19. Improve service delivery of government institutions and thereby reducing red tape
20. Educate and create awareness among entrepreneurs on bankruptcy laws and Intellectual property rights
21. Create public markets and products in key priority areas
22. Foreign trade commissions to bring concrete results on pre-determined sectoral areas
23. Improve service delivery of trade and industry related public sector organizations like PCSIR, SPARCO, PARC, PBS, TDAP, TEVTA, NAVTEC, etc.



Innovating Chemical Industry of Pakistan

From Isolation to Triple Helix Growth Model

Pakistan's chemical industry has achieved significant growth having 400-500 small to large plants and provide employment to around 400,000 people. The growth of the chemical industry can be characterized as "Isolation-led growth". The industry is facing serious challenges like absence of indigenous technology & raw material availability, high interest rate and weak government patronage. Therefore, Pakistan is spending around USD 10 billion per annum on chemical imports1. Dependence on Indian suppliers for strategically important basic drugs has grown to an alarming level which is a serious concern for Pakistan. In this scenario;

- Can the chemical industry survive in the future too by having this isolation-led growth or it needs to shift to the triple helix growth model?

The Triple Helix Growth Model

The triple helix growth model advocates for joint development working by academia, industry, and Government through a shared vision. The industry needs to understand the importance of academic partners for the supply of innovations, competent graduates and policy analysis. Similarly, the industry needs to realize the importance of public sector advocacy and pay some attention to help the government improve its offerings and services.

The jointly planned projects by academia, industry, and Government may yield better results for economic growth as each party will contribute to make it a success.

There are plenty of such examples of triple helix led growth like emerging electrical car industry of china2, canola industry of Canada and soybean industry of the USA where academia, industry, and government worked together to develop the world-leading sectors. The triple helix growth model includes the supply of innovations by academia, investment-friendly policies by Government and new ventures and industrialization by the private sector3.

Chemical Industry of Pakistan and Triple Helix Model

The Pakistan Chemical Manufacturers Association-PCMA may take the lead and exercise the triple helix approach for next industrial growth. PCMA may chart a macro-level plan and assign each partner its role to play. The model is exercised by the Canola Association of Canada4 where the association drove the stakeholders and developed a world-leading industry. The association influenced state policies for growth and also helped academia to develop new varieties and commercialize them. PCMA can replicate the same role for the chemical sector of Pakistan having development vision as follows:

Current State	New State after 5 years
USD 10 billion import →	USD 7 billion import
Less than USD 01 billion export →	More than USD 05 billion export
400 small to large plants →	1000 small and 100 large plants
Around 400,000 employment →	Around 08 lac employment

Policy Innervations

Policy Innervations under Triple Helix Growth Model are following:

R&D Level

- Dedicated 02 billion (PKR) R&D funding like TDF for viable chemical technologies
- Industry should assign projects to Postgraduate scholars along with technical & reasonable financial support.
- Incentivizing chemical-related Centre of Excellence for industrial work and adding industrial collaboration and technology sale in their performance parameters
- Transferring chemical technologies available in defense R&D to civil for commercialization
- Strengthen IPO, IP judiciary and IP enforcement to promote innovation culture

Technical Level

- Restructuring PCSR laboratories for chemical testing up to accreditation and certification level
- Restructuring TEVT for internationally certified chemical technicians

Diplomatic Level

- Training Pakistan ambassadors to foreign countries on exploring export opportunities, technology transfer and playing the role for the growth of the chemical industry

- Strengthening foreign ministry desk to support chemical export
- Using BRI and CPEC to strengthen local chemical manufacturing

Governmental Level

- One window operation for all Govt facilities involving chemical association
- Controlling under-invoicing, smuggling and misreporting of imported chemicals
- 50% sales tax reduction on sales of new plants/ technologies for initial 2-3 years
- Setting up Naphtha cracker facility
- Provide 5% finance for new plants having new technology.

Conclusion

The recent world history observed the emergence of many new sectors, regional industrial players and new economies that replaced the old giants. The biotechnology industry of China took birth recently, grown up and caused the shutting down of many world-leading plants in biotechnologies. This kind of growth requires a triple helix approach where academia and Government work in close partnership with industry. Unfortunately, the negative experiences of the past with each other's hinders the next collaboration and seize the opportunity for joint growth.

The industry needs to come out of Isolation-led growth-mindset and learn to work and grow in a collaborative way. The industry needs to realize the great potential with academia and influence its research for its economic benefits. Similarly, the industry needs to influence for the betterment of the Government services delivery.

PCMA may take the lead to practice the triple helix model of growth and set the example in the country for other sectors to follow.

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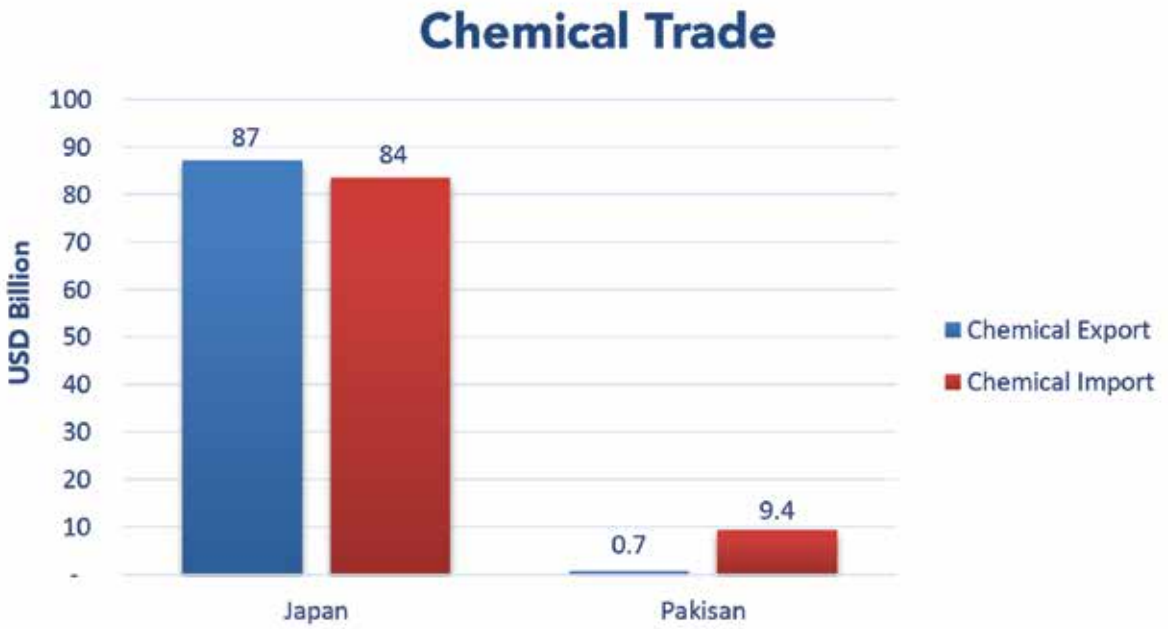
Japan as a Chemical Partner

Japan as a Chemical Partner

Indicator	Japan	Pakistan
Capital	Tokyo	Islamabad
GDP (nominal)	USD 4,971 Billion	USD 314 Billion
GDP growth rate	0.8%	5.8%
GDP per capita	USD 39,290	USD 1,482
Population	126 Million	212 Million
Land area (sq. km)	364,560	770,880
Currency	Japanese Yen (JPY)	Pakistani rupee (PKR)
Exchange rate (22nd December,2019)	1 USD = 109.5 JPY	1 USD = 154.9 PKR
Exports (UN Comtrade)	USD 738 Billion	USD 23.6 Billion
Imports (UN Comtrade)	USD 748 Billion	USD 60 Billion
Trade (% of GDP)	37	29
FDI net inflow	USD 25.9 Billion	USD 2.4 Billion
Gross domestic savings (% of GDP)	25	6

Source: World bank 2018, UN Comtrade 2018.



Source: ITC Trade Map 2018

History of Petrochemical Industry

From 1945-54

(Production of fertilizers, pharmaceuticals, etc.), The prime aim for japan was to feed its people. Therefore, Government ask domestic industry to provide fertilizers in large and sustainable quantities. After that, Government provide policy support to increase production. Follow this, ammonium sulfate plants were constructed all over the country. Later, industry focused on synthetic dyes, vinyl chloride, sweeteners, pharmaceuticals and agricultural pesticides. Sealed electric furnace was developed to streamline caustic soda production. To develop organic and inorganic chemicals japan increase their shipments by 2.5 times.

From 1955-64

(Production of petrochemicals), Innovation in technology shifted focus from fertilizers to petrochemicals. Established first State owned petrochemical company, named Japan Synthetic Rubber Co. to produce acryl fiber, acrylonitrile, polyester, nylon, caprolactam and polypropylene. Caustic Soda production was improvised by using electrolytic method instead of ammonia-based process. Japan Synthetic Alcohol Co was established to produce PVC and ethylene dichloride (EDC).

From 1965-70

(Use of Naphtha), To strengthen competitiveness Japan improved its technology and increased ethylene and ammonia production by importing naphtha to diversify raw materials. 15 petrochemical plants were built in this period.

From 1971-79

(Counter environmental issues), Japanese industry gone through structural changes and strengthened their environmental regulations. Caustic soda without using mercury was a major development in this phase. The era posted serious threats for petrochemicals due to two oil shocks. Japan developed new

technologies to diversify their raw materials.

From 1980-2010

(Structural improvement along with globalization), Japan began to relocate production facilities to developing world for cost reduction. Industry began to increase exports and started producing LLDPE. Few major chemical companies like Dow Chemicals and DuPont began their production in Japan. In 2008, Japan was the 3rd largest producer of chemicals with the market size of 43.7 trillion yen (USD 424 Billion).

Japan petrochemical industry focused on

- Replacement of old plants to optimize production capacities, reduce cost, increase energy efficiency and to ensure environmental & plant safety.
- Shifting towards higher value-added products by developing new derivatives.
- Strengthening Vertical and Horizontal integrations with refineries.
- Utilizing new technologies like artificial intelligence, machine learning and Internet of things.

Japan is the 5th largest chemical producer in the world.

In 2009, no Japanese chemical company was among the world's top 10, but 10 Japanese chemical companies placed in the top 50.

