TRAVANCORE TITANIUM PRODUCTS LIMITED

THIRUVANANTHAPURAM

MASTER PLAN

September 2021

Content

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MASTER PLAN

1. Executive Summary

This document is the Master Plan for Travancore Titanium Products Limited for the period of five financial years prepared in September 2021.

An analysis of Strength, Weakness, Opportunity and Threat (SWOT) of the Company was carried out and based on the outputs of this analysis, discussions were conducted with Department Heads / Officers and Unions to develop a strategy document. The Action Plans were further revised with cost lines and this document is the Report on Master Plan/Strategy documents of TTPL.

From the SWOT analysis, major challenges to be addressed on priority were identified for the sustained growth of the Company. The following are the major challenges faced by the Company.

1. Sulphate Route Titanium Dioxide industry is facing big challenges in terms of high cost structure, effluent treatment requirements and influx of cheap material from China. Even though there is a demand gap, the increased cost of pollution control is eating away the margins in this industry.

2. In the present quality- price combination of Anatase, the maximum sales expected are only 10,000 Tonnes per Annum (TPA), while the current break even production volume is around 12,000 TPA.

3. The capacity limitations of the effluent treatment facility i.e. the Neutralization Plant (NP), to cater to the breakeven level of the Titanium Dioxide Plant (TDP) leads to operating losses.

4. Proximity to the International Airport causes restrictions for further capacity enhancements in Titanium Dioxide as high rise buildings and stacks above 15 MSL is not allowed. So future developments should be based on these restrictions.

The Master Plan is formulated to overcome these challenges by an action plan the following major components.

1. Urgent actions to increase the capacity of NP by de-bottlenecking and pilot scale production of iron oxide to reduce production of Red Gypsum.
2. Over and above the possible sales of 10,000 TPA, the Company can produce up to 12,000 TPA with de-bottlenecking in the Titanium Dioxide Plant (TDP) and the Neutralization

Plant (NP) and commissioning of Copperas Recovery Plant alone. Further capacity utilization up to 15,000 TPA will be in to producing diversified products. Improvement in quality and scale of economy can push the sales against imported pigments fulfilling the domestic demand gap.

3. Capacity addition to 20,000 TPA requires major capital investments both in the Titanium Dioxide Plant, sulphuric Acid Plant and the Effluent treatment facilities. A portion of the titanium dioxide manufactured will be utilized for producing value added products. Effluent Treatment facilities will be upgraded with new technology technology and going for further value added products from the effluent and solid wastes. The approach in effluent treatment will be to achieve Zero Effluent Discharge, with cost recovery through new products.

2. The Company

Travancore Titanium Products Limited (TTPL) is a Public Sector Unit owned by the State Government of Kerala. The Company was incorporated in the year 1946 and started commercial operations in the year 1950 with an installed capacity of 5 MT per day of Anatase Grade Titanium Dioxide Pigment. The capacity was increased to 18 MT in 1962. Subsequently in 1973, the capacity was expanded to 68 tonnes per day, approximately 24,500 tonnes per annum. The Wazir Committee appointed by the Government in 1976 studied the plant and assessed the working capacity of the plant as 15000 MT per annum. TTPL uses sulphate route technology for the manufacture of tit4anium dioxide. The basic raw materials are ilmenite and sulphuric acid. TTPL has its own 300 TPD plant for producing sulphuric acid from sulphur. Ilmenite is procured from Indian Rare Earths Ltd (IRE) and sulphur from Cochin Refineries (BPCL).

The Company has a land of 80.05acres at Kochuveli, Thiruvananthapuram where the factory and the administrative offices are situated, out of which 28.57 acre is free hold and 51.48 under lease hold. Around 55.05acres is utilized for production purposes. 13 acre is designated for green belt. The Company also utilizes around 12 acre for agricultural purposes under "SubhikshaKeralam Project" of the State Government of Kerala. The Company requires an additional land of minimum 13 acre, near around the factory for future expansions.

The company over the years had contributed to the state and central exchequer to a large extend. Stiff challenges from Chinese imports and economic slowdown had affected the titanium dioxide market and TTPL was not able to market its products on a comfortable margin. The COVID epidemic and technical issues with the effluent treatment facility has resulted in poor performance in recent years. The performance of the company for the last five years is highlighted below:

Table-1- Performance of the Company for the last 5 years

Major products	**Installed capacity**	**Achievable capacity**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**
Titanium Dioxide (MT)	24,500	15,000	11,338	9,896	11,665	9,950	8,805
Capacity utilization (%)			**75.59**	**65.97**	**77.77**	**66.33**	**58.70**
Sulphuric Acid (MT)	108,000	99,000	64,560	56,580	77,216	66,044	41,897
Capacity utilization (%)			**65.21**	**57.15**	**78.00**	**66.71**	**42.32**

Particulars	**Financial Performance of TTPL for past 5 years (in Lakhs)**				
	2016-2017	**2017-2018**	**2018-2019**	**2019-2020**	**2020-2021**
Audited	Yes	Yes	No	No	No
Turnover	13,833.20	17,384.69	20,858.54	17,614.30	16,235.93
Profit/loss(PBDT)	504.98	2,378.21	1,262.26	(576.50)	(488.64)
Profit/loss(PBT)	331.65	1,925.50	792.47	(1,150.51)	(950.01)
Profit/loss(PAT)	65.07	1,771.75	596.98	(1,150.51)	(950.01)

3. The Industry

The origin of the TiO2 industry in India dates back to the pre independent days when Travancore Titanium Products Ltd. (TTP) was established in 1946 at Thiruvananthapuram) in Kerala State.

Titanium dioxide is manufactured in two grades, Anatase and Rutile. KMML is the only manufacturer of rutile grade titanium dioxide in India. TTPL manufactures both anatase and rutile. V. V. Minerals in Tuticorine is the only competitor manufacturing Anatase in India.

Titanium dioxide is a white pigment used as a raw material for paint, plastics, rubber, paper, ink etc. It is available in two forms, Anatase and Rutile. TTPL manufactures both Anatase grade and uncoated Rutile. TTPL also manufactures other value added specialty products like Special Grade Anatase, Potassium Titanate and hydrated Titania.

Paint - Anatase TiO2 are recommended especially for interior paints, such as primers, undercoats and fillers as well as for the interior top coats.

Plastics- Anatase TiO2 is used in various kinds of polymers. For example, for PVC, polyethylene, polyamide and other plastics, everywhere when high durability and light fastness of the pigment is not required.

Paper industry- Anatase TiO2 is used for the direct addition to the beater pulp for the all kinds of paper
(with exception of resin bonds laminate papers). The micronized Anatase TiO2 is favoured for the incorporation of paper with the high TiO2 content due to its advantageous particle size distribution.

Rubber industry- Anatase TiO2 is used for the colouring of kinds of rubber products. It is mostly applied because of its high tint reducing power.

Ceramics- Anatase TiO2 is used for the electro ceramics, common kinds of vitreous enamels, ceramic colorants and some other applications.

Manmade fibres- Micronized grades of anatase TiO2 are applied for the delustering of manmade fibres. It is suitable for polyester fibres and for the polyamide ones.

Other industrial use- Anatase TiO2 is used in the protein based and mixed leather finishes, for interior cement based paints, colouring of graphite products as well as for the soap, tooth pastes, cosmetics and other products.

The domestic demand for anatase grade titanium dioxide in India is around 45,000 MT per annum. A major percentage of the titanium dioxide requirements in India are met by imports. The projected demand for anatase by 2024 is around 52,000 MT.

Process

Titanium dioxide is manufactured in TTPL by the Sulphate Process from ilmenite. Ilmenite, which is a mixture of Titanium dioxide and iron oxide, is reacted with sulphuric acid and disintegrated

into ionic state in solution. The titanyl sulphate on hydrolysis gives hydrated titanium dioxide. On calcination at elevated temperature the hydrated titanium dioxide is transformed into crystalline form. Both Anatase and Rutile grades aremanufactured by the same process varying the nucleating agents for crystal formation. The milled pigment is packed in 25kg / 500 Kg HDPE bags for despatch.

