46th Leather Research Industry Get - Together (LERIG)

PREPRINTS

A COMPENDIUM OF LERIG 2012

PROCEEDINGS AND PRESENTATIONS

CSIR-CENTRAL LEATHER RESEARCH INSTITUTE

28 January 2012

Fostering LERIG 2012

The Leather Sector has been set an ambitious projected target of USD 14 billion to be achieved by 2016-17, growing at a CAGR of 24.03% (by 12th Five Year Plan) …

Shri M Rafeeque Ahmed, Chairman, Council for Leather Exports *at the India Leather Summit 2011*

LERIG 2012 will enable the Indian Leather Industry prepare for the future challenges in terms of Technology preparedness, growth, competitiveness and increased share in the global trade in the Twelfth Plan period.

Prof Dr AB Mandal, Director, CSIR-CLRI

"The industry was not untouched by global economic slowdown, and suffered negative growth of -5.51% during 2009-10, for the first time since 2001-02. Thus, the export from the industry was affected in the two year period from the second half of 2008-09 due to reasons beyond our control. However, with the resilience of the industry members and active support of the Government of India, the Industry was able to circumvent all the impediments and we are again on the growth path, with exports crossing the target of US $ 3.75 billion during 2010-11, showing a positive growth of 10.26%.

We in the Industry are fully aware that though we are back on track, but speed is not in consonance with the immense potential the industry has. Yes, the industry has serious constraints like

- the continuing crisis in the Euro Zone
- shortage of essential raw materials besides steep hike in prices,
- shortage of skilled workforce,
- infrastructure development
- technology and environment management
- design innovation
- market diversification

We are also aware that the Government is fully seized of all these problems and is doing everything possible to address these quickly. I assure you on behalf of the Industry if these impediments are taken care of, we as an Industry would definitely grow at about 24% per annum to achieve the export target of US $ 14 billion by the end of the twelfth plan period."

CSIR-CLRI for technology preparedness in the 12th plan

CSIR-CLRI is a part of the Chemical Cluster of the CSIR. For the 12th plan period, CSIR-CLRI has set for itself a goal to provide the necessary technology package for the leather industry to reach its target of US$ 14 billion trade by 2017. For this CSIR-CLRI will undertake four technology oriented programs, viz., S&T Revolution in Leather with a Green Touch (STRAIT), Zero Emission Research Initiative for Solid Wastes (ZERIS), Research Initiative for Waterless Tanning (RIWT) and CSIR 800 programs.

All these programs were developed after continuous dialogues with the leather industry over the last one year. These programs are in tune with the CSIR Vision 2022- "Pursue science which strives for global impact, technology that enables innovation-driven industry and nurture trans disciplinary leadership thereby catalysing inclusive economic development for the people of India"

CSIR-CLRI in association with Council for Leather Exports supported by the various Leather and Leather Products Trade Bodies and Associations, its CSIR Network Partners,Institutions and Universities for Leather and in co-operation with the Indian Leather Industry will deliberate on the issues to be addressed to evolve a stragetic Industry-Institution network for planning forward in the Twelfth Plan period.

The 46th Leather Research Industry Get-together (LERIG) at CSIR-CLRI from 27th to 29th January 2012 will enable the Indian Leather Industry prepare for the future challenges in terms of Technology preparedness, growth, competitiveness and increased share in the global trade in the Twelfth Plan period.

Through Sessions on:

• Leather Technology and Environment
• Leather Creativity & Design Innovation
• HRD for Change and Innovation

We hope that as part of LERIG 2012, a comprehensive strategy will be evolved for making a road map delineating the path to be traversed by the Institutions during the Twelfth Plan period and achieve the ambitious targets set.

We cordially invite you to foster LERIG 2012, offer your valuable insights and impressions of the path that the Leather Industry needs to traverse during the 12th

Five year Plan period and inspire the members of the Indian leather Fraternity. Let us together make LERIG 2012 and LEATHER WEEK 2012 fruitful and meaningful to the Sector.

Padmashri M. Rafeeque Ahmed
Chairman, Council for Leather Exports

Prof Dr A B Mandal
Director, CSIR-CLRI

From the Editors

Every year, for a three day period starting 27th January, researchers, industry leaders, technical experts and Institutional personnel, deliberate and develop strategies for research, policy planning, marketing and manpower preparedness to meet the needs of the leather industry in India. This meeting, the Leather Research Industry Get-together (LERIG), held at CSIR-CLRI has always had a direct role to play in the performance of the Leather sector.

It is with this background that the 46th edition of this annual conference – Leather Research Industry Get-together is being held. With India ready to enter into its 12th five year plan period, LERIG 2012, provides the forum for discussion on the goals of the leather industry, its technology and manpower requirements, and the targets for the research and academy to meet the needs of the industry.

To be inaugurated by His Excellency, the Governor of Tamil Nadu Dr K Rosaiah on 28 January 2012, technical deliberations will commence with a session on "Leather Technology and Environment." This session would deliberate on the technologies developed to meet the current needs, the techno-economic driving forces needed for prompting cleaner processing, thus leading to sustainable leather production in the country. Session II on 28 January 2012 afternoon, will feature Practical Demonstrations from academy, research and industry, thus providing to the participants an insight into technologies available for adoption in the 12th plan period.