Japan's petrochemical industry mainly use Naphtha as feedstock. Around 60% of demand is being fulfilled though imports. Below illustrated table, shows major import sources of naphtha for Japan.

Japan's Petrochemical Capacity, Production and Demand in 2017

Unit: 1000 metric ton	Building Blocks					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
Ethylene	6,155	6,530	5,961	701	132	106%
Propylene	-	5,459	4,730	883	154	-
Butadiene	-	916	951	27	62	-
Benzene	5,741	4,379	3,736	751	150	76%
Toluene	2,680	2,152	1,469	676	4	80%
Xylene	8,803	6,779	4,804	1,943	-	77%

Unit: 1000 metric ton	Polyolefins					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
LDPE (including LLDPE, EVA)	2,233	1,770	2,167	240	731	79%
HDPE	1,142	885	1,306	137	588	77%
PolyPropylene	2,759	2,506	2,931	287	642	91%

Unit: 1000 metric ton	Styrenics					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
PolyStyrene	853	706	670	32	31	83%
Styrene Monomer	1,949	2,084	1,488	592	-	107%
ABS	-	395	247	150	40	-

Unit: 1000 metric ton	PVC & VCM					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
PVC	1,929	1,664	1,049	608	4	86%
VCM	2,774	2,723	1,776	950	-	98%

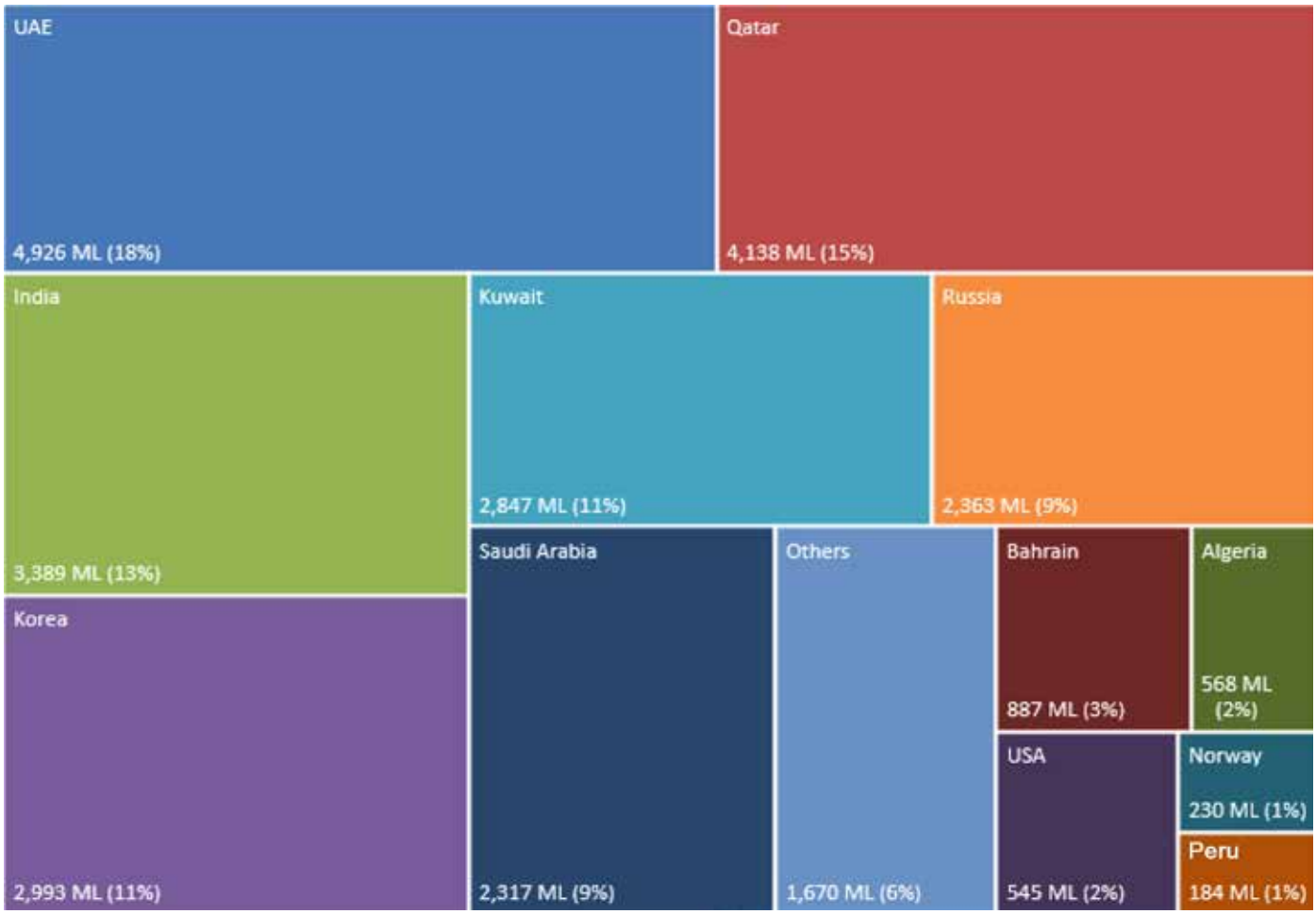
Unit: 1000 metric ton	Synthetic Rubber					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
SBR	598	473	298	233	60	79%
BR	295	318	191	144	25	108%
Others	-	830	385	486	66	-

Unit: 1000 metric ton	Synthetic Fiber Raw materials					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
Ethylene Oxide	921	946	433	-	-	103%
Ethylene Glycol	-	715	400	323	4	-
Acrylonitrile	498	435	437	23	17	87%
Caprolactam	-	221	136	84	-	-

Unit: 1000 metric ton	Other Petrochemicals					
Products	**Capacity**	**Production**	**Domestic Demand**	**Exports**	**Import**	**Operating rates**
Acetaldehyde	177	88	93	-	-	50%
Acetic Acid	-	-	-	16	145	-
Phthalic Anhydride	-	162	115	50	0	-
Phenol	-	676	659	61	54	-
Methanol	-	-	1,743	17	1,760	-

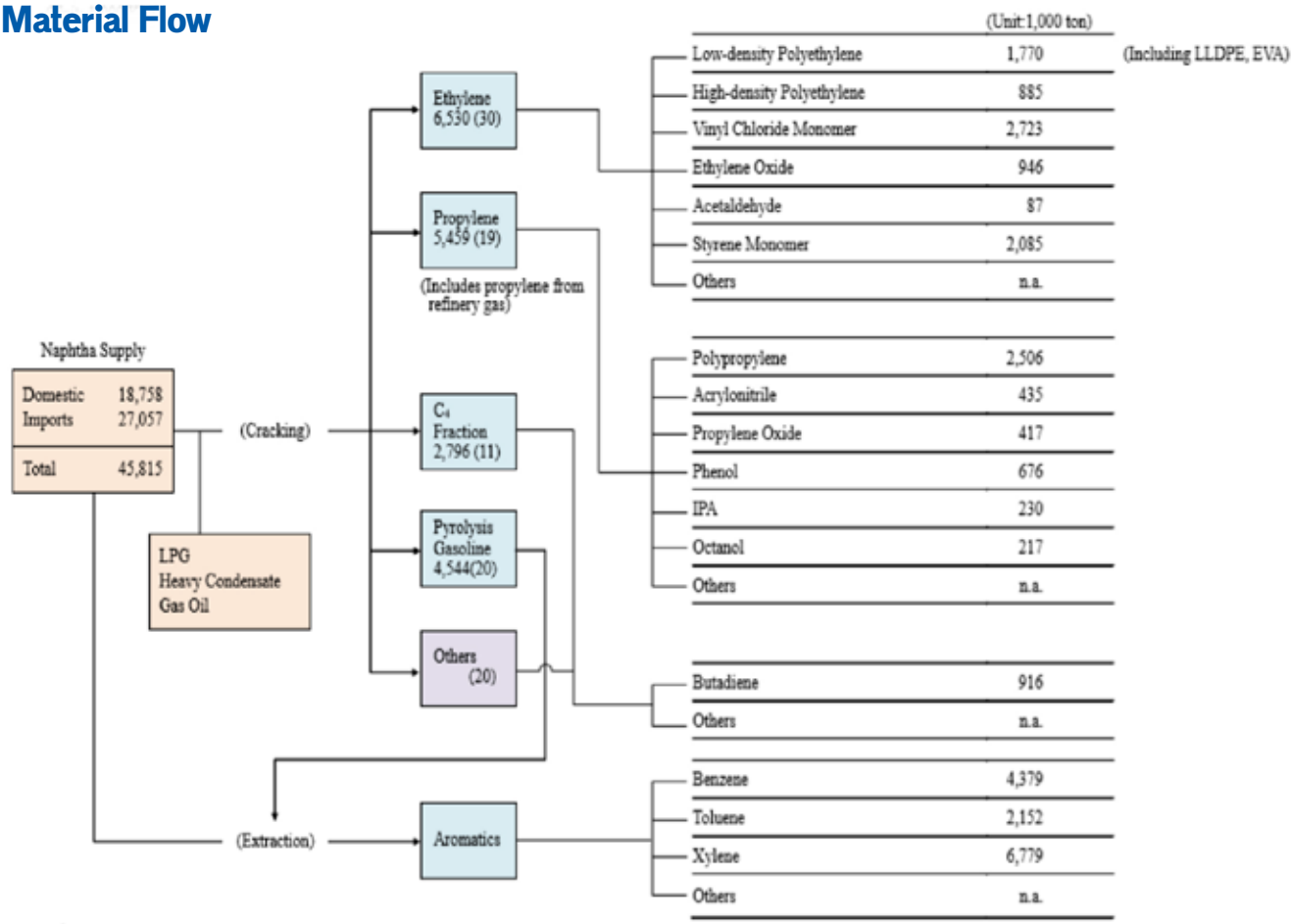
Note: Formula used to calculate operating rate is: Total Production / Total Production Capacity
Sources: Chemical industry statistics by Ministry of Economy, Trade and Industry, Japan (METI)
Trade Statistics by Ministry of Finance, Japan (MOF) JPCA

Japan's import of naphtha in ML (Million Litre)