4. SWOT Analysis

The following is the Corporate SWOT of TTPL-

4.1 Strengths:

- **Established source of high quality Quilon- Grade Ilmenite**
  Ilmenite is the basic raw material and good quality ilmenite is available from Chavara, processed by IRE Ltd.
- **Captive Sulphuric Acid Plant with captive steam availability.**
  The Company has its own 300 TPD Sulphuric Acid plant, which is the second raw material for titanium dioxide production. The plant produces steam as by product, which is utilized for process in the main plant, thus reducing energy cost.
- **Effluent Treatment Plant with water recovery module**
  Company has already established the Neutralization Plant with Water Recovery Module (WRM). The WRM has a capacity to treat 6 million liters of water per day and the purified effluent is recycled back to the Main Plant.
- **Brand Image**
  The Company has good brand image for the last 75 years in domestic and international markets.
- **Consistency in product quality**
  The process is well established and consistency in product quality is maintained, thus building good customer support.
- **In-house Research & Development**
  TTPL has a well equipped, DSIR approved research facility.

4.2 Weaknesses:

- **Absence of cost effective pollution abatement system and by- product recovery.**
  The effluent treatment for sulphate route plants is highly costly with large consumption of lime and limestone. Being a unique industry, cost effective effluent treatment process through by-product recovery yet to be developed.
- **Management team lagging in team work.**
  Lack of experienced professional management resources and poor team work often results in time lag in implementing corporate strategies.
- **Constraints in pricing policy.**
  Commercial decisions are often scrutinized by audit agencies and hence autonomy in product pricing is lacking. This often results in hesitations in capitalizing market variables.
- **Constraints with respect to capacity to produce product grades suitable for specific end user segments like plastic, paper, textile, etc**
  Product grading as per customer demand is poor and no definite plans are there to produce sector wise products. Capacity constraints forces catering to particular segments for long periods.

- **Supply constraints for Ilmenite**
  Ilmenite scarcity from IRE supply side due to local issues in mining often causes production problems in the Company.
- **Working capital crisis**
  The fluctuating marketing conditions often puts serious strain on working capital requirements.
- **High debt-equity ratio.**
  The Company has an outstanding debt as loan of around Rs.72 crores (including interest) from GoK, while the equity participation of GoK is only Rs.13 crore.
- **Outdated Instruments, Equipment and Procedures.**
  There was no conscious effort to upgrade technology, equipment and procedures for many years now, resulting in outdated manufacturing practices.
- **No Proactive steps to retain a loyal customer base/Inadequate focus on technical service to customers /lack of direct contact with customers.**
  Marketing strategies lack professional approach and often results in inadequate customer support and satisfaction.
- **Constraints in distribution network**
  Company mostly depends on stockists and traders for distributing the products and the control over the distribution network is very poor.
- **No adequate focus on market and market development**
  Professional approach to develop market is still lacking.
- **Widespread adulteration/ counterfeiting in certain markets**
  The existing distribution network lacks proper control over adulteration. Being the top quality products in India, the products are susceptible to adulteration.
- **High-cost structure**
  The cost of raw materials and fuel results in high cost structure. The effluent treatment plant also puts serious strain on the cost structure.
- **Plant is not of economic scale as per current Global Standards**
  Lack of proper effluent treatment system limits achieving economies of scale.
- **The sulphate process technology is not of current Global Standard**
  There is no serious up gradation in technology was carried out in the process so far.

4.3 Opportunities:

- Huge demand supply gap in Domestic Market
- High growth rate expected in domestic and International market
- Proximity to high quality mineral feedstock at Chavara, Kollam.
- Scope for vertical integration. Eg.value added products from process and from effluents
- Emerging demand for Specialty products from Anataseroute like catalyst, cosmetic and renewable energy applications
- Avenue for enhanced exports/imports- emerging Vizhinjam Sea port
- Developing inland & coastal transportation facility for moving raw materials and fuel.

- Technology advancement in Titanium dioxide manufacturing and pollution abatement through sulphate process
- Development of value added production through in-house R& D (hydrated titanium, Potassium Titanate whiskers, Nano Anatase, etc.)
- Access to infrastructure facilities- rail, road, air

4.4 Threats:

- **Increased competitive pressures from low cost domestic/international market**
  Import restrictions on titanium dioxide has been reduced to negligible level and the Company is facing serious market competition from imported and cheap materials from China and other countries.
- **Emergence of low cost substitutes for titanium dioxide (composites).**
  Being a high cost industrial product, consumer industries are often going for substituted products like titanium dioxide composites.
- **Increased environmental awareness.**
  Increased environmental awareness has necessitated huge investments in the pollution control activities. This has put a serious strain on the cost structure. The restrictions are also expected to be more stringent in future.
- **Socio Political Resistance from local public.**
  Social-political issues in the local population has resulted in constraints in the operation of the plant. Environmental incidents, demand for job etc often interrupts the operation of the company.
- **Proximity to Airport as well as situated in a growing populated area.**
  Development of Thiruvananthapuram Airport as an International Airport has now put restrictions in construction of new plants above 15 MSL. No serious capacity enhancements c could now be taken up by the Company on account of the height restrictions on the buildings and stacks of the Company.

4.5 The SWOT Analysis and the Master Plan

Based on the SWOT Analysis a SWOT matrix (TOWS) is prepared to develop strategies in terms of Strengths and Opportunities (SO), Strengths and Threats (ST), Weaknesses and Opportunities (WO) and Weaknesses and Threats (WT) as below.

4.5.1 SWOT Matrix (TOWS)

Strength- Opportunity (SO) Strategies

- Develop value added products like Plaster of Paris, Iron Oxide pigments, Sodium Sulphate etc from the effluent.
- Develop new products like To develop and market value added products like Iron Oxides, Plaster of Paris, Sodium Sulphate, Inorganic Coloures, Pearl Pigment, Catalytic TiO2 and Lithium Titanate etc from Titanium Dioxide.
- Capacity enhancement through up-gradation, modernization and plant optimization

- Exploit brand image and penetrate market with new products
- Develop market with good quality pigments to capitalize ever growing demand.

Strength- Threat (ST) Strategies

- Long term agreements with major raw material suppliers.
- Develop alternate feed stock.
- Cost reduction through capacity utilization, technology enhancement and modernization.
- ETP to be made fully operational so as to meet higher capacity utilization.
- Go for technologies aligned with Pink Zone height restrictions in the area.

Weakness- Opportunity (WO) Strategies

- Reduce cost through capacity utilization and enhancement
- Reduce cost through modernization.
- Diversify for cost reduction.
- Adopt financial restructuring activities like infusing working Capital, convert lease land to own land, convert Government loan to equity, debt restructuring etc.
- Develop alternate strategies for making ETP cost effective.
- Orient training to build effective management team and Trade Unions.

Weakness- Threat (WT) Strategies

- Cost reduction through capacity utilization, enhancement and modernization.
- Develop alternate strategies for making ETP cost effective.
- Scale up plant to most economic scale taking in to consideration of the Pink Zone height restrictions in the area.

4.5.2 Business Goals, Objectives and Strategies

Based on SWOT and TOWS analysis, business goals, objectives and strategies are formulated. This involves three major steps.

1. Work out objectives for each Business Goal.
2. Relate Business Goals with Objectives and Strategy.
3. Finalize the Business Goal of TTPL.

4.5.3 Business Goals

1. Increase Production
2. Increase Sales Turn Over
3. Improve Product Quality
4. Improve Profitability
5. Be the Market Leader in Anatase Grade TiO2 in Indian Market
6. Develop and Market other value added products
7. Improve performance in Social Responsibility.

4.5.4 Objectives

Based on the Goals, the Objectives are worked out as-

Sl No	Goal	Objectives
1	Increase Production	Achieve 10,000 TPA – Year- 1
		Achieve 12,000 TPA- Year- 2
		Achieve 15,000 TPA- Year- 3
		Achieve 18,000 TPA- Year- 4
		Achieve 20,000 TPA- Year- 5
2	Increase Sales Turn Over	Achieve a sales Turnover of Rs.350 Crore (pv) within 5 years
3	Improve Product Quality	Improve brightness in TiO2 by 5% within 5 years
		Improve High Speed dispersion by 5% within 5 years
4	Improve Profitability	Generate a net profit of minimum 5% year.
5	Be the Market Leader in Anatase Grade TiO2 in Indian Market	Achieve above 50% market share in Indian market within 5 years.
6	Develop and Market other value added products	To develop and market value added products like Iron Oxides, Plaster of Paris, Sodium Sulphate, Inorganic Coloures, Pearl Pigment, Catalytic TiO2 and Lithium Titanate within 3 years.
7	Improve performance in Social Responsibility	To improve technology and enhance capacity of Neutralization Plant by 2022.
		To Commission Copperas Recovery Plant in 2021
		To install Air Pollution Control Measures by 2022.
		Increased CSR activities corresponding to profits generated every year.