Innovation for high end leather processing, creativity in patterns and designs for leather products and innovative knowledge on human resource management play a major role to impact the prospect of the industry and its trade share in global market. Valuable insights would be offered to the path that the leather industry needs to traverse during the 12th five year plan period. This would be the focus of deliberations during Session III on "Leather Creativity and Design Innovation" and Session IV on "HRD for Change and Innovation" on 29 January 2012 i.e. day 2 of LERIG 2012 .

LERIG 2012 concludes in the afternoon of 29 January 2012 with a consolidated overview presented by industry and research, thus leading to a framework document on 12th Plan for the Indian Leather sector.

PREPRINTS: the LERIG 2012 Compendium of Proceedings and Presentations is a valuable compilation of all the Expert talk, Invited Lectures and Technical Presentations to be delivered at LERIG 2012. This would be an important document to preserve as it is a veritable 'treasure trove of information' and we hope that it becomes a reference document vis-à-vis the 12th Plan pathway for the Indian leather Industry to tread.

This 'magnum opus' would not have been possible without the active co-operation from all the speakers participating in LERIG 2012. Their ready support in sending us their presentations and talking points helped us put together this 'tome' of almost epic proportions. We THANK all of them wholeheartedly.

In executing a task of such gargantuan proportions, it is well nigh impossible to make it error free. WE have tried our best to be 'perfect' and have put in our best efforts to incorporate all the suggestions from the Industry and have drawn extensively by the inputs provided.

Before we present to you, our PREPRINTS, we seek pardon for any errors or omissions which is totally inadvertent. We would particularly like to acknowledge the Sponsorship support we have received from M/s T Abdul Wahid Tanneries and M/s VANITEC, whom we could not include in our Publicity Materials and in the Wrapper of this Compendium.

Each and Every Contribution from the Industry is 'Greatly Valued' by us and graciously acknowledged.

We THANK the Director and Management of CSIR-CLRI, The Patrons, Co-Convenors, Secretariat Task Force Members, LERIG Committee Members and all Colleagues of CSIR-CLRI for having bestowed on us this onerous responsibility, which we hope we have discharged to the satisfaction of all.

In particular, we THANK the members of the "Compendium Committee" led by or respected Director, Prof Dr AB Mandal and comprising Shri D Chandramouli, Dr BN Das and Dr KJ Sreeram.

Our Task Force Secretariat, so ably led by Shri K Dayalan and Shri D Suresh Kumar and their Team have contributed immensely towards making this Compendium a reality and we express our sincere THANKS to them.

All at CSIR-CLRI have been working diligently to give LERIG 2012 a meaning and a purpose which we hope would be beneficial to all members of the Indian Leather Fraternity.

It is our proud privilege to invite you to LERIG 2012 on behalf of the Prof Dr AB Mandal, Director, CSIR-CLRI & Padmashri M Rafeeque Ahmed, Chairman, CLE and to request you to please join us in making this endeavour fruitful and a truly landmark event.

The 46th LERIG would be an experience to savour.

"It may kindly be noted that THIS DOCUMENT AS NOT BEEN FORMALLY EDITED".

Shri Md. SADIQ and Shri GAUTHAM. G
Editors

CONTENTS

LERIG 2012 : PROGRAMME

Friday, 27 January 2012, B M Das Hall

2.45 pm – 3.30 pm	Press Meet

Friday, 27 January 2012, Triple Helix Auditorium

***Chairman*: Dr G Thyagarajan**, Former Director, CSIR/CLRI
***Co-Chair*: Shri SK Bhadra**, Consultant
***Presiding*: Prof. Dr A B Mandal**, Director, CSIR-CLRI

4.00 pm – 4.45 pm	**Prof B M Das Memorial Lecture** by **Professor Dr. Dietrich Kebschull**, Chairman, IGEP Foundation, Gurgaon
4.45 pm – 5.30 pm	**Prof Y Nayudamma Memorial Lecture** by **Dr Baldev Raj**, President, INAE

Tea: 5.30 pm

Prof. Dr A B Mandal, Director & Staff of
CSIR-Central Leather Research Institute

in association with

All Synergy partners & Stakeholders

cordially invite you to the Inaugural Function of

46th LEATHER RESEARCH-INDUSTRY GET-TOGETHER (LERIG) 2012

Dr K ROSAIAH

His Excellency The Governor of Tamil Nadu

has kindly consented to be the Chief Guest and inaugurate LERIG - 2012

on Saturday, 28th January 2012 at 10.30 am at the Triple Helix Auditorium, CSIR-CLRI, Chennai.

Dr K V Raghavan
Chairman, Research Council, CSIR-CLRI
will preside

Shri M Mohamed Hashim
Doyen of the
Indian Leather Industry

Shri M Rafeeque Ahmed
Chairman,
Council for Leather Exports

Dr G Thyagarajan
Former Director,
CSIR/CLRI

Dr Mebrahtu Meles
Program Director,
ECBP, Ethiopia

Shri P R Aqeel Ahmed
Regional Chairman (SR), CLE

Shri Rajeev Lakhara
Managing Director, FDDI

Dr S Devadoss
Director, NIFT, Chennai

will be the Guests of Honour

LERIG 2012: Session I on "Leather Technology & Environment"

Session sponsored by: Clariant Chemicals (India) Ltd.