Source: Customs Clearance statistic by MOF

Material Flow



Pakistan's potential chemical exports to Japan at HS-6

HS Code	Product label	Japan's Import		Pakistan's Export		Japan's import from Pakistan
		In USD Million	Average Price in USD/KG	In USD Million	Average Price in USD/KG	In USD Million
300490	Medicaments for therapeutic or prophylactic purposes, put up in measured doses, for retail sale	13,738.5	382.1	73.5	18.4	-
392690	Articles of plastics and articles of other materials	2,567.2	8.9	5.5	2.9	0.01
382499	Chemical products and preparations ,including mixtures with natural products	1,264.1	1.9	8.7	1.9	-
390761	PET, in primary forms, having viscosity >= 78 ml/g	1,091.8	1.3	133.0	1.3	0.18
330499	Beauty or make-up preparations and preparations for the care of the skin, incl. sunscreen or suntan preparations	922.2	31.3	5.2	6.9	0.01
300439	Medicaments containing hormones or steroids used as hormones but not antibiotics, put up in measured doses, for retail sale	871.4	1,710.2	60.5	18.8	-
392062	Plates, sheets, film, foil and strip, of non-cellular PET, not reinforced, laminated, without backing, unworked, merely cut into squares or rectangles	500.9	2.9	11.2	1.9	0.02
300420	Medicaments containing antibiotics, put up in measured doses, for retail sale	420.2	175.9	15.0	18.7	-
381512	Supported catalysts with precious metal or a precious-metal compound as the active substance	343.6	163.9	4.1	50.6	-
392490	Household articles and toilet articles, of plastics	336.3	5.1	17.6	2.6	-

Note: Product Selection criteria:
Japan's chemical import value is greater than $300 Million & Pakistan's chemical Export value is greater than $4 Million @ HS-6 levels.
Further Research is needed to realize quality & product differences along with Trade barriers.

Pakistan's chemical export to Japan stood at $0.7 million falling at the rate of 3% per annum (based on CAGR 2014-18). Top-10 chemicals contribute 99.7% of this export. Pakistan has the potential to increase their exports in earlier mentioned products while 6 new chemical products at competitive prices have been identified for export.
On the other hand, Pakistan's imports from Japan have surged by 71% in the last 5 years (2014-18). Chemical imports for Japan stood at $86 million, top-10 imports account for 44% which indicates that Japan's chemical export to Pakistan is much more diversified as compared to Pakistan chemical exports to Japan.

Pakistan's Chemical Trade With Japan

Unit: USD Million

Pakistan's top-10 chemical Imports from Japan							
HS-code	Product Label	2014	2015	2016	2017	2018	CAGR (2014-18)
39269099	Articles of plastics and other materials: other	3.9	4.2	5.5	6.4	6.7	14%
37011000	Photographic plates and film in the flat, sensitised, unexpc x-ray (excluding of paper, paperboard and textiles)	4.8	4.7	6.2	6.3	6.6	8%
29224990	Amino-acids and their esters; salts: other	5.1	4.2	5.3	4.6	4.9	-1%
38220000	Prepared diagnostic or laboratory reagents whether or not backing	2.5	2.1	2.6	3.6	4.0	12%
29161400	Esters of methacrylic acid	0.5	1.0	2.0	1.4	3.5	61%
29304000	Methionine	6.1	10.1	4.4	4.8	3.4	-14%
34039131	Spin finish oil (used in the textile or like industries)	1.7	1.7	2.1	2.7	2.5	11%
39069090	Acrylic polymers, in primary forms (excluding poly"methyl methacrylate"): other	1.7	1.5	1.8	2.2	2.2	6%
30051010	Surgical tape in jumbo rolls (for retail sale for medical, surgical, dental or veterinary purposes)	1.5	1.5	1.5	1.4	2.1	10%
29362600	Vitamin b12 and its derivatives, used primarily as vitamins	1.3	1.5	2.0	2.4	2.1	12%

Unit: USD Million

Pakistan's top-10 chemical exports to Japan							
HS-code	Product Label	2014	2015	2016	2017	2018	CAGR (2014-18)
39076120	Bottle grade PET, in primary forms,viscosity >= 78 ml/g	0.00	0.00	0.00	0.02	0.57	-
32041400	Direct synthetic organic dyes	0.05	0.22	0.16	0.19	0.03	-12%
39231000	Boxes, cases, crates and similar articles for the conveyance or packaging of goods, of plastics	0.00	0.02	0.03	0.02	0.03	-
39264090	Statuettes and other ornamental articles, of plastics: other	0.00	0.01	0.03	0.05	0.02	-
39269099	Articles of plastics and other materials : other	0.00	0.01	0.00	0.01	0.01	-
39201000	Plates, sheets, film, foil and strip, of non-cellular polymers of ethylene, not reinforced, laminated, supported or similarly combined with other materials, without backing, unworked, merely cut into squares or rectangles	0.00	0.00	0.00	0.00	0.01	-
33059090	Preparations for use on the hair (excluding shampoos, preparations for permanent waving or straightening and hair lacquers): other	0.00	0.00	0.00	0.01	0.01	-
39191090	Self-adhesive plates, sheets, film, foil, tape, strip and other flat shapes, of plastics, in rolls <= 20 cm wide: other	0.00	0.00	0.00	0.00	0.01	-
39069090	Acrylic polymers, in primary forms (excluding poly"methyl methacrylate"): other	0.00	0.00	0.00	0.01	0.005	-
39211200	Plates, sheets, film, foil and strip, of cellular polymers of vinyl chloride, unworked or merely surface-worked or merely cut into squares or rectangles	0.00	0.00	0.00	0.01	0.003	

Data Source: ITC Trade Map, 2018

Japan Chemical Trade With World

Japan's top-10 chemical exports to world

HS-Code	Product label	In USD Million	CAGR in Value of (2014-18)	Quantity In 1000 Tons	CAGR of Quantity (2014-18)	Average Price In USD/KG	Major Markets	
382499090	Other chemical products and preparations other than correcting fluids, put up in packings for retail sale	3,896.9	-	357.4	-	10.9	S. Korea 23	China 23
381800100	Chemical elements doped for use in electronics, in the form of discs, wafers or similar forms, of silicon	3,638.8	11%	6.3	4%	577.0	Taiwan 31	S. Korea 21
290243000	P-Xylene	3,284.7	3%	3,130.3	7%	1.0	China 79	Taiwan 21
300490900	Medicaments for therapeutic or prophylactic uses, put up in measured doses, for retail sale	3,240.6	28%	20.4	5%	159.2	USA 44	China 17
370790000	Chemical preparation for photographic uses; unmixed products for photographic uses, put up in measured portion or put up for retail sale in a form ready for uses, other than those of sensitized emulsions	2,855.6	2%	65.7	-1%	43.5	USA 21	Taiwan 19
330499900	Beauty or make-up preparations and preparations for the care of the skin	2,551.6	41%	65.9	33%	38.7	China 39	Hong Kong 27
392690000	Other articles of plastics and articles of other materials	1,992.3	4%	68.5	5%	29.1	China 23	USA 14
392099000	Other plates, sheets, film, foil and strip, non-cellular Plastic, not reinforced, laminated, supported or similarly combined with other materials	1,967.0	2%	50.4	8%	39.0	China 39	Taiwan 21
284190000	Salts of oxometallic or peroxometallic acids	1,488.2	67%	66.6	42%	22.4	USA 46	S.korea 29
392062000	Other plates, sheets, film, foil and strip, non-cellular PET and not reinforced, laminated, supported or similarly combined with other materials	1,147.6	-6%	140.1	1%	8.2	China 35	S. Korea 26

Japan's top-10 chemical imports from world

HS-Code	Product label	In USD Million	CAGR in Value of (2014-18)	Quantity In Tons	CAGR of Quantity (2014-18)	Average Price In USD/KG	Major Suppliers	
300490029	Medicaments for therapeutic or prophylactic purposes, put up in measured doses: Other	11,252.3	5%	5,695.5	-1%	1,975.7	USA 20	Germany 15
300215000	Immunological products, put up in measured doses or in forms or packings for retail sale	5,794.0	-	1,040.7	-	5,567.4	USA 26	Germany 26
392690029	Articles of plastics and articles of other materials: Other	2,473.9	3%	246,514.9	2%	10.0	China 53	USA 10
300490024	Medicaments for therapeutic or prophylactic purposes, put up in measured doses, packings for retail sale: Other	2,442.6	10%	29,767.1	-1%	82.1	Ireland 35	Germany 16
293499099	Nucleic acids and their salts, heterocyclic compounds: Other	1,428.0	9%	11,434.2	-0.5%	124.9	Belgium 39	USA 19
392321000	Sacks and bags (including cones) of polymers of ethylene, for the conveyance or packing	1,362.7	-0.2%	585,948.2	2%	2.3	China 41	VietNam 20
290919010	Acyclic ethers and its derivatives: Ethyl-tertiary-butyl ether produced from ethanol which is derived from biomass	1,200.7	8%	1,299,357.1	13%	0.9	USA 100	
390761000	PET, in primary forms, having a viscosity number of >= 78 ml/g	1,091.8	-	844,309.7	-	1.3	Taiwan 53	Thailand 25
382499999	Chemical products and preparations, including mixtures with natural products	1,080.0	-	619,934.2	-	1.7	China 35	USA 22
293349900	Heterocyclic compounds with nitrogen hetero-atom[s] only, containing in the structure a quinoline or isoquinoline ring-system, not further fused : Other	879.0	25%	1,217.4	9%	722.0	Ireland 85	China 11

Data Source: ITC Trade Map, 2018

Ittehad Chemicals: The Pioneer of Chlor Alkali Industry in Pakistan

An Ittehad of Talent & Technology

We started our production in 1964 with an installed capacity of 40 MT/day of Caustic Soda.
Currently the existing plant capacity stands at 425 MT/day, using the environment friendly "ION Exchange Membrane Technology"