4.5.5 Strategies

Based on the Goals and Objectives, the Strategies are formulated as-

Sl No	Goal	Strategy
1	Increase Production	Process optimization in TDP by improvements in process.
		De-bottlenecking and augmenting equipment capacities in TDP.
		LNG as new fuel
		Micronizers and hot bag filters for TiO2 milling
		Low energy high output Mills for ilmenite grinding
		Larox Filters for better throughput
		New efficient Clarifiers for black liquor
		Vacuum Evaporation Unit
		Scrubbing System for Stacks
		PLC driven process automation
		Revamping SAP
		De-bottlenecking and augmenting equipment capacities in NP
		Copperas Recovery Plant

2	Increase Sales Turn Over	Market penetration and Market Development
		Restructuring of networking & pricing policies
		Develop market for new value added products
3	Improve Product Quality	Completion of Copperas Recovery Plant
		Micronizers and hot bag filters for TiO2 milling
		Larox Filters for better filtration
		R&D efforts for quality improvements
4	Improve Profitability	Optimize employee cost to 10-15% by scale of economies
		Improve process efficiency by upgrading process and technology
		Cost reduction through fuel and energy conservation measures
		Improved marketing and purchase functions
		Diversification to reduce cost
		Financial Restructuring
		Capcity utilization, enhancement and modernization
5	Be the Market Leader in Anatase Grade TiO2 in Indian Market	Improved Customer Service
		Market penetration in proportion to demand growth.
		Combat adulteration
		Restructuring marketing activities, distribution network, export and procing.
6	Develop and Market other value added products	Installing iron oxide plant with sodium sulphate recovery - 3 years
		Installing Plaster of Paris Plant- 3 years
		Installing plant for value added prodcuts from TiO2- 3 years
7	Improve performance in Social Responsibility	Towards Zero Emission Standards
		Completion of Copperas Recovery Plant- FY 2021-22
		Revamp and capacity enhancement of NP- 2 years
		Stack Emission Control - 2 years
		Green Belt with 5000 trees and other vegetations in the Campus in 5 years
		Rain water Harvesting, internal water resource recycling, process water recycling, condensate recycling
		Social forestry activities- Miyavaki forest, agricultural and fish farms.
		New CSR plans -social and financial supports to local people.

The whole Master Plan is designed based on the Strategies formulated. The same will be analyzed on a micro level and detailed actions plans with time lines and responsibilities will be formulated.

5. Constraints in increasing capacity utilization

5.1 Technology

The capacity utilization is low for the past few years, mainly because of the environmental aspects of the industry. Sulphate route of producing Titanium Dioxide results in huge quantity of effluents carrying sulphuric acid and iron sulphates. The effluent was being directed to the Arabian Sea for many years and eventually this was prohibited by the State Pollution Control Board through acts and regulations.

The company installed and commissioned a Neutralization Plant (NP) in 2018 to neutralize the acid and the iron sulphate in the effluent to white and red gypsum. Due to the technical and process issues in the plant, currently the plant can neutralize the effluent corresponding to 30 TPD of pigment production only. So to increase in capacity utilization the titanium dioxide is possible only with de-bottlenecking and further capacity enhancement of the Effluent Treatment facilities capital infusion.

The NP produces around 150 TPD of both white and red gypsum, which is a huge quantity. The white gypsum produced has only limited applications like cement manufacturing. The transportation cost is a major hindrance. The red gypsum has no viable market now. This has now resulted in to piling up of huge quantity unsold gypsum in the campus and increasing capacity utilization in pigment production results in more production of unsold gypsum.

The Company has now undertaken a number of projects for reducing pollutants and manufacturing marketable products from effluent like Copperas (Iron sulphate hepta hydrate), black-yellow-red iron oxide pigments, sodium sulphate, and Plaster of Paris etc. This will limit generation of unsaleable gypsum.The Company has also undertaken a lot of in-house R&D efforts in to related diversifications and quality improvements. The Plant Technical Services has undertaken several project packages for improving process efficiency and capacity de-bottlenecking to increase capacity utilization.

5.2 Marketing

Over the years, the consumption of Anatase grade pigment is coming down in major application areas like paints, plastics and rubber replaced by coated rutile. The high cost of production including the effluent treatment cost has put a serious strain on the cost structure of the Anatase, resulting in reduced market share in the domestic market. Increased import of cheap material from China is also creating serious problems for the Company in the domestic market.

The demand for titanium dioxide, though moving up steadily, has also shown a cyclic behavior over the past several years. Being an industrial product, the capacity utilization is also linked with the market variables, especially with price. The company sometimes runs huge inventory on finished products.

Commercial decisions are often scrutinized by audit agencies and hence autonomy in product pricing is lacking. This often results in hesitations in capitalizing market variables. A product pricing model approved by the Government as in the case of M/s. Travancore Cochin Chemicals (TCC) can be explored.

5.3 Working Capital

At present the Company is availing working capital loan facility of Rs 6 Crore however the request for working capital loan enhancement & other term loan are not been actively considered by the financial institutions owing to the following reasons

5.4 Audit Status

The statutory audit for the financial year 2017-18 had been completed & the statutory audit for the financial year 2018-19 had been progressing.

5.5 Net worth

The net worth of the company as on 31-03-2021 is negative 38.14 Crore. The interest due on government loans as on the same date is Rs 36.07 Crores which constitutes the major portion of the negative net worth. The Company's request for converting Government loan into equity is pending with the Government, thus if the request in this regard is considered favorably by the Government immediately, the net worth position for the financial year 2018-19 for which audit is progressing will improve and the Company will be able to obtain financial support from the financial institution.

The Company has a leased land of 51.5 acres and has requested the Government to convert the land to company ownership. The Company has also requested for pattayam for another 14.57 acre land held by the Company. These actions will improve financial liquidity of the Company.

6. Assessment

6.1 Technology

The sulphate route of manufacturing itself is an old process. Most of the manufacturers have now moved to Chloride Route for manufacturing titanium dioxide. Brown field expansion to the technology change is not possible since sulphate and chloride processes have no similarity. Green field projects in chloride route require huge capital investment. So the improvements in technology up gradation are at a slow pace in process / equipment improvements and major achievements are kept well-guarded in the industry. To improve the process efficiency and hence the capacity utilization lot of in-house R&D work has to be undertaken.

There was no major technology upgradation in the manufacturing process up to 1980. Some of the milestones achieved in this respect are listed below.

- Upgradation of Sulphuric acid plant technology to DCDA in 1980.
- New DCDA Sulphuric acid plant of 300 MT incorporating technology for air pollution abatement per day in 1996.
- Production of rutile by in-house technology in 2002.
- Introduction of in situ nuclei for quality improvements in
- Commissioning of Neutralization Plant with RO plant – 2018
- Development and marketing of Road Marking Paint - 2020
- In house technology development of new products-2019 - 2020
    - Iron oxide pigments- Pilot stage
    - Lithium Titanate – Lab scale
    - Pearlescent pigments- Lab scale
    - Inorganic colored pigments – Lab scale
- Development of marketable products form solid waste- 2019-2020
    - Solid / hollow bricks from ilmenite sludge
    - Solid bricks using red gypsum
    - Inter-lock tiles using ilmenite sludge
    - Tetra pods and Tetra pots using red gypsum and ilmenite sludge for coastal protection
- Production of Ti-secure brand hand sanitizer and hand scrub- commissioned in 2021
- Copperas Recovery Plant –will be commissioned in 2021

Most of the diversification efforts are aimed at reducing environmental issues in the sulphate process and to reduce the cost of effluent treatment.

6.2 Marketing

6.2.1 Demand, Target Market & Demand Potential

Titanium Dioxide - The demand for Titanium Dioxide in India is about 3 to 3.5 Lakhs metric tons. Domestic production comes about 50,000 MTs per year. India is importing about 2.8 to 3 Lakhs MTs per year.

Anatase grade TiO_2 – Domestic demand is about 40,000 MTs per year and the major share is Chinese imports. Demand for Fiber grade, Food Grade &Pharma grades are catered by imported products. TTPL's share is below 25% during the last year. Ms/. V. V. Titanium Pigments is the domestic competitor for Anatase Grade Titanium Dioxide. Demand of anatase grade is highly depended on price gap with Rutile. In most of the applications Anatase can be replaced by Rutile.

Rutile Grade TiO_2 – About 94% of the total domestic demand is for Rutile grade and KMML is the main domestic manufacturer. Most of the demand is met by imports.
The major customers for Titanium Dioxide are manufacturers of Paint, Plastic, Rubber, Paper, Textile etc… As the user industries are growing at good CAGR the market potential for Titanium Dioxide is also growing at good pace.