Saturday, 28 January 2012, Triple Helix Auditorium; 12 Noon to 2.00 pm

Time	Topic	Speaker
12 Noon – 12.15 pm	**Lead Lecture**	**Shri A Sahasranaman**, Vice Chairman, CEMCOT
12.15 pm – 12.45 pm	**Expert Talk**	**Shri CV Sankar**, Chairman, TNPCB
		Shri M Mohamed Hashim, Chairman, KH Group
		Shri O K Kaul, Executive Director, TATA international
		Shri T Rafeeq Ahmed, Chairman, TAW Group
		Shri PM Yousuff, Managing Director, HIJAZ Leathers
		Shri R.Kumaresan, Head-Leather Business, Clariant Chemicals
12.45 pm – 01.00 pm	**Zero Liquid Discharge technology – Alternative Options**	**Dr NK Chandrababu**, Chief Scientist & Head, CSIR-CLRI Leather Process Division
01.00 pm – 1.15 pm	**Salt free, zero emission chrome tanning technology**	**Dr C Muralidharan**, Senior Principal Scientist & Head, CSIR-CLRI EXCEL Laboratory **Shri Sayeed Ahmed Pakkar**, Managing Partner, Pakkar Leathers
01.15 pm – 01.30 pm	**Wealth from solid wastes**	**Dr G Sekaran**, Chief Scientist & Head, CSIR-CLRI Environment Technology Division
01.30 pm – 01.45 pm	**Clean Leather Processes – Techno-economic and regulatory driving forces**	**Dr KV Raghavan**, Chairman, Research Council, CSIR-CLRI
01.45 pm – 02.00 pm	**Steering deliberations, Q & A and Summary on Session I**	**Dr KV Raghavan**, Chairman, Research Council, CSIR-CLRI **Dr KJ Sreeram**, Principal Scientist

Lunch: 2.00 PM – 2.30 pm

LERIG 2012: Session II "Practical Demonstration"

Saturday, 28 January 2012, Tannery Quadrangle, CSIR-CLRI; 2.30 pm to 4.00 pm

Chairman: **Shri V P Naimur Rahman,** Vice Chairman, IFLMEA
Co-Chair: **Shri C S Gnanasekaran,** President, ALFA
Co-Chair: **Shri C R Mohan,** Secretary, LCMA
Co-Chair: **Shri Praveen J Tatia,** Secretary, LCDA
Presiding: **Prof. Dr A B Mandal,** Director, CSIR-CLRI

Demonstration Of Innovative Texture Developments And Surface Modifications.	Leather Design Department of NIFT, Chennai.
X-Tan wet white process based on Polycarbamoylsulfonate	Lanxess India
Demonstration of Leather upgradation techniques	Sellam Chemicals
Range of Chemicals from Zschimmer & Schwarz GmbH & co kg",Germany." And Langro Chemie Theo Lang GmbH",Germany.	Kanna Chemie (P) Ltd.
Demonstration of Leather Articles and Colours	Chenitan Colour Chem Pvt. Ltd.
Leather Finishing and Footwear Finishing Chemicals	Saba Group
Range of New Leathers	Stahl India Ltd.
Leather Chemicals and Finished Leather	Retchakar Tannins Pvt. Ltd.
Leather Chemicals	Sree Abirami Colours
Demonstration of New Leathers & Chemicals	Fine Chem
Demonstration of New Leathers & Chemicals	Clariant Chemicals (India) Ltd.
Unique designs and combo materials based on ethnic North-East motifs	**Shri K Karthikeyan,** Scientist CLAD, Department, CSIR-CLRI
Bio-refinery pilot plant for the sequential production of bio-diesel, bio-ethanol, bio-hydrogen and bio-methane from organic liquid and solid wastes to attain ZLD/ZSD	**Dr.P.Shanmugam** Principal Scientist Environmental Engineering Department CSIR-CLRI
Automated software for managing consumable and chemicals in a Tannery.	**Smt Malathy Jawahar,** Senior Scientist, Leather Process Division, CSIR-CLRI & **Shri S Nithyanantha Vasagam**, Scientist, Economics Research Laboratory
Kolhapuri Footwear	**Shri S Mathivanan,** Senior Principal Scientist, SDDC, CSIR-CLRI

LERIG 2012: Session III on "Leather Creativity & Design Innovation"

Sunday, 29 January 2012, Triple Helix Auditorium; 10.00 am to 11.45 am

Time	Topic	Speakers
10.00 am – 10.30 am	**Introductory Remarks**	**Shri P R Aqeel Ahmed**, Regional Chairman (SR), Council for Leather Exports **Shri N Shafeeq Ahmed**, Chairman, Indian Finished Leather Manufacturers & Exporters Association **Shri Motilal Sethi**, President, Indian Leather Garments Association **Dr S Devadoss**, Director, National Institute of Fashion Technology, Chennai **Shri K Srinivasan**, Convenor, Finished Leather Panel, Council for Leather Exports **Shri SV Kumar**, Vice President, Indian Shoe Federation
10.30 am – 10.45 am	**High-end leather processing**	**Mr Tim Amos**, Managing Director, STAHL India Limited, Chennai **Dr J Raghava Rao**, Senior Principal Scientist, Chemical Lab, CSIR-CLRI
10.45 am – 11.05 am	**Unique Designs for best value from medium and low priced products**	**Shri PV Gopalakrishna Bachi,** Convenor, Leather Footwear Panel, Council for Leather Exports **Smt Shinju Mahajan,** Chairperson, Leather Design, National Institute of Fashion Technology, New Delhi **Ms Sumitra Roy,** Director, TERRA Handbags
11.05 am – 11.20 am	**Fashion / Design Incubators – Recent Developments & New Opportunities**	**Mrs Shalini Sud**, Professor, Head CE-Diploma, Corporate Communication Cell
	Design Drivers for Leather Apparel Industry.	**Mr. Shahrukh Zaidi**, Creative Head, AVT Leather
11.20 am – 11.30 am	**Steering Deliberations, Q & A and Summary on Session II**	**Dr BN Das**, Senior Principal Scientist & Head, CSIR-CLRI Shoe Design & Development Centre **Shri Gautham Gopalakrishna**, Senior Principal Scientist, CSIR-CLRI Shoe Design & Development Centre