Mega project spread over 106 Acres

We are running smoothy our LABSA/SLES plant since may 2019

We Deliver more than expected

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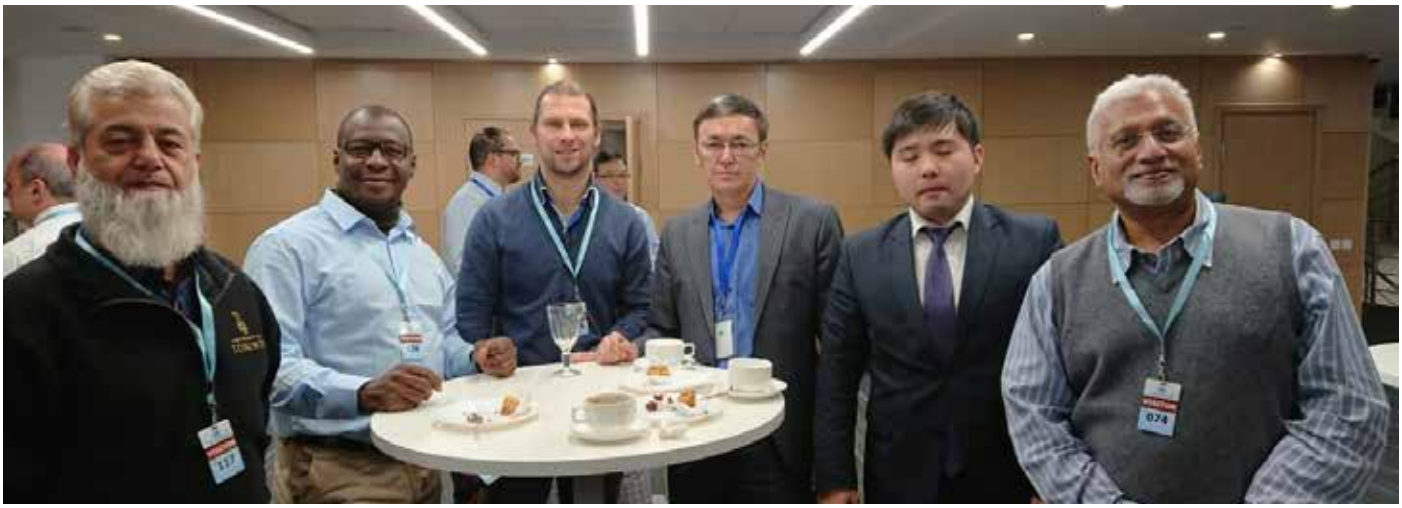
Tel : 042 - 3630 6586-88 Fax : 042 - 3636 7023
Website: www.ittehadchemicals.com
Email: marketing@ittehadchemicals.com

PCMA Activities in December 2019

PCMA Secretary General participated/presented in workshop on "Indicative Guidelines for the chemical safety and security management for small & medium sized enterprises" at Almaty Kazakhstan in 2-5 December 2019.



PCMA delegates met Abdul Razak Dawood, Advisor To PM and Andaleeb Abbas , PTI Parliamentary Secretary and discussed huge potential of growth of chemical & petrochemical industry in making Pakistan self-reliant thereby contributing in import substitution. The point was brought home that domestic manufacturing was key to promote pro-market approach and chemical industry with its enormous potential of developing the down-stream product line of petrochemical had a potential to turn the economic tide in favor of Pakistan.

PCMA's delegation met Sardar Ayaz Sadiq for his facilitation in resolving the anomaly on sales tax and planned a high level meeting at Islamabad as soon as possible. Sales tax anomaly is that there is different sales tax regime for EOUs on imports versus local purchase.

Details of Sales Tax Anomaly

The Export Oriented Units (EOUs) are allowed to import raw materials (which are the finished products of chemical industry) free of Sales Tax under SRO 327. However, there is no exemption on sales tax for EOUs on buying locally produced goods. No sales tax will be charged on imports while local buying would be subject to sales tax which will eventually become a refund for the EOUs. Hence, EOUs would prefer to import instead of buying locally produced goods. Owing to this anomaly, local manufacturer will not be able to compete with the imported product and this may result in closure of the domestic industry. Besides, this will promote unnecessary imports causing a huge drain of precious foreign exchange of the country.

Secretary General PCMA met Rubina Ather, current chairperson NTC. Discussed forthcoming Budget consultations. PCMA and NTC will hold consultative meetings with chemical industry in Jan 2020. The Chair Person, with her Team will visit Lahore and Karachi to meet stakeholders and discuss budget proposal to finalize the same by March 2020.

Detail

Members of PCMA Tariff Rationalization Committee met Ms. Rubina Ather, Chair Person NTC, in her office and presented her PCMAs' first- ever magazine. Members also briefed her on the PCMA activities and discussed budgetary proposal of PCMA for the forth-coming budget. She informed that NTC would start budget consultations with chemical industry in mid of January - February 2020 to finalize their proposal. She appreciated the quality of PCMA magazine and consented to contribute informative material for the magazine relating to NTC.

Make in Pakistan:

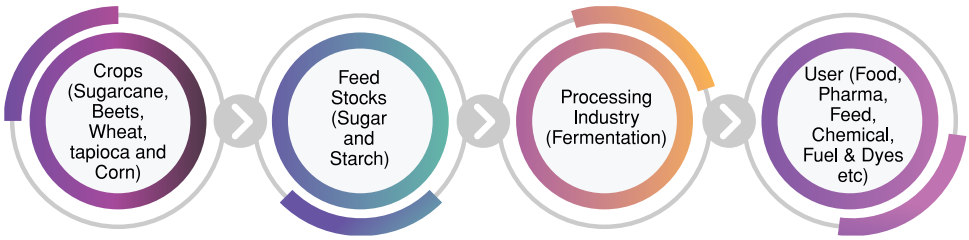
Make in Pakistan is a recent initiative of ministry of commerce spearheaded by Ali Habib, Advisor to Prime Minister of Pakistan. Key objective of the initiative is to give boost to exports & ensure import substitution. Chemical industry of Pakistan through its apex body, PCMA, with its huge potential of import substitution is being seen as key promotor of Make in Pakistan. Ali Habib is taking a meeting of PCMA members representing all the segments of chemical industry on 9th Jan 2020 at ministry of Commerce. PCMA members met in PCMA office on 27th Dec 2019 to plan for the meeting on 9th Jan. Abrar Ahmad, Chairman PCMA gave away a presentation presentation was finalized with members inputs for presenting in the meeting of Make in Pakistan.

China FTA II & SRO 1640

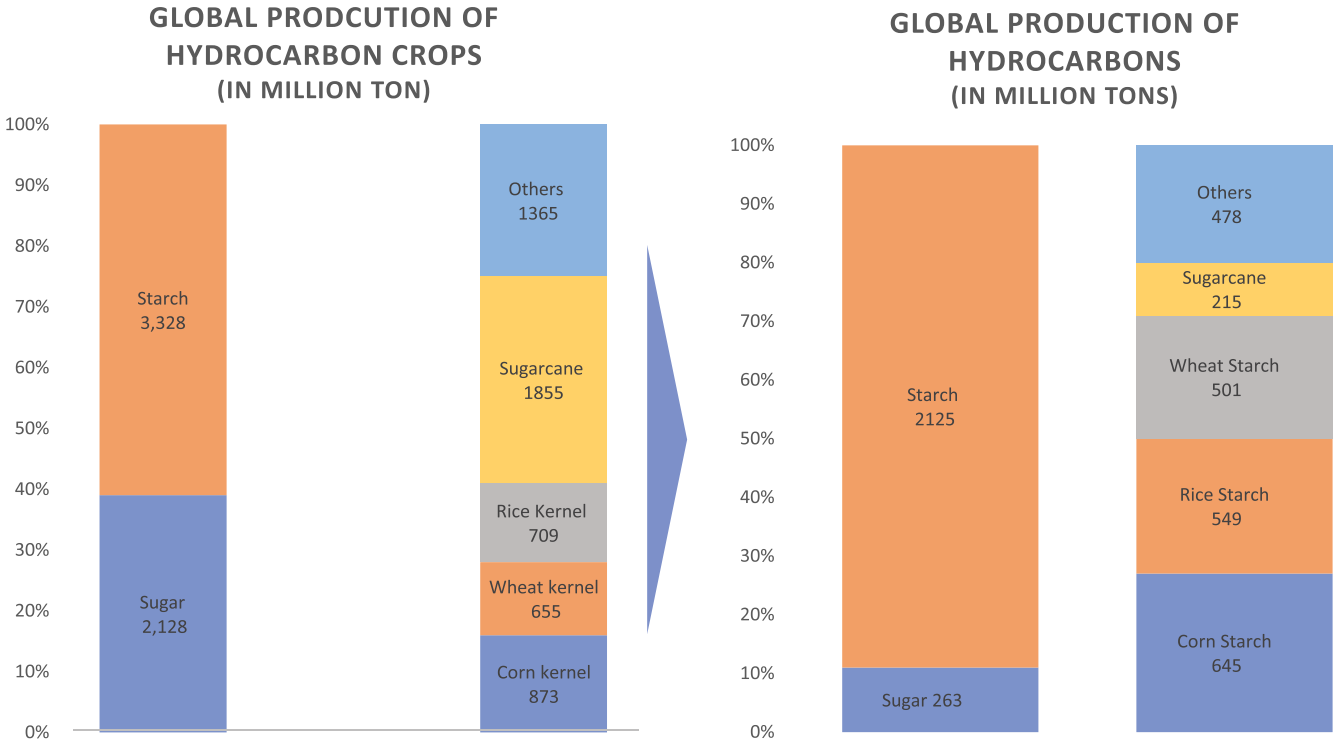
Ministry of commerce through its recent letter & through SRO 1640 informed that in FTA II with China the ministry was able to get hundreds of import items from China were declared as zero-rated. While the ministry is claiming it a feat, Pakistan Chemical Manufacturers Association has taken it as a "mixed blessing." PCMA is striving hard to promote domestic manufacturing in chemical & petrochemical sector. With zero rated imports of petrochemical products, domestic manufacturing is likely to be discouraged while the raw material imported at zero rated will benefit local manufacturing. Members are examining the China FTA II with great care and will submit their comments through PCMA as soon as possible.

Opportunities for the BIO-BASED Chemical Industry

Global competition in the chemical market is intensifying and Variance in energy price plays an important role in overall chemical production cost. The abundance of shale gas in the US, oil and gas in the Middle East and coal in China increase the pressure on the rest of world's chemical industry to find new ways to create a sustainable competitive advantage. Innovation in biotechnology and biorefineries are among the possible alternatives which require partnerships between the agricultural and chemical sectors.



Each year, 5.5 billion tons of crops are grown, containing 2.4 billion tons of hydrocarbon. Around 89% of the global hydrocarbon supply comes from 61% of crops. Sugarcane, sugar beet, tapioca and corn are four major crops for fermentation industry. These four crops account for 75% crop volume and generate 80% of the global hydrocarbon production. The diagram shows the difference between percentage of hydrocarbons compared to crop volumes.