Market Potential for Potassium Titanate, Sodium Titanate and other specialty pigments are comparatively low. Sulphuric Acid market is highly volatile and the potential depends on import quantity & price. Import cost varies largely from Rs. 3000/- PMT to Rs. 10,000/- PMT as per the last year data.

Ti-secure products – Outbreak of Covid brought huge potential in Sanitizer market. Flooded with branded and local products, the market has become highly competent. Still we have good potential to grab a good market share in local Sanitizer market. Hand wash & Wash room Cleaner also have increased potential recently.

6.2.2 Market share

Market share of TTPL in domestic Titanium Dioxide market is less than 4%. TTPL's market share of Anatase Grade Titanium Dioxide in India is about 25%. In Indian Titanium Dioxide Market 92-94 % is Rutile grade Titanium Dioxide and approximately 85% of the total Titanium Dioxide consumption in India depends on imports.

Opportunities for increasing Market share

- Improving quality of Titanium Dioxide
- Competitive pricing by improving the capacity utilization.
- Increasing import duty/ taking import control measures like imposing Anti Dumping Duty can substantially increase the market share of TTPL in Domestic market.
- Strengthening the supply chain
- Ensuring regular supply
- Introduction of Coated rutile at competent price.
- Fiber grade TiO_2 production
- The market share of Sulphuric Acid can be increased by entering long term contract with large direct customers in Tamil Nadu region.
- Market share for Ti-secure products can be increased by strengthening the promotion/marketing including digital marketing.

6.2.3 Global Market size, potential & competitiveness

The global titanium dioxide market size was valued at around USD 17 billion and the total global consumption around 7 Million tones. The CAGR is predicted around 4 to 9% by various research organizations. The global capacity utilization is reported as 76.67% in the market study report submitted by M/s. Nandini Consultancy Centre Pvt. Ltd. in 2019. Globally the market share of Anatase is coming down as the usage of rutile is increasing faster and most of the application Anatase can be replaced by rutile. Most of the expansion in capacity is done through chloride route and many sulphate route plants are being shutdown. Production and consumption in Asian region is much faster than the western region mainly driven by Chinese manufacturers. China possesses the lion share of the global Titanium Dioxide Market. Chemours, Cristal, Venetor, Lomon, Kronos and Tronox are the major players in global market.

TTPL's products are exported to many countries around the world. Our products are well accepted by customers around the world and we were regularly exporting to Countries like Japan, US, UAE etc… The major threat for exports is the Chinese low priced Anatase throughout the globe.

6.2.4 Competition from substitutes

Many customers are using product like lithopone, kaolin, etc. as substitute up to certain extend for cost advantage.

6.2.5 Major competitors

Major domestic competitor is M/s. V.V. Titanium Pigments (P) Ltd,Thoothukudi.

TTPL is facing acute competition from Chinese imports, especially at very lower cost many times, even less than our total cost of production. Competition from coated rutile manufacturers/suppliers will be relevant if the price gap with rutile products in the market decreases below 25%.

6.2.6 Competitor's capacity expansion plan

At present we do not have information about any Capacity expansion of domestic competitor. Capacity enhancements are being done mainly in China, especially for production of coated rutile, which may directly affect marketability of Anatase & Rutile grades of TTPL.

6.2.7 Duty Tariff structure & imports

Basic Import duty for Titanium Dioxide is 10% and 2% surcharge - total 10.2%. IGST applicable is 18%. Based on the trade agreements with many countries the duty structure varies and the duty is 3% for the import from Korea, and from countries like Singapore & Malaysia there is nil duty. Import poses the major threat for marketing our products. Import from China at lower prices, even lesser than our production cost make it difficult for TTPL to promote our products. Earlier Anatase grade Titanium

Dioxide was protected up to certain extend through Anti dumping duty (ADD). But after 2015, ADD is not reinstated.

Table-2- Import details Anatase Grade TiO2 in MTs

Name of Country	2020-21
China	18,190.02
Germany	2,487.35
Japan	861.25
Korea	2,993.00
USA	35.00
Total	**24,566.62**

Source: Happily Trade Exim Pvt. Ltd., Delhi

6.2.8 Suggestions to improve price realization

- A product pricing model approved by the Government as in the case of M/s. Travancore Cochin Chemicals (TCC) can be explored.
- Improvements in the quality of the products.
- Introduction of fiber grade, coated rutile/anatase will result in improved price realization.
- Packing of the product to be improved so as to curb the practice of adulteration and counterfeiting upto a great extent.
- The newly developed products viz., iron oxides, lithium titanate, pearl pigment, barium titanate etc. to be promoted.
- Promotion of Ti-secure products to be improved.

6.3 HR Planning

Travancore Titanium Products Limited (TTPL) has already initiated steps towards rationalization with optimal utilization of our resources by conducting Work Study of the Company by a Government agency. We had submitted Work Study Report by HLL Management Academy which was analyzed by the concerned HODs of each department of our Company for its effectiveness and efficacy and was forwarded to Government /RIAB on 18/06/2020 for approval.

By considering the suggestions put forward in the Work Study and through SWOT analysis among the employees of TTPL, the following are the HR Plan for better utilization of manpower:

- **Implementation of ERP** in the HR will leverage the technology to increase efficiencies in tracking and maintaining HR metrics such as Recruitment, Performance Appraisal, Training and Development and Attendance Management System. The time frame for implementation of ERP in HR department is within 30th June 2021 and in Attendance Management Cell is within 30th August 2021.

- **To scrutinize** all Creation/Revival of posts
- **Out Sourcing of jobs** other than core activities will generate huge cost saving. The time frame will be 31st December 2021.
- **To assess the existing manpower** in different sections against the sanctioned strength and to rationalize and redeploy of excess manpower. The time frame will be 31st December 2021.
- **Recommended to identify the skill sets** for each activity of the department and to suggest redesignation/abolition of the existing posts and create a new post. The time frame will be 31st December 2021.
- **Better Resource Utilization**: It helps to focus on the area of core competence and the resource can be utilized more effectively without being diverted with other support activities.
- **Recruitments corresponding to development activities:** The developmental activities envisaged in the Master Plan require further Human Resource supports. The Company had already requested the Government for permission to recruit technically qualified personnel for the operation of the Neutralization Plant and the Copperas Recovery Plant. In addition to this the Company requires around 312 nos of personnel for the upcoming projects by 2023-24.

6.4 Cost structure

The cost structure as *percentage on cost of sales* for the last five financial years is provided below.

Table-3- Cost components as percentage of turnover- Rs. Lakh

	2016-17		2017-18		2018-19		2019-20		2020-21	
Turnover	**13,833.20**		**17,384.69**		**20,858.54**		**17,737.11**		**16,285.58**	
		%		**%**		**%**		**%**		
Raw Materials	3,746.46	**27**	4,708.40	**27**	6,932.45	**33**	6,646.75	**37**	**5,422.19**	33
Power & Fuel	1,710.26	**12**	1,856.65	**11**	2,362.37	**11**	2,321.19	**13**	**2,079.95**	13
Employee Cost	5,018.32	**36**	5,729.47	**33**	5,754.34	**28**	5,901.65	**33**	**5,610.53**	34
All Other Fixed Expenses	2,031.92	**15**	2,068.88	**12**	4,692.33	**22**	2,961.00	**17**	**2,328.29**	14
Interest Charges	725.19	**5**	609.72	**4**	526.25	**3**	501.7	**3**	**537.37**	3
Depreciation	173.34	**1**	452.72	**3**	469.79	**2**	574.01	**3**	**461.36**	3
Avg No of Employees	**701**		**671**		**656**		**630**		**604**	

The annual cost of sales averages in the last five years on Rs. 153 crore.

There is no specific benchmark on cost structure in domestic titanium dioxide industry as it is a specialty chemical and almost a monopoly in domestic production.

6.5 Environment

Discussed under section-7

6.6 Energy

The major energy sources for the production are Electricity, Furnace Oil and Diesel. A solar energy source of 22KWP has also been installed with an average production 60-70KWh. Total share of energy cost over total cost is around 13%. The energy cost has lot of cost saving potentials. An Energy Audit in this connection was conducted during the year 2020. The average energy cost during July2019 to June 2020 was:

Table-4- Average energy cost- Rs. Lakh

Sl No	Particulars	Unit	Quantity	Cost (Average/Unit)	Average Cost (Lakhs Rs)	Cost (%)
1	Electricity	kWh	1,26,96,900	6.5	825.30	38.26
2	Diesel	Litres	8,537	60	5.12	0.24
3	Furnace Oil	K Litres	4,422.827	30	1,326.85	61.51

The energy audit has proposed various Energy Saving projects and are in implementation stage. The annual energy saving after the implementation of the projects is Rs. 1.04 Cr in Electricity and Rs. 2.46 Lakh in Furnace Oil. The details are shown below.