Tea: 11.30 am – 11.45 am

LERIG 2012: Session IV on "HRD For Change and Innovation"

Sunday, 29 January 2012, Triple Helix Auditorium; 12 Noon to 01.00 pm

Time	Topic	Speakers
11.45 am – 12.10 pm	**Introductory Remarks**	**Shri Habib Hussain**, Chairman, NSDC & Director, AV Thomas Group **Dr KV Raghavan**, Chairman, Research council, CSIR-CLRI **Smt Revathi Roy**, Managing Director, RR Leather Products P. Ltd. **Dr AB Mandal**, Director, CSIR-CLRI **Mr Ato Wondu Legesse**, Director General Leather Industry Development Institute (LIDI), Ethiopia
12.10 pm – 12.20 pm	**Changing Demands of Human Capabilities in Leather & Product Sectors**	**Shri Mohan M Sreenivas**, Managing Director, ORIENT Express **Shri M S Khaleel Lur Rahman**, Managing Director, NIBRAS & Co
12.20 pm – 12.35 pm	**Knowledge Sharing – A new Inter-institutional HRD Gateway**	**Dr B Chandrasekaran** , Senior Principal Scientist & Head, CHORD, CSIR-CLRI **Shri D Saalai Maraan**, Executive Director, Footwear Design & Development Institute (FDDI)
12.35 pm – 12.45 pm	**Developing Effective Public – Private Platforms for Talent Search**	**Shri Intisar M Mohammed**, Youth Committe member, CLE & Director, Shafeeq Shameel Group
12.45 pm – 12.55 pm	**Experiences from Chennai Cluster**	**Shri D M Parikh**, Associate Senior Faculty, Entrepreneurship Development Institute of India
12.55 pm – 1.00 pm	**Steering Deliberations Q & A and Summary on Session III**	**Dr B Chandrasekaran**, Senior Principal Scientist & Head, CHORD, CSIR-CLRI **Smt Swarna Kanth**, Principal Scientist, CHORD

CLASPING LERIG 2012,

1.00 pm to 1.30 pm; Triple Helix Auditorium

Time	Topic	Speakers
1.00 pm – 1.15 pm	**Clasping LERIG 2012: Industry Views & Way Forward**	**Shri Ali Ahmed Khan**, Executive Director,Council for Leather Exports
1.15 pm – 1.30 pm	**Clasping LERIG 2012: Role of Institutions & Way Forward**	**Shri D Chandramouli**, Chief Scientist, CSIR-CLRI

THANKSGIVING CEREMONY & CELEBRATING

"LEATHERWEEK 2012,"

1.30 pm to 2.00 pm, Ascent of Triple Helix Auditorium

Release of Balloons & Welcome to
27th India International Leather Fair (IILF) 2012

2.00 pm – 2.30 pm: LUNCH

LEATHERWEEK 2012 'Seminar Day' on Monday, 30th January 2012; 10.00 am to 5.00 pm organized by: ITPO, CLE & CSIR-CLRI. For further details, please contact: bndas@clri.res.in

The Fisherman's Fare	State Bank of India	GLOBAL PRINTING PRESS	LEATHER NEWS INDIA
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KEYNOTE LECTURES FOR LERIG 2012

46th Leather Research Industry Get-Together (LERIG), January 27-29, 2012

Leather Industry perspectives & challenges vis-a-vis the 12th Five Year Plan 2012-17

A presentation by: ***Shri Ali Ahmed Khan,***

Executive Director, Council for Leather Exports (CLE)

While prospects for India's Leather Industry has brightened in view of declining production of leather products including footwear in the Western European countries, the industry in India has to go in for substantial capacity enhancement in order to fully utilize this opportunity. Thus, there is emergent necessity to build production capacities in the leather & leather products industry.

Let us analyze the current status of the sector from perspective of Clusters, social impact, export, market share of India in the global trade, and target set by the Government for Twelfth Five Year Pan period 2012-17.

Major leather clusters in the country are situated in Tamil Nadu, Uttar Pradesh, West Bengal, Delhi, Haryana, Punjab, Maharashtra, Puducherry, Rajasthan and Karnataka. Besides these, there are some minor clusters in the states of Andhra Pradesh, Assam, Madhya Pradesh, Bihar etc. These industry clusters not only significantly contribute to the export growth of the sector but also offer employment opportunities to the rural people, particularly women and economically weaker sections of the society. These leather industry clusters are acting as catalyst for the growth of the Indian Leather Sector. All along, the focus has been on strengthening these clusters and create infrastructure facilities to assist their further growth. However, besides strengthening the existing clusters, we need to concentrate on building new production centers across the country as well.