Source: United States Department of Agriculture,Deloitte ,FAO.

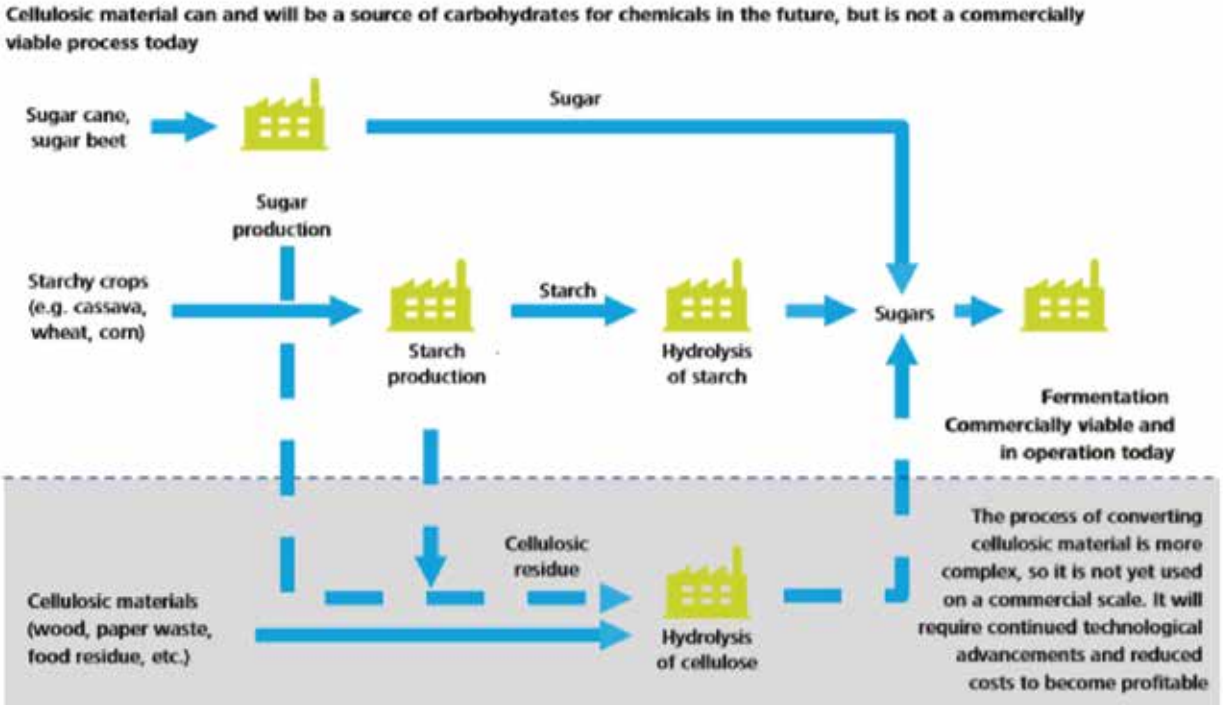
INDUSTRIAL APPLICATION OF BIOBASED FEEDSTOCKS (SUGAR & STARCH) WILL BROADEN RAW MATERIAL RANGE AND GENERATE NEW PROPERTIES AND APPLICATION.

Biobased feedstocks and their Industrial application will not only broaden the range of raw materials but also generate materials with new properties and applications. e.g. potential replacement of PET bottles are PEF biobased bottles. Further developments of processes and technologies are necessary and feasible since biobased feedstocks differ from fossil feedstocks. Currently, fossil-based products have strong asset and technological base. Therefore, Biobased product needs to be provided with level playing field in order to compete fossil-based alternatives. This action can be useful to achieve United Nation sustainable development goal program.

Sugar, a major biobased feedstock, comes either directly from sugarcane and beet or indirectly from corn and tapioca starch. Due to improvement in crop seeds and yields, white sugar has become cheaper compared to crude oil. The use of sugar & starch for biobased chemicals compared to food, feed and fuel is insignificant but cost position can be improved using sugar juice instead of white sugar.

ACCORDING TO WORLD BANK, PAKISTAN HAS 368,440 SQ. KM (36.8 MILLION HECTARES) OF AGRICULTURAL LAND. WHICH MAKES US A SUITABLE COUNTRY FOR THE DEVELOPMENT OF AGRO BASED CHEMICAL INDUSTRY.

In 2017-18, Pakistan has used only 1.3 and 8.8 million hectares of land to produce sugarcane and wheat respectively. Therefore, Supply of Biobased feedstock for fermentation industry seems secure in long term.



Source: Deloitte

Fermentation is the key process that converts hydrocarbon biobased feedstocks into food, feed, fuel and molecules. Worldwide Demand for fermentation-based chemicals has increased in past decade and most of its production capacity shifted to Brazil & Thailand. These countries had the medium to low level of biotechnology knowhow. Pakistan has the potential to follow suit of Brazil & Thailand. Today, the biotechnological knowhow is widely available. As an example, in 2006 a broad group of stakeholders led by Wageningen University and Research Centre (WUR) and Energy Research Centre for the Netherlands (ECN) documented the broad range of possibilities and a roadmap for industrial biorefineries. Several years later, the World Economic Forum also recognized the future of biorefineries.

DEMAND FOR BIOCHEMICALS INCREASED IN THE LAST DECADE WHILE MOST OF THE PRODUCTION CAPACITY SHIFTED TOWARDS BRAZIL & THAILAND. THESE COUNTRIES HAVE MEDIUM TO LOW LEVEL OF BIOTECHNOLOGY KNOWHOW. PAKISTAN HAS BASIC INGREDIENTS FOR THE DEVELOPMENT OF GREEN CHEMICALS.

Ethanol, Butanol, BDO, Acetone, Lactic acid, Citric acid, Succinic acid, Xanthan, PHA, Tetracycline, Clavulanic acid, methane, MSG acid, Lysine acid, Threonine acid, Tryptophan acid, Amylase, Cellulase, Lipase, Protease, Vitamin C, B2 and B12 are being produced through fermentation. Pakistan is currently producing and exporting bioethanol. On the base of ITC trade data 2018, Pakistan exported around 843,000 Tons of Bioethanol.

In 2012, global market size of fermentation-based industry was around 127 billion dollars. Industry used sugar, starches or cellulosic origins, i.e. white sugar, thick juice and sugarcane juice as raw materials and processed around 200-250 million tons of hydrocarbons annually. Market-share of Bioethanol was 94% of global fermentation-based industry. Antibiotics i.e. Beta-lectarn, Tetracycline and Clavulanic acid provided higher value addition as compare to bioethanol. Average annual growth rate until 2020 was estimated at 6.5% (excluding Bioethanol) with a gross margin contribution of $ 12 billion per annum;., which is well above projected GDP growth.

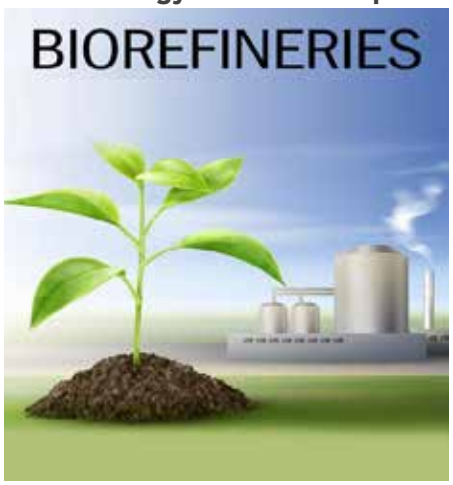
Category	Production	Average Theoretical Yield	Market size	Forecasted Growth rate
	Miliion Tons	Per KG of Glcose	USD Billion	
Alcohols	99.8	0.51 Kg	110	4%
Amino Acids	7.1	0.92 Kg	11	6%
Organic Acids	2.9	1.05 Kg	3.5	9%
Biogas	0.1	0.27 Kg	0.2	5%
Polymers	0.2	0.93 Kg	0.6	14%
Vitamins	0.2	0.96 Kg	0.7	3%
Antibiotics	0.2	1.00 Kg	0.8	4%
Industrial Enzymes	0.1	1.00 Kg	0.3	8%

Source: BCC research, Deloitte, NOVA Institut, FAO/OECD, FO Licht Renewable Chemicals Database

The opportunity in value addition is closely linked to available agricultural land in country. According to world bank data, Pakistan has abundant arable land. Investors are well advised to evaluate government policies along with market condition while considering investment decision. Change in external & non-financial factors can easily turn the table.

Way forward

Growing importance of UN sustainable development goal program along with depletion of natural resources, make agricultural products a potential raw material in chemical industry. **Agricultural land, fertilizer availability along the biotechnology advancement places key role in competitive advantage of a country's agricultural goods.** ACCORDING TO WORLD BANK'S 2016 DATA, PAKISTAN HAS 368,440 SQ. KM (368.44 MILLION HECTARES) OF AGRICULTURAL LAND, which make it a suitable country for development of biobased chemicals. Although, Pakistan has little to medium knowhow of biotechnology but still we can follow Thailand and brazil model to develop our fermentation-based industry. Area in use, production and yield of major Pakistani crop that can be used in fermentation-based industry highlights the abundance of arable land available to Pakistan.



Crop	Area	Production	Yield
	Million Hectares	Million Tons	(Ton/Hectare)
Sugarcane	1.3	83.3	62
Corn	1.25	5.9	4.7
Wheat	8.8	25	2.8
Rice	2.9	7.4	2.6

Source: Economic Survey of Pakistan 2017-18

According to Economic Survey of Pakistan, Pakistan produced 83 million tons of sugarcane and 5.9 million tons of Corn by using only 2.6 million hectares of land which is nothing more than a fraction of land available for Pakistan. These are the two major crops for fermentation based chemical industry. On the other hand, Pakistan also has other hydrocarbon crops in the form of wheat and rice. Pakistan has the potential to increase the yield and cultivation land of these crops. This act may help Pakistan to increase its competitiveness in biobased chemicals. By focusing on bio-based products Pakistan can replace its imports with idle usable indigenous resources.

Government can provide following support for the development of biobased chemicals.