Table-5- Cost components as percentage of turnover- Rs. Lakh

Sl No	Energy Conservation proposal	Annual energy savings	Annual Financial Savings	Investment	Simple payback period	Time frame to implement the proposal in months
1	Replacement of FTL with LED lights (800 Nos.)	60,480	3,78,000.00	2,40,000.00	08	12
2	Replacement of ceiling fans with Energy efficient (50 No)and BLDC(50 No) fans	19,250	1,20,313.00	2,45,000.00	25	2
3	VFD in Cooling pump	45,500	2,84,375.00	1,50,000.00	07	12
4	Install New pump with VFD in KWA water	111440	696500	1,20,000.00	02	12
5	Installation of VFD in screw compressor	47,250	2,95,313.00	1,50,000.00	07	4
6	Replacement of	3,06,000	19,12,500.00	15,00,000.00	10	8

	acid cooling tower pump					
7	Installation of VFD in air compressor no: 6 or 7	67,200	4,20,000.00	3,50,000.00	10	18
8	Provide auto vacuum sensor for the operation of Vacuum pump and modification in vacuum system	2,64,600	16,53,750.00	40,00,000.00	1	12
9	Steam turbine installation in place of PRDS station	7,55,240	4,72,050	15,00,000	37	12
10	Replacement of existing TD steam traps with float types	82,000 litres of FO	2,46,000	30,00,000	12	6
11	**Total Electricity savings**	**16,76,960**	**1,04,81,001.00**	**2,17,55,000**		
12	**Total FO savings**	**82,000**	**2,46,000**	**30,00,000**		

Alternate Energy Sources

TTPL installed 22kW solar power system above the main administration office building on 2010 onwards. 11Kw*2 Numbers of delta make solar investors are fitted. There is 230W solar panels of 92 No: are installed I as 10 rows above the building. Average production rate is 88 kWh. The installed area is 317m2. TTPL had already in KSEB roof solar project. KSEB Officials had visited TTPL campus and made a study and implementation of the project is in process at KSEB.

Co-generation project at acid plant.

TTPL has its own Sulphuric Acid Plant (SAP) for captive consumption for the manufacturing of titanium dioxide. The plant has a design capacity of 300 TPD of 98.5% acid. The normal production achieved is 270 TPD. The plant employs Double Contact Double Absorption (DCDA) process by burning refinery sulphur to produce sulphur dioxide, convert sulphur dioxide to trioxide, absorb the same in dilute sulphuric acid to prepare oleum, and dilute the oleum to product acid.

Burning of sulphur is an exothermic reaction producing 297 kJ/mol of heat. This waste heat is recovered as steam by using waste heat boiler in SAP. The SAP produces around 1.15 MT of super-heated steam at 32 kg/cm^2 and 330^{0}C per MT of sulphuric acid produced. The reduction in pressure through PRDS liberates substantial energy wastage which can be effectively utilized for

power generation through Micro Steam Turbine and Cogeneration. TTPL with the support of Energy Management Centre (EMC) conducted a study to explore the energy recovery potential from the steam generation. EMC has now submitted a preliminary feasibility assessment of Cogeneration attempted by the TTPL-EMC team.

The proposal is to go for a micro steam turbine for Cogeneration to generate a power output of 85 to 125 kW. The excess super heated steam will be utilized for Cogeneration. TTPL expect to produce around 108 kW while the SAP is running at 270 TPD. The approximate investment required for the project is 141 Lakhs (without tax) and the payback period is around 3.5 years.

Change Over from Furnace Oil to LNG

TTPL is currently using furnace oil (FO) as its main fuel for operation of the plant and boilers. Use of FO for industrial purposes is now restricted in India due to its adverse environmental impact. The Environment Bench of the Supreme Court had already ordered a ban on the industrial use of pet coke and furnace oil in the States of Uttar Pradesh, Haryana and Rajasthan on 24-10-2017.On the wake of the expected ban on consumption of FO in industry, TTPL may have to peruse various other fuel alternatives such as LNG for the sustained operation of the plant.

Liquid natural Gas (LNG) is the cleanest fissile fuel available in the world and represents the best alternative for drastic reduction in green house gas emissions. Now that LNG storage and transferring facilities are available at Kochi, this is the best alternative for the fuel requirements of TTPL. A cost- benefit analysis is worked out for the transition of the fuel from FO to LNG and infrastructural facilities to be installed at the factory site for the use of FO in the plant.

6.7 Plant Safety Management

The Company has a Safety & Environment Department headed by an Asst. General Manager directly reporting to the Managing Director. The S&E department has the charge of all PSM activities in the Company and conducts HAZOP studies, Safety Audits, Plant Health Studies and Mock Drills regularly. Behavioural Based Safety (BBS) is one area TTPL has to explore more and implement.

7. Growth – Way forward

Innovation is fundamental to the growth strategy of any organization. TTPL has a well equipped, DSIR approved research facility. Around 25 people are employed in research, Technical service, and QC& pilot plant activities.

Over the years TTPL was facing a major dilemma in terms of its operations on an environmental perspective. The sulphate route process for manufacturing titanium dioxide has a major impact on the environment due to its use of sulphuric acid. The resultant effluent contained large quantities of sulphuric acid and sulphates of iron and other heavy metals. The practice worldwide was to dispose the effluent to the sea, where it gets neutralized by the alkalinity in the sea water. However, over the years stringent restrictions was imposed by various environmental and statutory authorities and the industry was forced to look for alternative solutions for the effluent disposal. Most of the titanium dioxide manufacturers changed the process to chloride route with huge investments; others implemented treated systems, again with huge investments.

TTPL decided to go for a treatment system for complete neutralization of the acidic effluent in 2010. This required huge investments. So the plan was to go for the treatment system in stages. A Neutralization Plant with RO water recovery was constructed and commissioned in 2018 at a cost of around Rs. 40 crore. Another plant, Copperas Recovery Plant for removing iron sulphate at a cost of Rs. 36 crore will be commissioned this year. With this, TTPL hope to achieve zero pollution status. The Kerala Pollution Control Board (KSPCB) bestowed the Company the award for the best pollution control activities in 2019.
The Factory ensures that all norms laid by the Kerala Pollution Control Board were met. The exhaust air quality is maintained within standard limits. The company has installed equipments like scrubbers, electrostatic precipitators; bag air filters etc. to ensure the exhaust air quality. On line stack emission measurements are strictly being done. After all the stringent pollution control efforts made by the company, the KSPCB conferred the consent to operate the plant till 30/06/2023. TTP's motto is 'Reduce, Reuse and Recycle' to leap forward.

The problem with sulphuric acid neutralization is the generation of huge quantities of gypsum. This resulted in another environmental issue as space pollution for storing and disposing the generated gypsum. Hence the Company's efforts are now focused on converting the solid gypsum in to other valuable products for different segments.

Added to this, the decline of the Anatase grade titanium dioxide in major segments like paints and coatings affected the company's turnover and financial stability. To overcome this issues the Company decided to go for related diversification with value added products from Titanium Dioxide.

In the coming years, TTPL will manufacture iron oxides (Red, Black and yellow) and sodium sulphate from the effluent, Plaster of Paris from White Gypsum, Building bricks, interlock tiles and B-Caps (Blocks for Coastal Area Protection) from Red Gypsum. The company will also start

manufacturing value added products like Fibre Grade Titanium Dioxide, Nano titanium dioxide, Road Marking Paints, Pearlescent Pigments and Lithium Titanate (for battery in electrical vehicles) in near future.

The entire expansion plan has its own orientation. The pollution control activities undertaken by the company is having huge capital expenditure and running cost also. So all the expansion plans aim at recovering the cost through value added products and at the same maintaining pollution control norms. This is a new direction compared to the old one in which pollution abatement projects are considered to be a drain on the profits of the organization. So the company could now balance the cost for pollution abatement to the commitment to the environment and society as a whole.

7.1 New products from effluent and solid wastes

The acid and iron sulphates in the effluent is currently being neutralized with lime and lime stone to convert it into white and red gypsums in the neutralization Plant (NP), the treated effluent is further purified in a modern Micro Filtration cum Reverse Osmosis (MFRO) plant which is recycled back to the main plant.