The tanning sector's annual production capacity is estimated at 2 billion square feet and the sector accounts for 10% of world leather requirement. India is the second largest footwear producer after China, with annual production capacity of 2065 million pairs. The Footwear as a commodity accounts for 45.05% share in India's total export from leather sector. The product mix of the footwear sector is Gents 52%, Ladies 39% and Children 9%. In the Leather garment segment, India is the second largest producer with annual production capacity of 16 million pieces, and in fact, India is the third largest global exporter of leather garments. In leather goods and accessories, India is the fifth largest global exporter, and this segment accounts for 23.44% share in India's total export. Product capacity was estimated at - 63 million pieces of leather articles, 52 million pairs of Industrial gloves & 12.50 million pieces of Harness & Saddlery items.

As an industry, the leather sector is having a huge social impact as it is an employment intensive sector. According to a rough estimation, about one million people are engaged in activities such as flaying, curing, handling & transport of raw hides & skins, 0.60 million are employed in tanneries and leather product manufacturing units, and 0.90 million people are involved in footwear & leather articles manufacturing in the cottage, households as rural artisans. As such, an estimated 2.50 million people are engaged in various fields of the leather industry. What is more relevance and add to the importance o f the sector is reflected in the fact that most of the people involved in the sector are drawn from the weaker sections of the society. In leather product sectors, another significant factor is that women employment is predominant with about 30% share.

On the export front, with an annual turnover of over US$ 7.5 billion, the export of leather and leather products increased manifold over the past decades and touched US$ 3.84 billion in 2010-11, recording a cumulative annual growth rate of about 5.87% (5 years)

					(Value in Million US$)
Product	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Finished Leather	724.00	807.19	673.37	627.95	810.92
Footwear	1236.91	1489.35	1534.32	1507.59	1732.04
Leather Garments	309.91	345.34	426.17	428.62	400.83
Leather Goods	706.28	800.46	873.44	757.02	814.91
Saddlery & Harness	82.33	106.18	92.15	83.39	86.15
Total	3059.43	3548.51	3599.46	3404.57	3844.86
% Growth	11.15%	15.99%	1.44%	-5.41%	12.93%

Table: India's export for the past five years – Source DGCI&S, Kolkata

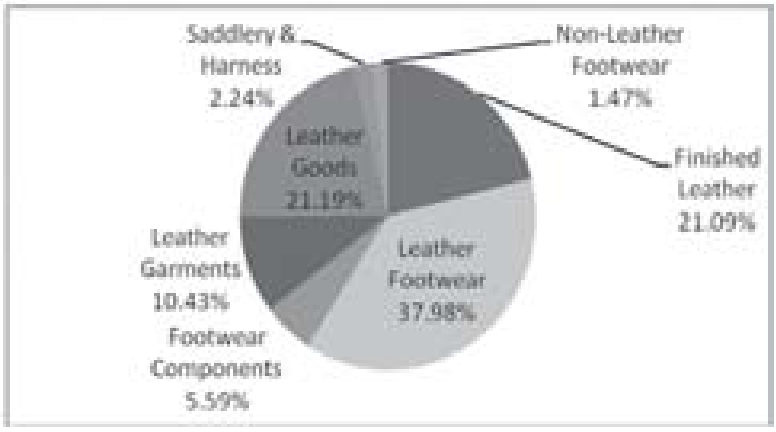

Chart: India's Export Basket – Share of product segments 2010-11

The major markets for Indian leather products are Germany with a share of 14.34%, UK 12.80%, Italy 11.52%, USA 8.72%, Hong Kong 8.11%, France 7.07%, Spain 6.31%, Netherlands 3.98%, Belgium 2.02%, U.A.E.1.92%, Australia 1.30%. These 11 countries together accounts for nearly 78.09% of India's total leather products export. India's Export of Leather & Leather Products to the European Union touched US $ 2517.51 million in 2010-11, accounting for a share of 65.48% in India's total leather export trade of US$ 3844.86 million.

						(Value in million USD)
Country	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**% Share**
Germany	410.08	493.34	508.45	491.28	551.32	14.34%
Italy	413.35	490.77	461.56	398.56	442.75	11.52%
UK	359.84	417.64	413.24	456.59	492.32	12.80%
USA	317.59	311.21	359.22	296.37	335.11	8.72%
Hong Kong	279.72	280.97	237.72	251.53	311.81	8.11%
Spain	185.78	216.07	219.18	219.13	242.73	6.31%
France	174.04	198.52	221.33	255.29	271.93	6.52%

Table: India's export to different countries
NB: Countries having a share of 5% and below are not mentioned in the above Table.

The Government of India had identified the Leather Sector as a Focus Sector in its Foreign Trade Policy 2009-14 (status continued from the previous FTP 2004-09) in view of its immense potential for export growth prospects and employment generation. Accordingly, the Government is also implementing various special focus initiatives under the Foreign Trade Policy for the growth of leather sector. With the implementation of various industrial developmental programmes as well as export promotional activities; and keeping in view the past performance, and industry's inherent strengths of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and dedicated support of the allied industries, **the Government of India has set a export target of US $ 14 billion by 2016-17 (12th Five Year Plan Period), and resultantly create additional livelihood to overall one million people**.