- Establish new and reinvigorate old research centers to undertake yield improvement initiatives in the agricultural sector.
- Establish a high-powered Chemical Industry Working Group tasked to identify key technological, financial and legislative impediments to the growth of the industry and assigning tasks to respective line departments and research institutes.
- Introduce a reward culture (a local version of Nobel prize) for researchers, technicians and industries striving to address impediments to growth as identified by the Chemical Industry Working Group (CIWG)
- Re-organize horse and cattle show with a focus on development of productivity enhancement tools, mechanisms, processes and technologies.

- Bring industry and academia under one roof, for the development of new methods to make fertilizers with indigenous raw material.
- Advancement of research in biotechnology through research grants, foreign collaborations and trainings to improve upon necessary skills.
- PCSIR and biotechnology departments of various universities to be tasked to develop biotechnology processes for converting these functional units into marketable product. The production process should be sold to industries at minimal prices.
- Pilot units of various sizes to be established and operated on commercial basis in universities to further research cause and also train future generations on new technologies.
- Provide legislative support to increase viability of biobased products like complete ban of non-biodegradable packaging material for consumer goods; strict policy implementation is needed.
- Technical and financial support for farmers to improve yield of corn and sugarcane crops.

The above measures will address impediments to the growth of the industry in general and chemical sector in particular; resulting in import substitution, job creation, enhanced GDP and a self-reliant Pakistan.

Originally Produced By:
Deloitte Netherlands

Summarized & Recreated according to Pakistan.

Arsalan Nadeem
Lead Researcher
ERA Corporation

PRODUCT SAFETY CODE OF MANAGEMENT PRACTICES

Purpose and Scope

Chemistry is a source of innovation that creates a healthier, safer and more sustainable future. From solar cells, wind turbines and rechargeable batteries to air filters, water purifiers and disinfectants, chemistry enables us to save energy, reduce pollution and enhance public health.

The American Chemistry Council's (ACC) Responsible Care companies manufacture a broad array of chemical products, ranging from commodity industrial chemicals used to make other chemical products, to specialty chemicals tailored for unique applications and formulations, to finished goods and consumer products. Product safety and stewardship are shared value chain responsibilities, as each company, depending upon its position in the chemical value chain, has a distinct and essential role to play. At each stage in the value chain, protecting public health, safety, and the environment must be embraced as a core value, as it is by chemical manufacturers.

ACC Responsible Care companies are committed to making innovative chemical products that can be used safely for their intended purposes. As part of this commitment, ACC and its members created this Responsible Care Product Safety Code, which sets forth a set of practices to manage chemical product safety as part of our industry's signature health, safety, security, and environmental management system. The Code reinforces Responsible Care's legacy of product stewardship that goes beyond regulatory requirements, which has been a central tenet of the program since its inception.

The Responsible Care Product Safety Code provides a comprehensive framework to drive continuous improvement in chemical product safety and stewardship. Implementation of this Product Safety Code is mandatory for all ACC Responsible Care companies.

Management Practices

The Product Safety Code requires that companies include product safety and stewardship as part of their management systems. Product safety management requires an understanding of intended product uses, a science-based assessment of potential risks from products, and consideration of the opportunities to manage product safety along the value chain. A key component of managing product safety by parties in the value chain is exchanging information regarding product hazards, intended uses, handling practices, exposures and risks. Product stewardship is the responsibility to understand, manage and communicate the health and environmental impacts of chemical products.

Taken together, implementation of the following management practices enables chemical manufacturers to systematically evaluate, demonstrate and continuously improve their product safety performance, while also enhancing communication about important factors that can influence product safety throughout the value chain.

Each Responsible Care company's management system will include the following product safety and stewardship management practices:

Leadership Commitment.

Senior leaders drive continuous improvement of product safety and stewardship through published policies, active participation and communication concerning product safety, establishing, tracking/reporting of objectives and goals, and providing sufficient and qualified resources. Senior leadership is charged with evaluating the effectiveness of product safety programs and providing active support to drive improvement.

Accountability and management.

Product safety and stewardship are core values that permeate each company's operations and functional responsibilities. Product safety and stewardship responsibilities of employees are understood, including those roles that engage with suppliers, customers, contract manufacturers, carriers, distributors, contractors and third-party logistics providers. Employees assigned these roles are informed and held accountable for their performance.

Prioritization of products.

Companies have a process in place to prioritize their products to identify those that require a more detailed evaluation, assessment, and risk management controls, as well as those that require additional data and information gathering. Companies apply a science- and risk- based approach, considering hazard, intended uses and exposure potential when they prioritize their products. Companies include criteria that are applied uniformly to all products screened and that incorporate relevant, credible scientific advances and consider significant new information to ensure that prioritization decisions remain current.

Product information.

Companies consider the results of their risk-based prioritization process when gathering and developing information that is used in their risk evaluations, characterizations, and consideration of product safety management actions. Companies evaluate existing information and appropriate assessment techniques, such as ACC's science policies and principles, to determine when additional information on hazards, intended uses, and exposures is needed.

Risk characterization.

Companies characterize the potential risks of their products using an iterative, tiered process that considers prioritization results and may identify needs for additional hazard, use and exposure information. Risk characterizations include consideration of information about downstream uses and reasonably anticipated exposures, including potential exposures to children. Risk characterizations use valid, reliable and relevant scientific studies and information, giving such studies and information appropriate weight, to determine potential risks associated with relevant levels of exposure under expected conditions of use.

Product safety management.

Companies implement a process to select, implement, document and communicate measures that appropriately manage health, safety and environmental risks of their products. A range of measures may be considered commensurate with the risk characterization, taking into

account the feasibility of value chain implementation. Examples of such measures may include labeling, handling instructions, training, engineering and design controls, use restrictions and/or reformulations. Risk management actions may require modifications based on substantive new information on hazards, uses and exposures so that products can continue to be safely used for their intended purposes.

Management of new information.

Companies establish processes that enable new information to be brought to light and establish when and how to elevate product safety and stewardship issues within the company. New information could come from internal and external sources.

Product design and improvement.

Companies consider health, safety and environmental impacts when designing and improving their products, including factors such as intended use, expected product lifetime, durability, reuse, recyclability or beneficial disposition.

Value chain communication, cooperation and outreach.

Commensurate with risk, companies work with and as appropriate, review customers, suppliers, contract manufacturers, carriers, distributors, contractors and third-party logistics providers based on Responsible Care or other health, safety, security and environmental performance criteria. Processes are in place to communicate, receive and evaluate product safety and stewardship information and requests from value chain participants. If improper practices involving a product are discovered, corrective measures are taken based upon a company's independent judgment, ranging from resolving the improper practices to termination of business relationships, if necessary.

Information sharing.

Companies make product safety and stewardship information publicly available to enhance public knowledge of and confidence in the safe use of chemical products, while protecting confidential business information. Publicly available information includes relevant health and environmental effects and safety management measures to promote safe handling and use of products throughout their lifecycle.

Performance assessment and continuous improvement.

Companies implement an internal process to monitor and assess product safety and stewardship performance, utilizing appropriate indicators. Companies report their activities associated with implementation of this Code to ACC to facilitate public understanding of the industry's overall product safety commitment and performance.

Pakistan has created its first tariff policy in 71 years named "National Tariff Policy 2019-24". This action will increase Transparency & Predictability of tariff structure in Pakistan. The silent features of this policy are following:

1. INTRODUCTION

Since Fy2013, GDP growth and exports has shown inverse trend that indicates that exports were not contributing in GDP growth. High tariffs have increased Trade related revenues and decreased export competitiveness. From 2013-17, trade related revenues have increased by 169% while import grew by only 17%, and Regulatory Duties (RDs) increased from 105 tariff lines to 1500 tariff lines.

If tariffs are excessively employed	If tariffs are effectively employed
Decrease Industry's Competitiveness and cause de-industrialization	Protect domestic industry
Increase Unemployment	Create Jobs
Restrain Investments	Attract and protect investment
Worsen Balance of Payment (which cause increase in Foreign loans and currency devaluation)	Improve Balance of Payment
Breed incompetence and create anti-export bias	Increase competitiveness, remove anti-export bias and increase exports
Decrease Consumer welfare	Increase Consumer welfare

2. BACKGROUND

Pakistan use Custom Duties (CDs)and RD for revenue generation as it's easy to collect as compare to direct taxed. Pakistan is on crack to increase trade liberalization by reducing slabs and tariff rate. This trend will remain continue in long term.

To facilitate the manufacture-cum-exporters, several schemes are placed to waive import duty on their raw materials but many exporters especially SMEs often failed to avail the benefits from these schemes. Many concessionary Statutory Regulatory Order (SROs) and Custom General Order (CGOs) were issued to provide concessions and exemptions. To reduce complexity and distortion created by these SROs, many concessions were moved to Fifth Schedule of Pakistan Custom Tariff.

Years	Number of Tariff slabs	Maximum Tariff slab	Minimum Tariff Slab
2015	6	25٪	1٪
2016	5	20٪	2٪
2017	4	20٪	3٪

3. ISSUES IN TARIFF REGIME

Cause	Effect
No tariff Policy	Lack of transparency & Predictability in Tariff structure
Revenue Tool	Create distortions and decrease competitiveness
Costly Raw materials	Discourage value-added industry
High level tariff protection	Create inefficiencies & anti-export bias and reduce consumer welfare
Multiple tariff slabs, High Tariffs, SROs and RDs.	Encourage Smuggling, under invoicing and mis declaration
Different tariff rates for Commercial and Industrial importer	Encourage mis declaration and creates distortion for SMEs (as SMEs imports through commercial importers)
Frequent imposition of RDs	Make Tariff structure inconsistent & unpredictable and hinders investment decisions

4. REGIONAL TRENDS

During last decade, all 20 fastest export growth economies have reduced import tariffs, two fastest growing economies have reduced tariffs by 72% & 51% while Pakistan has increased tariffs by 11% under same period. Additionally, the imposition of RDs has increased the effective tariffs even higher.

Below mentioned table shows that decrease of weighted average tariff in Pakistan leads to higher export growth.

The total revenue collection in Pakistan at the import stage is around 44% of the total tax revenues.