However this generates huge quantity of gypsum which is mostly un-saleable due to the huge logistical costs involved in distribution to prospective customers. This is also a major bottleneck in achieving higher capacity utilization in the titanium dioxide plant. Only Malabar Cements, Cherthalai is currently taking white gypsum from TTPL.

So TTPL proposed a number of projects for making saleable value added products from the effluent and gypsum as below, which is under consideration of the State government of Kerala.

7.1.1 Iron Oxide Pigments(Black, Red and Yellow Oxides)

The effluent carries huge quantity of ferrous sulphate which is converted in to red gypsum which has currently no applications. One proposal is to make black (5 TPD), red (15 TPD) and yellow (7.5 TPD) iron oxide pigments from ferrous sulphate. Iron oxides are inexpensive and durable pigments in paints, coatings and colored concretes. The plant will also produce around 48 TPD of sodium sulphate which has good market potential in paper, glass and detergent and metallurgy sectors.

The current domestic demand for iron oxide pigments is around 47,500 MT per annum. There is a supply gap of around 28,500 MT. sodium sulphate is having a current demand of 2,60,500 MT and the supply gap is around 20,000 MT.

7.1.2 Plaster of Paris (PoP) from white gypsum

PoP can be manufactured from white gypsum after leaching to remove excess iron and drying at around 120 degree Celsius. PoP is mainly used construction industry, Ceramic sector (Sanitary ware, crockery items, refractory) and for surgical bandages/dental/hospitals. It is also a fire retardant.

The current domestic demand for PoP is around 2,23,240MT per annum. Current supply and demand matches in Indian market, however the competition relies mainly upon quality. TTPL can manufacture high quality PoP proposes a project for producing 150 TPD of PoP.

7.2 Diversified products from Titanium Dioxide

The demand for Anatase grade titanium dioxide is declining over the years. The raw material costs are increasing day by day. The additional cost for effluent treatment is also badly affecting the cost structure.

The R&D team of the company has been working on diversified value added products for the last several years and the company is now ready for these niche products, which are mostly being imported in to the country. Manufacturing these products can greatly improve the financial parameters of the company, paving way for sustained development of the Company.

TTPL proposes to manufacture the below Titanium Dioxide derivatives in a single facility with minimum capital investments. The production volumes will be based on customer requirements.

7.2.1 Catalytic Titanium Dioxide

Selective catalytic reduction (SCR) is a means of converting nitrogen oxides, also referred to as NOx with the aid of a catalyst into diatomic nitrogen (N2), and water (H2O). A gaseous reductant, typically anhydrous ammonia, aqueous ammonia or urea, is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst. Carbon dioxide is a reaction product when urea is used as the reductant.SCR catalysts are made from various ceramic materials used as a carrier, such as titanium oxide, and active catalytic components are usually oxides of base metals (such as vanadium, molybdenum and tungsten), zeolites, or various precious metals. Another catalyst based on activated carbon is applicable for the removal of NOx at low temperatures. Each catalyst component has advantages and disadvantages.TiO2-based products are at the core of catalyst technologies for NOx abatement (Selective Catalytic Reduction, SCR) and sulfur recovery (Claus Catalysis).

The R&D team of TTPL has successfully developed high performing SCR catalysts and now proposes commercial production of the same. Currently SCR catalysts are being imported in to the country and there are no domestic manufacturers. This is a high value low volume product.

7.2.2 Colored Inorganic Paints

This project proposes to manufacture colored inorganic pigments like, Pigment Yellow 53, Pigment Green 50, Pigment Brown 34 and Pigment Blue 28. These can be prepared from titanium hydroxide pulp with inorganic colorants and calcining at around 900 degree Celsius. Inorganic pigments are specialty pigments for paint and coating applications.

7.2.3 Lithium Titanate

Lithium Titanate forms part of the emerging technology of electric vehicles. Lithium titanate is the anode component of the fast recharging lithium titanate battery. Currently Lithium

Iron batteries are in vogue, but Lithium Titanate batteries offer a revolutionary change in the behavior of the cells.

Lithium titanate replaces the graphite in the anode of a typical lithium-ion battery and thematerial forms into a spinel structure. The cathode can be lithium manganese oxide or NMC Lithium titanate has nominal cell voltage of 2.40V, can be fast charged and delivers a high discharge current ten times the rated capacity. The anode of the lithium titanate battery is covered with lithium titanate nano crystals, that are chemically enhanced in order to provide a larger surface area (100 m2 per gram compared to the 3m2 per gram for carbon). This allows greater charge and discharge rates and an increase in energy storage.

The advanced nanotechnology consisting of lithium-titanate nano crystals and their increased surface area are especially designed to enhance the lifetime of these batteries. With an over 30 times larger surface area, this technology is able to recharge substantially faster than its more traditional alternative, the Li-Ion battery. The cycle count of a Lithium Titanate battery is 20,000 in comparison of only 2000 in a regular lithium battery, marking a revolutionary approach to energy storage.

TTPL has successfully developed lithium titanate nano crystals with high surface area and tested in VSSC for electric cell development. The material also passed the test of Central Electrochemical Research Institute (CECRI), Chennai. VSSC has tested this material and successfully developed high performing Lithium Titanate(LTO) cells suitable for electric vehicles especially of high load capacity.

7.2.4 Pearlescent Titanium dioxide

Pearlescent pigment is one type of effect pigments that has some unique optical properties.The most important base material for pearlescent pigments is the natural mineral mica.

Transparent to semi transparent effect pigments based on mica platelets are coated with a micro millimeter thick layer of highly refractive metal oxide (e.g. titanium dioxide, ferrous oxide or iron titanate) and are formed using the thin layer substrate principle. Commercially, widely used substrate is natural mica.

Pearlescent pigment deliver superior whiteness, brilliance and coverage with extraordinary optical effects ranging from a fine-grained luster to a bold silvery white sparkle. In the application medium, they may have a pearlescent iridescent luster. By selecting the right metal oxide and therefore the right refractive index for the visually highly refractive coat as well as the thickness of the coat (coats are normally from 50 to 500nm thick),-various types of coloured interference phenomena combined with gloss effects can be created.

Beside plastics, paints, pearlescent pigments are used in textile printing, paper coatings and cosmetic applications.

The current domestic demand for Pearl Pigments is around 2330 MT per annum. There is a supply gap of around 1285 MT.

7.3 Financial Analysis for the new projects

The Company has already submitted the Detailed Project Report before the State Government of Kerala for approval and administrative sanction. The Government has already allotted Rs.1000 Lakh in the budget 2020-21 for preliminary works.

Table-6- Details of the New Project

Sl No	Project	Capital Outlay	Products	Remarks
1	**Project-1** Iron oxide from waste effluent 1. Black iron oxide – 5 TPD 2. Red iron oxide – 15 TPD 3. Yellow iron oxide – 7.5 TPD 4. Sodium Sulphate- 47.8 TPD (bye-product)	Rs. 120.79 Crore	Red, Black and yellow iron oxides	Conversion of pollutants in to value added products
2	**Project-2** Plaster of Paris from Gypsum- 130 TPD	Rs. 52.74 Crore	Plaster of Paris	Value addition to Gypsum, which is in a more marketable form.
3	**Project-3** Specialty Chemicals 1. Catalytic GradeTiO2- 10 TPD 2. Colored pigment – 1.75 TPD 3. Lithium Titanate- 1.75 TPD 4. Pearl TiO2 – 70 TPD	Rs. 49.42 Crore	Catalytic TiO2, Colored pigments, Lithium Titanate, Pearl TiO2	Value addition to existing TiO2 for better margin.
		Rs. 222.95 Crore		

The salient financial indicators are provided below.

- Land requirement : 13 acre
- Proposed duration of the project : 36 months
- Total cost of the project : Rs. 22,295.04 Lakh
- Sources of fund
    - Equity GOK : Rs. 5,573.84 Lakh
    - Term loan from FI : Rs. 16,721.20 Lakh

7.4 Land for the Project

Land availability near to the existing plant is a must for the financial viability of the project. The Company has already taken up discussions with Directorate of Industries and Commerce (DIC) for making available of 13 acres of land in the nearby Kochuveli Industrial Estate. If suitable land is not available, the Company has to depend on existing premises for the new plants, after verifying MOEF and Coastal Zone stipulations and restrictions.

Other Development Projects-2021-24

7.4.1 Other products from solid wastes

In the coming years, TTPL will manufacture building bricks, interlock tiles, Tetra pods and Tetra pots from Red Gypsum and spent ilmenite sludge. TTPL has already established facilities for manufacturing building bricks, and interlock tiles.