					(In US $ million)
Product	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**
Finished leather	1100	1250	1400	1500	1650
Footwear	2800	3500	4200	5200	7100
Leather Garments	600	900	1300	1800	2200
Leather Goods	1150	1400	1700	2000	2500
Saddlery & Harness	200	275	350	420	550
Total	5850	7325	8950	10920	14000
% Growth	23.81%	25.21%	22.18%	22.01%	28.21%

In order to achieve the export target, the industry need to grow at a CAGR of 24.03% from the year 2010-11 to 2016-17.

What are the opportunities available for Indian leather industry?

- The decreasing production base in Europe and escalating cost of production in world's largest producer China has made the overseas firms to increasingly look at India as an alternate sourcing option. Several European manufacturers are looking for joint venture collaborations with Indian firms, in view of the significant export prospects and the growing domestic retail market in India.
- Worldwide, the demand for leather and leather products is on the increase with global imports increasing from USD 77 billion in the year 2000 to USD 115 billion in the year 2009. Growing at a rate of 6% per annum, the global trade is projected to rise to a staggering USD 245 billion in 2020. Hence India has vast scope to achieve a greater share in global leather trade in next 5 years.

What are the challenges being faced by the industry?

- Inadequate collection of raw hides & skins, and shortage of the raw materials (hides & skins) to meet the requirements of the leather sector
- Environment management in tanning sector, ZLD technology etc
- Lack of economies of scale vis-à-vis competing countries – absence of plants with huge manufacturing capacities
- Modernization and expansion of production capacities in the sector
- Absence of Leather Parks in various parts of the country
- Inadequacy of sector-specific support infrastructure facilities at the clusters
- Shortage of trained manpower and need for skill development initiatives at larger scale

- Absence of 'branding' since the industry focus was / is on contract manufacturing for foreign brands
- Need to attract Joint Venture collaborations and FDIs into the leather sector

Analysis of challenges and suggested interventions

Animal husbandry measures

The Leather industry is bestowed with an affluence of raw materials as India is endowed with 21% of world cattle & buffalo and 11% of world goat & sheep population. This also means that we should put in place effective mechanism for back end operations. During interactions with the CLRI, some of the concerns noted are Inadequate animal husbandry measures which has a direct bearing on the animal health, Inadequate collection of raw hides and skins & also decentralized system of collection, Delayed preservation and eventual deterioration of quality of raw hides and skins, Inefficient and not-so-eco friendly preservation system etc. Roughly about 20% of the raw hides and skins are left uncollected, which is a national loss. Apart from inadequate collection of raw materials, poor animal rearing practices and unorganized system of rawhide collection leads to deterioration of quality of rawhides and skins. These are the areas which need to be looked after by the CLRI for the development of leather industry. he industry would urge the CLRI to discuss these concerns and suggest possible solutions to the relevant Ministry in the Government of India for drawing up of action plan in this macro level subject.

Brand creation and promotion

The major challenges are in creating larger capacities with world-class infrastructure and at the same time marketing India's strength to all brands and retailers. Improvement in design and product development is more of an internal requirement for the industry to achieve better unit value realization for their products. The industry with the support of Technical Institutes and by engaging the services of world reputed designers to develop newer designs replicating the latest fashion trends in order to present their best collections to overseas customers. In this context, brand creation and promotion assumes greater significance for building up the image of Indian leather products.

Technology Upgradation and Modernization

For the industry to be efficient and cost-effective; there is no alternative except to initiate modernization of production facilities in the units on a massive scale on the one hand and create substantial capacities on the other. Adoption of newer technologies coupled with installation of modern state-of-the-art machinery and equipment in the production units is the need of the hour. The best way to beat competition is to improve productivity and quality consistency of our production and to provide the buyers with more services that make procurement in India more attractive that in other

competing countries. Both these call for induction of the best available technology and processes. There is no escape from immediate modernization of all segments of the industry. The modernization process should be comprehensive so that the levels of productivity reach the best in the world. The Government has been very supportive by implementing the IDLS Scheme which encouraged the industry at the enterprise level to go in for modernization, technology upgradation and expanding the capacities.

India has the added advantage of having premier technical institutions such as Central Leather Research Institute (CLRI) & Footwear Design & Development Institute (FDDI) which provides vital inputs and technologies in the areas of product design and development, environment technology, product testing etc. Most of our manufacturers of leather obtain latest technology and processes from their chemical suppliers. Likewise, for footwear, garments etc, the manufacturing technology is easily available from importers. There are a number of Training Institutions imparting Training to workers in fabrication technology, many of them having received adequate foreign expertise and inputs. What appears to stand between manufacturer and latest technology is either lack of financial resources or willingness. There is no gainsaying the fact that if the technology adopted by a factory is current and modern, the productivity, quality consistency etc will be far better than those adopting outmoded technology.

Human Resource Development

One of the important areas of concern is from the human resources front. There is a need for vocational training on a large scale so that a continuous supply of labor is available to the industry at competitive wage levels. The margins are rather small in this sector, due to intense competition. If the wage levels rise too high in parts of India, such areas could indeed become uncompetitive via-a-vis other parts or other low cost countries. Being a labor intensive industry, shortage of skilled workers is a major challenge. This needs to be addressed. Skill development programmes have to be conducted nation-wide to train the workforce for the leather industry, both fresh as well as existing workers. The technical institutions such as FDDI, CLRI, CFTI, NSIC etc are conducting training programmes and churns out manpower for the sector. There is need to strengthen the infrastructure in these Training Institutes and establish branches of these institutes across the leather clusters.