Pakistan's effectively applied import tariffs are:

- 3 times than East Asia
- Twice the world average
- 3rd highest average weighted tariff amongst the 68 countries having more than USD 20 billion annual export

Years	Weighted Average Tariff	Export growth
2001	20.62%	-
2014	8.92%	173% (between 2001-14)
Since 2014	10.09%	-19% (from 2014 onwards)

5. OBJECTIVES

1. To Improve competitiveness through duty free access to imported raw materials
2. To Increase employment opportunities by attracting efficiency seeking investment by making tariff regime transparent and predictable
3. To reduce distortions in domestic prices & improve consumer welfare
4. To remove anomalies in tariff structure which is causing distortions in value chain

6. PRINCIPLES OF TARIFF POLICY

Existing	New
Source of Revenue generation	**Instrument of Trade policy** (to create a right balance between trade liberalization and time bound protection)
Complex Tariff Structure	**Simplified tariff structure** By reducing exemptions and concession through SROs
Lack of Transparency in Tariff Structure	Transparent Tariff Structure based on **Cascading principle** (increase tariff with production stages)
High Tariff to protect local industry	**Strategic Protection** Time bound Tariff protection for Nascent (Infant) industries (protection will phase out, to increase global competitiveness of industry)
High Tariffs to increase revenue	**Competitive Import Substitution** Time bound Tariff protection for Domestic industry (protection will phase out, to increase competitiveness for export-oriented products)

7. POLICY GUIDELINES

- These policies will be implemented gradually starting from the Budget 2019-20.
- Tariffs slabs will be simplified based on Cascading principle.
- Custom Duties, Additional CDs and RDs on Raw materials, intermediate goods and machinery will be gradually reduced.
- Difference in tariff rates for commercial importers and industrial importers on Raw materials, intermediate goods and machinery will be eliminated.
- The nascent industry will get time bound protection, which will cover payback period of financing and investment. Protection will phase out gradually.
- Creation Tariff Policy Board that will be responsible to formulation, amendments and implementation of the National Tariff Policy.

Institutional Mechanism

Institutional Mechanism of TPB is following

1. TARIFF POLICY BOARD (TPB)

Designation	Members
Head	Advisor/ Minister of Commerce
Secretary	Secretary Commerce
Member	Minister of Industries & Production
Member	Secretary Industries and Production
Member	Secretary Finance
Member	Secretary BOI
Member	Chairman FBR
Member	Chairman NTC

2. TARIFF POLICY CENTRE (TPC)

TPC will be the Secretariat for TPB to carry out the examination of the proposals for levy, amendment or removal of tariffs including CDs, ACDs (Additional Custom Duties) & RDs

3. TPC WORK PLAN

Consultation with

Businesses
FBR
Ministry of Finance
Ministry of Industries

Analysis based on

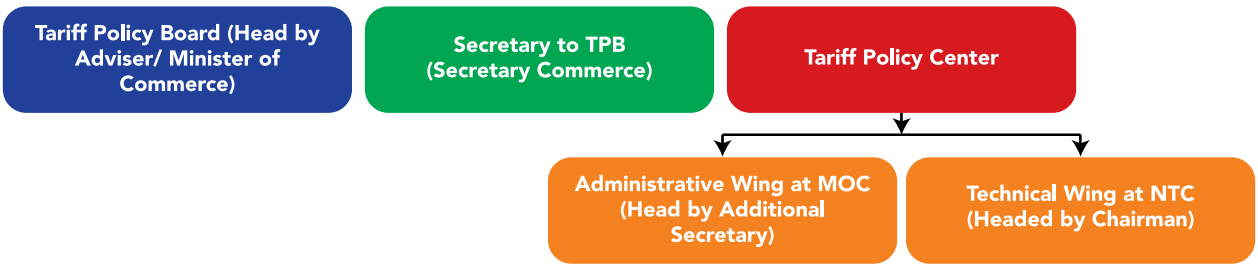
Information collected through stakeholders consultation
Customs import and export database
NTC database
Import/export forecasting methods (TRIST, SMART, CGE and GTAP models)

Timelines	Activities
January, 2020	Stakeholder consultations
February, 2020	Analysis of information
March, 2020	Recommendations by TPC to be submitted to Policy Board

4. APPROVING AUTHORITY

Cabinet	For Regulatory Duties (RDs)	Parliament	For Custom Duties (CDs)

Institutional Structur



SUGGESTIONS FROM PCMA

- At least one person from the business community should be included in Tariff Policy Board.
- Time frame for Time-bound protection should be defined after consulting with related industry.
- New Tariff Structure should be considered while negotiating Free Trade Agreements (FTAs) or Preferential Trade Agreements (PTAs).
- Tariff policy should be well connected with order governmental policies such as fiscal, monetary, production & Investment etc.
- Tariff Policies should be well advertised.

Provided by
Arsalan Nadeem
Lead Researcher
ERA corporation

TOWARDS SUSTAINABLE INDUSTRY & EXPORTS

Industrialization is a back-bone of every economy. In Pakistan unfortunately, solid base of industry has either been missing or could not sustain for a longer period. In 1960s; in order to promote investment in country, government incentivized private investors by establishing Pakistan Industrial Development Corporation,. Pakistan Investment & Credit Corporation and a number of similar initiatives were put in place to facilitate "access to finance" for small & medium enterprises. The impetus of industrialization; however, was slowed down after nationalization of private industry by government. Similarly, lack of well-structured planning & long-term vision, poor law & order, war on terror etc., played a negative role in setting up of a sustainable industrial base in Pakistan.

Current government, while grappling with multiple challenges is also confronted with a gigantic issue of un-favorable balance of payment account. This situation is primarily due to imbalance in exports & imports while negative practices in business are adding fuel to fire. These practices include tax evasion, mis-declaration, under-invoicing, smuggling, sub-standard products, etc. Domestic industry is affected negatively and threatened to operate under such mal-practicing environment.

Above in view, it may be suggested as demand side measures, that a visual check on every business transaction is desired, to deny wrong-doers exploiting the loop-holes in system. Officials at borders, customs & in regulatory regime may have to implement the relevant laws & instructions in letter & spirit. They have to be upright, motivated and impersonal, as general presumption is that system can be exploited in connivance with the concerned officials and wrong-doers can get away with it. Discretionary powers of higher officials may not be un-bridled or exploitative. Recent announcement by Chairman FBR to take strict action by lodging of FIRs under the customs Act against importers involved in mis-declaration of goods of Indian origin through international ports like Dubai, Hong Kong and Singapore is a very welcomed step.

While FBR under the leadership of Mr. Shabbar Zaidi is discouraging this "origin of import circumvention" there is a need to curb infiltration of smuggled chemicals being done from our borders including Wahga, Kabul and, Kandhar. Chemical manufacturing companies are producing these chemicals with investments worth billions of rupees. Illegitimate practices including smuggling, mis-declaration, under-invoicing etc., are posing immense threat to existing local industry & potential investments. Chemical industry alone;, with its huge potential can be a game changer. Numerous chemicals worth billions of dollars are being imported annually for value addition and domestic consumption. A little attention from state in providing proper border policing may result in exponential growth of the domestic chemical industry.

In order to promote fresh investment and protect existing industry from closure, government may have to introduce new and strengthen existing supply side interventions. Replicating best practices of many countries, government may offer to SMEs, free land for establishing export oriented manufacturing facilities. Industrial land has gone out of reach of SMEs as the cost of land alone renders the whole business un-viable. Similarly, access to finance is another big challenge as pay-back period increases with the cost of finance going up. Provincial governments, may extend financial & physical infrastructure through its city governments to increase domestic produce and make available surplus for exports. Provision of SEZs & free trade zones with tax holidays; and common facility centers may promote cluster development & volumes needed for exports.

Author
Syed Iqbal A. Kidwai
Secretary General
PCMA

TAX NOTIFICATIONS, CIRCULARS AND AMENDMENTS

Tax Notifications, Circulars and Amendments are following

Tax Notifications, Circulars and Amendments are following

1. TAX NOTIFICATIONS/ CIRCULARS

Tax Notifications/ Circulars are following

A. DEFINATION OF GREEN FIELD INDUSTRY

Through the Finance Supplementary (Second Amendment) Act, 2019, (PUBLISHED IN THE GAZETTE OF PAKISTAN ON 11TH MARCH 2019) exemption from sales tax was provided on the import of plant and machinery by the Greenfield industry under serial number 150 of Table-1 of Sixth Schedule to the Sales Tax Act, 1990. Many queries have been received seeking clarification of the term "greenfield industry". A definition of this term in section 2 of the Sales Tax Act, 1990 has now been inserted as under;

1. **a new industrial undertaking which is-**
   - setup on land which has not previously been utilized for any commercial, industrial or manufacturing activity and is free from constraints imposed by any prior work;
   - built without demolishing, revamping, renovating, upgrading, remodeling or modifying any existing structure, facility or plant;
   - not formed by the splitting up or reconstitution of an undertaking already in existence or by transfer of machinery, plant or building from an undertaking established in Pakistan prior to commencement of the new business and is not part of an expansion project;
   - using any process or technology that has not earlier been used in Pakistan and is so approved by the Engineering Development Board; and
2. **is approved by the Commissioner on an application made in the prescribed form and manner, accompanied by the prescribed documents and, such other documents as may be required by the Commissioner:**

Provided that this definition shall be applicable from the 1st July, 2019 and onwards."

B. EXEMPTION FROM PUNJAB INFRASTRUCTURE DEVELOPMENT CESS

The Punjab Revenue Authority ("PRA") through a Notification, bearing No. PRA/ STE-04/ 2018/453, dated 12th December 2019, has exempted goods declared as temporary imports (to be re-exported) from the payment of Punjab Infrastructure Development Cess ("PIDC") by exercising its power under Section 6 of the PIDC Act 2015.

C. THE PUNJAB WORKERS WELFARE FUND ACT 2019

The Provincial Assembly of Punjab approved the Punjab Workers Welfare Fund Act 2019 ("PWWF") on 20th November 2019. It came into force right after the Act received the Punjab Governor's assent; i.e. 10th December 2019. After its enactment, the WWF for entities in Punjab will now be a provincial subject and will be collected by the PRA instead of FBR. Moreover, the fee so paid will be allowed as a deduction under Section 60A of the Income Tax Ordinance 2001.