In view of the serious erosion of the coastal regions of Kerala, TTPL has successfully developed Tetra pods and Tetra pots from Red Gypsum and spent ilmenite sludge which will replace scarce and costly sand by minimum 30%. The proposal is under government consideration.

7.4.2 Revamping of the Titanium Dioxide Plant

The Titanium dioxide plant buildings and the machineries have become obsolete through the long years. Not much revamping has been done during this period. The usual life of a chemical plant is 25 years and the plant has survived 74 years without much re-vamping. The plant health study conducted this year has clearly indicated necessity for strengthening the civil and structural installations in the Company. The Company is planning for a serious re-vamping of its civil and structural installations and major equipments and requested the government to include fund support of Rs. 10 core for the re-vamping work in the 2021-22 budget.

7.4.3 Development of Rutile grade for scouring in oxidation lines

The Chloride route in KMML uses silica sand for scouring the deposited titanium dioxide particles in the oxidation lines. TTPL with the help of KMML has now developed hardened rutile grade titanium dioxide as the scouring medium to replace silica sand, which can improve the throughput. This will also reduce the energy for separating the spent silica sand from the titanium dioxide particles.

The trials show promising results, and if successful commercially, the requirement will be around 600 MT of hardened rutile from TTPL. There will not be any additional capital investments other than improved milling system, which can cost around Rs. 3 crore. The capacity utilization will also improve to a great extent.

8. The 5 year Master Plan

8.1 The Corporate Goals

The following corporate goals are identified through detailed discussions:

8.1.1 Capacity enhancement

1. Achieve 80% capacity utilization (on 15000TPA) within 1year
2. Achieve 100% capacity utilization (on 15000TPA) within 2 years
3. Achieve 18,000 TPA within 3 years
4. Achieve 20,000 TPA within 4 years

8.1.2 Increase Sales Turn Over

Increase sales turn over to Rs. 350 crores (PV) within 5 years

8.1.3 Improve Product Quality

1. Improve brightness in Titanium dioxide by 5% within 5 year.
2. Improve High Speed Dispersion by 5%within 5 year.

8.1.4 Improve Profitability

To generate a net profit of minimum 5% per year

8.1.5 Be the Market Leader in Anatase Grade TiO_2 in Indian Market

Achieve above 50% market share in Domestic Market within 5 years.

8.1.6 Develop and Market other Value added Products

1. Copperas (Ferrous Hydrate Heptahydrate) from titanium dioxide stream- 3 months
2. Inorganic Pigments, Pearlescent Pigments, Lithium Titanate and catalytic TiO2 from titanium dioxide stream- 3 years
3. Iron oxide and sodium sulphate from effluent- 3 years
4. Plaster of Paris from white gypsum- 3 years.

8.2 Production Plan

Table-7- Production Plan of the Company for the next 5 years (Tonnes per Annum-TPA)

PRODUCTS	Year- 1	Year- 2	Year- 3	Year- 4	Year- 5
Titanium Dioxide	10,000	12,000	15,000	18,000	20,000
Sulphuric Acid	25,000	25,000	25,000	25,000	25,000
Copperas	12,000	30,000	37,000	45,000	50,000
Black Iron Oxide				810	1,296
Red Iron Oxide				2,430	3,888
Yellow Iron Oxide				1,215	1,944
Sodium Sulphte				7,743	12,389
Plaster of Paris				21,060	33,696
Inorganic Pigments				283	453
Pearlescent Pigments				11,340	18,144
Catalytic TiO2				1,620	2,592
Lithium Titanate				283	453

8.3 Master Plan- Year- 1

In the current Financial Year (FY 2021-22), the Company could achieve only 17.29% of the capacity (existing 10000 TPA) in 5 months due to a Furnace Oil spillage incident and the resultant local unrest. The Company could resume production in normal capacity only in September 2021. The Company will complete the Copperas Recovery Plant this financial year itself. The implementation of the Master Plan will start from FY 2022-23 as the first year after finalization, approvals and detailed project analysis.

In order to achieve a production level of 10,000 TPA, the Company has to undertake the following activities in Year-1. This includes dust and emission controls in various stacks of the Titanium Dioxide Plant (TDP), Change over from Furnace Oil to LNG as fuel, Commissioning of new Vacuum Evaporation Plant, and modernization in Sulphuric Acid Plant (SAP). De-bottlenecking of Neutralization Plant to enable 12000 TPA production in TDP will be carried out. Copperas Recovery Plant will be commissioned and the Red Gypsum generation will be reduced. Pilot stage production of the iron oxide will be carried out.

The preliminary activities of the upcoming new projects will be carried out in Year-1.

Table-8- Master Plan Investment- Year-1 (Rs. Lakh)

Sl No	Activity	Goal	Investment
A	**TITANIUM DIOXIDE PLANT**		
	Drain, Sump and Recycling	Cost Reduction	30.00
		Improve Production	
	Stack scrubbers	Social Responsibility	150.00
	LNG Conversion Project	Social Responsibility	400.00
		Product Quality	
	Vacuum Evaporation	Improve Production	400.00
	Sub-Total		***980.00***
B	**SULPHURIC ACID PLANT**		
	New Cooling Tower	Improve production	55.00
	New Acid Product Tank		85.00
	Sub-Total		***140.00***
C	**NEUTRALIZATION PLANT**		
	Pre-treatment facilities	Improve Production	100.00
	Drain , Sump and Recycling	Social Responsibility	98.00
	Additional Filter		85.00
	Spare Flash Mixer		85.00
	Sub-Total		368.00

D	**COPPERAS RECOVERY PLANT**		
	Material handling	Improve Production	200.00
	Sub-Total		***200.00***
E	**NEW PROJECTS**		
	Land Development	Waste Reduction	601.25
	Industrial Building	Social Responsibility	1,887.75
	Plant & Machinery	Sustainability	4,813.42
	Electrical Installations	Value Added Products	647.05
	Instrumentation with PLC	Improve Profitability	94.36
	Lab Equipments		28.64
	Electronic Equipments		20.82
	Office Equipments		24.87
	Furnitutre & Fittings		23.13
	Preliminary & Pre-operative Expenses		161.88
	Sub-Total		***8,303.17***
F	**GRAND TOTAL**		**9,991.17**

**There will be an additional cost of Rs.6,500 Lakh, if land from outside is bought for the new projects.*

8.4 Master Plan- Year-2

The following activities are planned Year-2.

The dust and emission controls in various stacks of the TDP will be completed and change over from Furnace Oil to LNG as fuel will be commissioned. Other activities include modernization of SAP, capacity enhancement of NPand improvements in CRP. Tenders will be floated and Work Orders will be issued for Civil & Structural. Mechanical, Electrical, and Instrumentation packages in the new project. Construction of the three plants will also be started in this year.

Table-9- Master Plan Investment- Year-2 (Rs. Lakh)

Sl No	Activity	Goal	Investment
A	**TITANIUM DIOXIDE PLANT**		
	Stack scrubbers	*Social Responsibility*	150
	LNG Conversion Project	*Product Quality*	400
	Sub-Total		***550***
B	**SULPHURIC ACID PLANT**		
	Acid Lines- 316 L	*Sustainability*	100
	Sub-Total		***100***
C	**NEUTRALIZATION PLANT**		
	Additional filtration	*Improve Production*	1,000.00
	Raw Material Handling	*Social Responsibility*	500
	Gypsum Handling		500
	Sub-Total		***2,000.00***
E	**NEW PROJECTS**		
	Land Development	*Waste Reduction*	698.75
	Industrial Building	*Social Responsibility*	2193.88
	Plant & Machinery	*Sustainability*	5593.95
	Electrical Installations	*Value Added Products*	751.97
	Instrumentation with PLC	*Improve Profitability*	109.66
	Lab Equipments		33.29
	Electronic Equipments		24.21
	Office Equipments		28.91
	Furnitutre & Fittings		26.89
	Preliminary & Pre-operative Expenses		188.13
	Sub-Total		***9,649.64***
F	**GRAND TOTAL**		**12,299.64**

8.5 Master Plan- Year-3

Capacity enhancement has to be carried out in TDP in FY 2023-24 to achieve 18,000 TPA production level. New reaction vessels are to be incorporated in production stream to increase input. The old type milling system and filtration systems are to be changed to high-capacity low energy systems like Micronizers and Pressure Filtration systems. Corresponding to the capacity enhancement, additional capacity in NP has also to be bult in. Most of the packages in the new project will be completed in Year-3.