In addition, it is proposed to undertake HR intervention through the mechanism of National Skill Development Corporation (NSDC). The steps are already being taken to form the Sector Skill Council (SSC) for the Leather Sector which will be a Section 25 Company under the Companies Act. The Council for Leather Exports has recently submitted a proposal to the NSDC to set up a Sector Skill Council for Leather Sector so as to fulfill the existing skill gaps in the leather sector, particularly in the area of shop floor level operations and give basic entry level training on a mass scale. The objective is to provide about 2 million trained workforces for the leather industry by the year

2020, particularly for performing the shop floor level operations. The SSC will facilitate the development of contents and curriculum for about 50 identified shop floor level operations and setting up of new training centres across the country.

Increasing the tanning capacity

India's acknowledged strength in this industry has been its rich raw material resources, with nearly 10% of global raw material being available in India. Hence, to meet the total turnover (both domestic and export) of US $ 17 billion, India would require an additional 3 billion square of leather to produce the leather products. This has two implications, namely, sourcing of raw materials from wherever we could get and secondly enlarging the tanning capacity within the country. The present capacity for tanning in the country is estimated at about 2 billion square feet per year but a significant part of this capacity is found in micro and small scale tanneries. For the industry to be efficient and cost effective, massive creation of additional capacities has to be explored, at the same time taking all precautions for environmental management. It is pertinent to mention here that a Leather Tanning Park is proposed to be established at Kothapatnam village in Nellore District, Andhra Pradesh (earlier it was to be set up in Krishnapatnam). The Government of Andhra Pradesh is promoting this Park and a SPV has already been formed. The Government of Andhra Pradesh has earmarked a total area of 536.88 acres of land for the establishment of the Tanning Park. Out of which, the SPV has already taken possession of 358.97 acres of land during Dec 2011. The industry eagerly looks forward to the formal announcement of the Tanning Park project, with Industrial plot layouts and costs so that interested companies may apply for allotment of plots in the Park

Collaboration with countries having abundant raw materials, at enterprise levels

Since several overseas countries do not allow export of raw materials (raw hides & skins) from their country with the aim for value addition, and to give employment opportunities to their own people, the Indian companies should make an attempt to forge collaborations with the overseas tanneries, provide technology for better conversion into semi finished leathers (crust, wet blue etc) and finished leathers. Such leathers can be exported to India which will go to meet the leather requirements of the leather products industry. This option needs to be explored seriously, and Trade Delegations should be mooted to all prospective countries to make an assessment, identify the counterpart tanners, and enter into dialogue process with them in these countries.

Shift from SSI to Large Units

Though existing companies are attempting to expand their production base but the industry is not seeing an influx of many new entrants in this sector. Hence, there is need to promote investments from new companies both domestic as well as overseas companies. A major number of manufacturing units are family based or controlled.

Many of them have a tendency to remain within the small scale fold to avail themselves of the so called concessions available under small scale industrial sector. This tendency hampers further growth of the individual units and the industry as a whole. The leather industry today is not at all expanding its operations today as there are no big players, established corporates, and majority of the companies are privately-held family-run units. In the WTO regime, a change in this tendency and approach is very much required. Therefore even the small scale production units should get prepared for such a change and any delay in this regard will not be in their own interest. They should therefore grow into large units, public limited companies, to reap the benefits of economies of scale and upgrade their production capacities, quality of the products and be price competitive in the international market.

There could be good scope to expand the leather sector by availing the venture capital fund. The creation of Venture Capital Fund is one of the strategies listed in the strategy paper for doubling exports released in May 2011 by the Hon'ble Union Minister of Commerce & Industry. This strategy paper states that leather units/projects face difficulty in raising adequate capital from sources like public issues or bank loans and hence creation of Venture Capital Fund under an institution like Exim Bank, ECGC or Nationalized Bank equity participation for capital requirements can be possible. The strategy paper emphasized the creation of such a revolving pool of funds which would be useful for capacity enhancement / modernization of existing leather units and also in establishment of new units. As there is no awareness in the leather industry on the Venture Capital Fund, the Council's Committee of Administration has deliberated this issue and it was decided that the Council will hold awareness seminars in various regions which will be addressed by the experts from listed Venture Capital Funds so as to sensitize and gain first- hand knowledge of its advantages and this will enable the industry to explore the possibility of tapping this facility.

Development of specific Infrastructures at Clusters

There is need to set up infrastructure at the export clusters which can be commonly used by the units operating in that cluster, and some of these facilities could be Common Facility Centre, Testing Laboratory, Design Studio, Trade Centre, Convention Hall and other such infrastructures needed by the industry. It is pertinent to mention here that with a view to reduce the transaction cost and time leading to increase in the cost competitiveness, the Government has been providing all required support to the leather industry under ASIDE Scheme to set up critical infrastructure facilities at the export clusters. The Council for Leather Exports (CLE) has been designated as Implementation Agency for several infrastructure projects which were implemented / are currently under implementation. These projects are (a) Additional infrastructure in Ambur Trade Centre at Ambur (b) Establishment of Testing Laboratory at Ranipet (c) Infrastructure Up gradation of Design Studio at Kolkata (d) Setting up of Testing Laboratory at Kanpur (e) Establishment of Multi Skill Development Centre at Kanpur (f) Establishment of Common Facility Centre at Jalandhar.