Salient features of the PWWF, are as follows:

- Establishments with total income viz. accounting income exceeding Rs 500,000, will be liable to pay @ 2% of its total income.
- The amount is to be deposited within 30 days of the close of accounts.
- The payment receipt and the last income tax return that was filed, shall be submitted with the PRA before the due date of filling of income tax returns.
- The officer can, through an order, reassess the liability. The said order shall be appealable with the Appellate Tribunal.
- The maximum amount that shall be recoverable can be of the last 5 tax or income years, with an additional charge @15%.
- In addition to the above, the Government of Punjab, on recommendation of the Committee, may determine the 'additional amount' to be paid by the establishments. The Committee shall examine the circumstances of an establishment, including but not limited to those of financial in nature, and make recommendations as to the additional amount to be collected from the entity.
- The contribution payable under the Workers' Welfare Fund Ordinance 1971 will now be collected under the PWWF.
- The provisions of the Punjab Sales Tax on Services Act 2012, and the rules made thereunder, in relation to maters of record keeping, registration, charge, additional charge, recovery and appeals shall apply.
- No Suit can be instituted in any Civil Court, to set aside, or modify any order passed, any assessment made, or any penalty or default surcharge imposed by an Officer.

D. E-PROCEDURE FOR CORRECTION IN CPR OF INCOME TAX, SALES TAX AND FEDERAL EXCISE DUTY

The FBR has issued a circular dated 30th December 2019, whereby all previous circulars on the pertinent subject matter- to prescribe the procedure for correction in the CPR through IRIS- have been superseded. Most of the new procedures are similar to the ones previously prescribed, through the circular dated 5th October 2018, except that the requirement to submit a copy of CNIC of the withholding agent has been removed. Previously, if the CPR had already been utilized, there would be no further process. However, now the particulars will be rectified though the CPR already utilized. The timespan for processing has also been increased from 3 to 15 days. If the officer rejects the application, he is under an obligation to give reasons for doing so in writing.

2. AMENDMENTS IN CUSTOMS ACT, 1969 THROUGH 'TAX LAWS (SECOND AMENDMENT) ORDINANCE, 2019

Tax Laws (SECOND AMENDMENT) ORDINANCE, 2019 has been published in THE GAZETTE OF PAKISTAN on 27th December, 2019. Amendments in custom act 1969 are following:

1. A new Directorate by the name of 'Directorate General of Law and Prosecution' has been established by adding Section 3CCA in the Customs Act 1969 ("the 1969 Act"), through the Tax Laws (Second Amendment) Ordinance 2019 ("the 2019 Ordinance").
2. Section 7 of the 1969 Act requires all officers of the Federal and Provincial Governments, including the Inland Revenue, Police, National Highways and Pakistan Motorway Police, Civil Armed Forces, and officers engaged in the collection of land revenue, to assist the officers of Customs in the discharge of their functions. Now through the 2019 Ordinance, the assistance required by customs, shall be binding on such officials.
3. Section 194 of the 1969 Act specifies the provisions relating to establishment and functions of the Appellate Tribunal. However, by virtue of an amendment through the 2019 Ordinance, the power to appoint members and their terms and conditions now vests with the Prime Minister of Pakistan, instead of the Federal Government.
4. New penalties have been imposed on smuggling of currency, gold, silver, platinum or precious stone in Serial No.8 of Section 156 and been substituted in Serial No. 70.

These are as follows;

Offences	Penalties
Smuggled Currency, if over and above permissible limit up to:	
$10,000 or equivalent	Confiscation + maximum penalty up to excess amount
$10,001 - $20,000 or equivalent	Confiscation + maximum penalty up to twice of excess amount.
$20,001 - $50,000 or equivalent.	Confiscation + maximum penalty up to thrice of excess amount + imprisonment of maximum 2 years.
$50,001 - $100,000 or equivalent.	Confiscation + maximum penalty up to four times of excess amount + imprisonment of maximum 7 years.
$100,001 - $200,000 or equivalent.	Confiscation + maximum penalty up to five times of excess amount + imprisonment of minimum 3 years and up to maximum 10 years.
Exceeding $200,000 or equivalent.	Confiscation + maximum penalty up to 10 times of excess amount + imprisonment of minimum 5 years and up to maximum 14 years.
Smuggled gold, silver, platinum or precious stones, if over and above permissible limit up to:	
15 Tola gold or equivalent in value	Confiscation + maximum penalty up to excess amount
16 - 30 Tola gold or equivalent in value	Confiscation + maximum penalty up to twice of excess amount.
31 - 50 Tola gold or equivalent in value	Confiscation + maximum penalty up to thrice of excess amount + imprisonment of maximum 1 year.
51 - 100 Tola gold or equivalent in value	Confiscation + maximum penalty up to thrice of excess amount + imprisonment of maximum 3 years.
101 - 200 Tola gold or equivalent in value	Confiscation + maximum penalty up to four times of excess amount + imprisonment of maximum 5 years.
201 - 500 Tola gold or equivalent in value	Confiscation + maximum penalty up to five times of excess amount + imprisonment of minimum 3 years and up to maximum 10 years
Exceeding 500 Tola gold or equivalent in value	Confiscation + maximum penalty up to ten times of excess amount + imprisonment of minimum 5 years and up to maximum 14 years
Incorrect declaration, non-satisfactory explanation regarding luggage in relation to:	
Other than currency, gold, silver, platinum & precious stones	Same as above in case of smuggled currency
Currency if over and above permissible limit up to	Confiscation + Penalty maximum up to three times value
Gold, silver, platinum and precious stones in any form, if over and above permissible limit	Same as above in case of smuggled gold, silver etc.

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PyGas/Reformate Value Chain

NAPHTHA/MIXED FEED CRACKER

PyGas/Reformate

BENZENE (C6H6)
HS: 290220
Import: USD 948
Kgs: 636

TOLUENE (C7H8)
HS: 290230
Import: USD 8,638,770
Kgs: 5,421,651

XYLENE* (C8H10)
HS: 290244
Import: USD 492,164
Kgs: 398,372

ETHYLBENZENE (C8H10)
HS: 290260
Import: USD 38,686
Kgs: 20,000

High Value imported Petrochemicals

STYRENE (C8H8)
HS: 290250
Import: USD 73,745,210
Kgs: 52,290,442

SBR (C12H14)
HS: 400219
Import: USD 49,369,339
Kgs: 23,435,021

ABS (C8H8.C4H6.C3H3N)n
HS: 390330
Import: USD 52,628,154
Kgs: 26,438,743

SAN (C8H8)n-(C3H3N)m
HS: 390320
Import: USD 4,060,849
Kgs: 2,133,974

POLYSTYRENE PLASTIC (C8H8)n
HS: 390319
Import: USD 4 million
Kgs Import: 2, 547,931
Export: USD 24 million
Kgs Export: 15,435,362

UNSAT. POLYESTER (C)
HS: 390791
Import: USD 470,334
Kgs: 129,197

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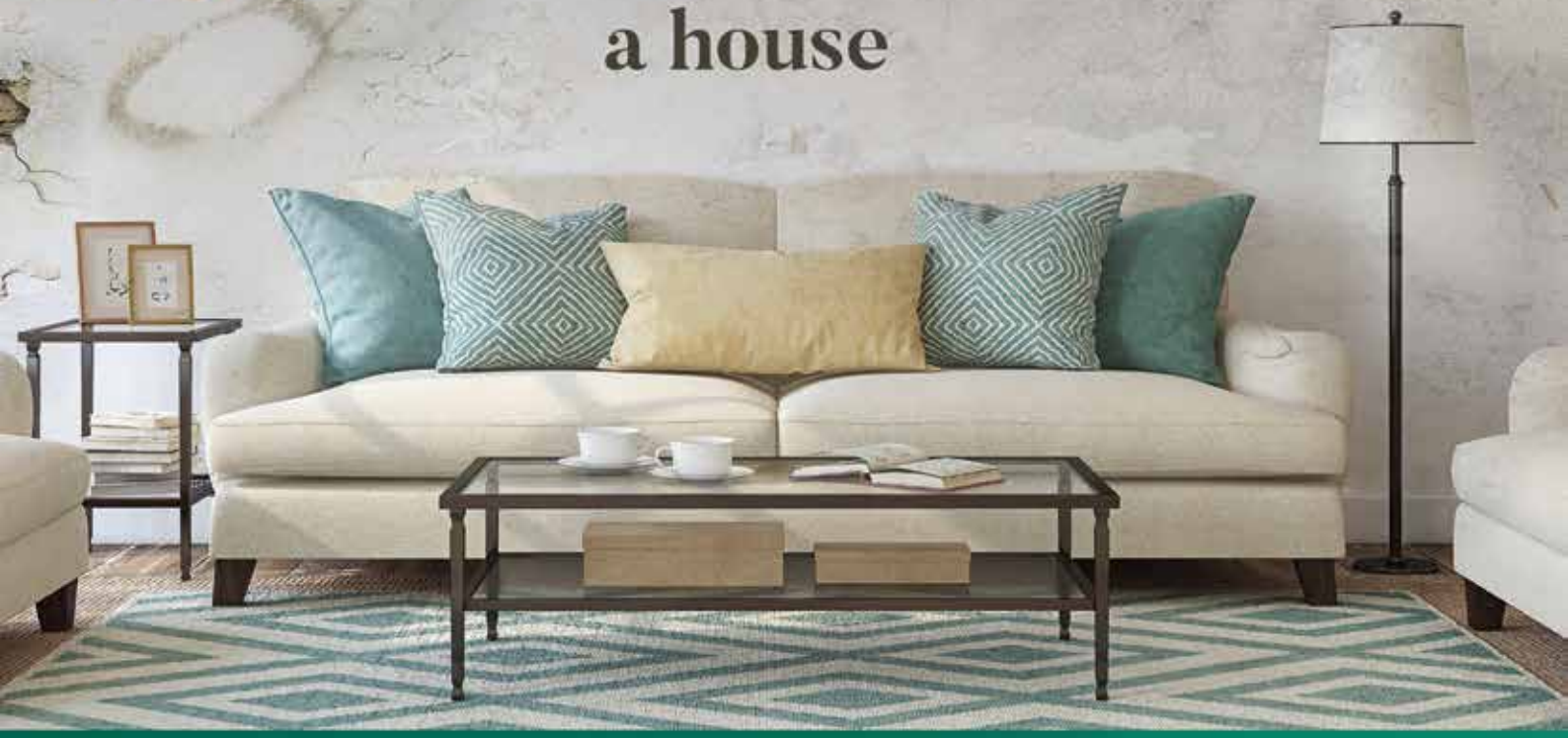

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