Table-10- Master Plan Investment- Year-3 (Rs. Lakh)

Sl No	Activity	Goals	Investment
A	**TITANIUM DIOXIDE PLANT**		
	New Digesters	*Increased production/ Profitability*	1,000.00
	Micronizers	*Market Leadership*	1,000.00
	Larox Filtration		2,500.00
	Sub-Total		***4,500.00***
B	**NEUTRALIZATION PLANT**		
	Additional filtration	*Sustainability*	1,000.00
	Additional Treatment System	*Improved Production*	500
	MFRO up-gradation		1,500.00
	Sub-Total		***3,000.00***
C	**NEW PROJECTS**		
	Interest During Construction		4,342.43
	Sub-Total		***4,342.43***
D	**GRAND TOTAL**		**11,842.43**

8.6 Master Plan- Year-4

Capacity enhancement of TDP will be completed for production levels of 20,000 TPA. This will support the manufacture of Titanium Dioxide derivatives (Plant-3) in the new project. All the three plants, Plant-1 (Iron Oxide & Sodium Sulphate), Plant-2 (Plaster Of Paris) and Plant-3 (Titanium derivatives) will be commissioned in Year-4.

Table-11- Master Plan Investment- Year-4 (Rs. Lakh)

Sl No	Activity		Investment
A	**TITANIUM DIOXIDE PLANT**		
	New Black Mills	*Increased production/ Profitability Market Leadership*	1,000.00
	Clarifiers		500.00
	Larox Filters		2,500.00
	Sub-Total		**4,000.00**
C	**GRAND TOTAL**		**4,000.00**

8.7 Master Plan- Year-5

All the investments for production of 20,000 TPA of titanium dioxide and the diversified products will be completed in Year-5. The new plant for diversified products will be run at 50% capacity and will be streamlined for troubleshooting in the Year-5. No additional investments are expected in Year-5 for these projects.

8.8 Investments required

The expected investments over a five year period is –

Table-12- 5 year Master Plan Investment (Rs. Crore)

	Year-1	Year-2	Year-3	Year-4	TOTAL
Titanium Dioxide Plant	**980.00**	**550.00**	**4,500.00**	**4,000.00**	**6,030.00**
Sulphuric Acid Plant	**140.00**				**140.00**
Neutralization Plant	**368.00**	**2,000.00**	**3,000.00**		**5,368.00**
Copperas Recovery Plant	**200.00**				**200.00**
New Projects	**8,303.17**	**9,649.64**	**4,342.43**		**22,295.24**
Grand Total	**9,991.17**	**2,199.64**	**11,842.43**	**4,000.00**	**34,033.24**

**There will be an additional cost of Rs.6,500 Lakh, if land from outside is bought for the new projects.*

** The Working Capital Margin of Rs. 1559.32 Lakh for the new plants in the fourth year will be considered extra.*

8.9 Sources of Funds

- The investment required for capacity de-bottle necking to enhancement up to 20,000 TPA level needs an investment of around Rs.6,030 Lakh in four years. The Company expects budget support from the Government as above.
- The modernization of SAP at an investment of Rs.140 Lakh will be carried out by the Company from its own reserves.
- NP requires a capital infusion of Rs. 53.68 crore in three years, for which the company expects budget support from the Government as above.
- CRP will be commissioned in FY 2021-22 itself and requires an additional investment of Rs. 200 Lakh, for which the company expects budget support from the Government as above.
- The new projects need a capital investment of Rs.222.95 crore in three years including Interest during construction (IDC).The fund sourcing is planned as below:
    - Equity- Government of Kerala- 25%- Rs.55.74 crore
    - Term loan from FIs- 75%- Rs. 167.21 crore
- The Company has already undertaken discussions with Banks like State Bank of India and Union Bank of India and they have agreed in principle to finance the new projects. In order to facilitate the term loans, the Company will have to convert the outstanding term loans from the Government to Equity, to make the net worth bankable. The Company has already taken up the matter with the Government.

9. Request before the Government

9.1 Administrative Sanction for the New Projects with fund support of Rs. 55.74 crore.

The Company has already submitted the Detailed Project Report (DPR) with financial viability study to the Government for administrative sanction. The Government was kind enough to allocate Rs.10 crore in the budget of FY 2021-22 for preliminary activities.

The Company urgently requires Administrative Sanction and fund support to the tune of Rs.55.74 crore for commencing the project. Without the new projects, company cannot sustain its operations or enhance the production capacity, due to various environmental issues.

9.2 Fund support for capacity enhancements in TDP and NP of Rs.114 crore.

For the sustained growth of the Company, we require capital infusion to the tune of Rs.114 crore in 4 years. This is to augment the capacity of the effluent treatment plant and for capacity enhancement of TDP.

The Company expects a fund support of Rs. 114 crore from the Government in 4 years as above.

9.3 13 acres of land near by the company for the new projects.

The Company needs 13 acres of land nearby by the existing facilities, since all the raw materials are sourced from the existing facility and the cost of transport is a crucial factor for the viability of the project.

If such land is not available, the Company may have to explore using the existing premises for the new projects. The Company requests the Government for kind intervention with statutory bodies like LSGD, Factories & Boliers, MOEF, and KSPCB for getting permission to establish the facilities inside the campus.

9.4 Administrative Sanction and fund support of Rs. 2 crore.

The Company has already requested for Administrative Sanction for the cost escalation in the CRP project and expects an additional fund support of Rs. 2 crore in the FY 2021-22.

9.5 Conversion of outstanding loan amount of Rs.72 crore to equity to improve asset value.

In order to be eligible for availing the loans, the implementation of financial restructuring is inevitable, so that the Company will become acceptable to the Bankers for financing of Capital Projects. At present we are unable to avail bank loan on account of the present negative net worth.

Realizing this situation and upon exploring the possibility of mobilizing funds from banks, we proposing capital restructuring by converting outstanding loans into equity and conversion of lease land in to own land whereby negative net worth can be nullified.

The Government may kindly convert outstanding loans in to equity, thereby improving the net worth of the Company for mobilizing funds from financial institutions for the new projects.

9.6 Conversion of 51.5 acre lease land to company ownership and pattayam for 14.57 acre land to improve financial liquidity.

The Lease land held by the Company may be converted to freehold and title deeds issued in the name of the TTPL, so that the Asset position of the company will be enhanced. Thus the net worth of the company will be improved. Through this measure Company will be able to avail loan from Financial Institutions for funding the TTPL modernization Projects.

9.7 Release of Rs.14.6 crore plus applicable interest to come out of EPCG commitments(as approved by GO(Ms) No- 67/2011/ID dated 01-03-2011.

Government of Kerala vide order No.G.O (Ms) No.67/2011/ID dated 01/03/2011, approved TTPL's revised proposal to implement Neutralization Plant and Copperas Recovery Plant and to abandon the Acid Recovery Plant (ARP). Since the ARP is abandoned, to support TTPL, the said order also accorded sanction of an amount of Rs. 14.63 crores plus applicable interest at the rate of 15% from the date of import of equipments and penalty therein to meet the import duty commitments against equipments imported for ARP.

Government may kindly allot necessary funds to TTPL for remitting to Central Excise against import duty, as per the above order for enabling the Company to get out of the EPCG commitments.

It is also requested that the State Government may take up the issue of the EPCG to the Central Government to avail any concession in the amount or waiver of the penalty.

9.8 Absorption of skilled and experienced man power

A major problem faced by the company is the lack of skilled and experienced managerial, administrative and technical staff for the operation of the Company. This is a prime requirement to implement the Master Plan successfully and has to be undertaken on a fast track.

A separate Recruitment Board for PSUs is a good initiative by the Government.

9.9 Fast track approvals for projects

Obtaining project approvals, administrative sanctions and fund supports are often a long drawn process. In all projects, time is the essence and delays in approvals and funding can adversely affect the financial viability of the projects.

It is requested that a separate single window framework to be installed to tackle such issues.

9.10 Common R&D and Project Management Facilities

PSUs especially those in Chemical Sector are investing money and human resources in R&D and technical improvements, which are often with similar goals and objectives. A good synergy can be developed and focused with cost reduction by formulating a common R&D facility for such endeavors.

Lot of capital intensive projects are being taken up by the PSUs in manufacturing area. The project requires Engineering and Project Management Consultants for preparing Project Concepts, Basic Engineering, Detailed Engineering, Financial Evaluations, Project management etc for which the cost is around 10 to 15% of the total project cost. A common Technical & Project Management facility under the State Government with adequate, skilled and experienced managers and technical experts can greatly reduce the overall project cost.