Indian Leather Development Programme (ILDP)

The Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, Govt. of India has been implementing the Indian Leather Development Programme (ILDP) for the overall industrial growth of leather sector. These were implemented on a large scale during the Tenth Five Year Plan period 2002-07with an outlay of Rs.400 Crore. The ILDP is being continued in the Eleventh Five Year Plan period 2007-2012, and the sub-schemes with a combined Plan Outlay of Rs.1251.29 Crores have been notified and are under various stages of execution through several implementation agencies. The ILDP lays thrust on several areas such as modernization of production facilities, up gradation of technologies, expansion of production capacities, setting up of institutional facilities, skill development of fresh manpower, skill up gradation of existing manpower, development of rural artisans, address environmental concerns in the tanning sector etc. As part of this focus, Integrated Development of Leather Sector (IDLS) Scheme is being implemented to assist the manufacturing units in all segments of the leather industry to build up capacities and modernize the production facilities. The IDLS Scheme has proved highly useful to the leather industry to expand its capacities and upgrade the technology by installing modern machinery and equipments. The projects for up gradation, installation of infrastructure in the seven Common Effluent Treatment Plants (CETPs) situated in Tamil Nadu for environment protection are under implementation. These projects pertain to up gradation of CETPs, Installation of Reverse Osmosis and Reject Handling Systems, and the implementation of these projects has brought several benefits to the tanning industry and ZLD system has been demonstrated successfully. Under the HRD Scheme, measures are being taken to impart Placement linked Skill Development training amongst unemployed youths and on-site training for skill up gradation of existing employees in the industry at the shop floor levels. Several projects were approved for implementation through the technical institutions. All these intervention measures are pivotal for the industrial development of the leather sector.

12th Five Year Plan 2012-17 and the Leather Sector

The Planning Commission has constituted a Working Group for Leather & Leather Products for the Twelfth Five Year Plan 2012-17 under the Chairmanship of Secretary, Department of Industrial Policy & Promotion (DIPP), Government of India. The Working Group has constituted six Sub-Groups on different important topics (a) Leather Technology, Innovation & Environment Issues (b) Infrastructure development (c) Skill development initiatives (d) Brand building (e) Attracting FDI in Leather Sector in India (f) Macro issues of leather sector, convergence & linkages. The Nodal Department for this Working Group is DIPP. The DIPP has held several review meetings with Chairmen of Sub-Groups to fine tune the reports. Based on the reports of the sub-groups, the DIPP has prepared the draft report and this was discussed in the Working Group meeting held on 04.10.2011. An outlay of Rs.3220 Crore (estimated and draft) is proposed for the development of the Leather Sector during the Twelfth Five Year

Plan 2012-17. The proposed outlay is as against the allocation of Rs.1251.29 Crore for ILDP during current Eleventh Plan period 2007-12, an increase of 2.6 times. Since the focus in the next years would continue to be on expansion, capacity building and technology up gradation of the manufacturing facilities to meet the probable future global opportunities of shifting manufacturing to India, higher Plan Outlay for the ILDP is very much needed in commensurate with the prospects and potential of the leather sector on various fronts.

As mentioned elsewhere, there is dire need for the industry to expand production capacities, and in this context, the proposals to establish Mega Leather Clusters in various parts of the country will be of significant importance. As per the strategy paper of the GOI on the major intervention measures required for achieving the export target, one of the action plan proposed is to establish Mega Leather Clusters in Tamil Nadu, Uttar Pradesh, West Bengal, Delhi, Maharashtra, Haryana and Rajasthan. It is also proposed to set up Mega Leather Clusters in other States as well. These mega leather clusters will have Ready-to-use Factory Sheds with plug-in facility for machinery/ equipments, core infrastructure such as road, power, water, secured compound wall & wire fence, solid waste disposal plant, effluent treatment plant, common facility centres, warehouse, product display centre, exhibition hall, Dormitory for workers, fire fighting systems, training centers, social infrastructure such as hostel, crèche, and also R& D infrastructures such as Testing lab, design studio etc. There will be a SPV for each mega leather cluster and the SPV would conceptualize the project, formulate, achieve financial closure, implement and manage the infrastructure. The role of the State Government is envisaged in areas such as providing all the requisite clearances, wherever needed, and providing the necessary assistance for Power, Water and other utilities, A diagnostic study for each cluster is proposed to be undertaken through a professionally qualified agency having adequate experience in cluster development work in leather or similar other manufacturing sector. The diagnostic study will be the basis for subsequent preparation of DPR. The scheme guidelines are currently under the approval process of the Government. The industry is eagerly waiting for the notification of the scheme for development of Mega Leather Clusters.

The practical feedbacks obtained on the Scheme for Development of Leather Parks earlier notified by DIPP needs to be kept in view while framing the guidelines for the proposed Mega Leather Clusters. The industry has pleaded with the GOI to exempt the condition of registering the SPV under Sec 25 of Companies Act, and instead allow SPV to register under any sections of the Companies Act. The Industry is of the view that this change is basically to tide over the difficulty in getting finance for the project as investors will be reluctant to invest in a SPV which is mandated to work on no-profit basis. This provision hinders the workability of the Leather Park Scheme. The Scheme for Integrated Textile Parks (SITP), on which the Scheme for Leather Parks is more or less based, has no such condition imposing mandatory registration of SPV under Sec 25 of the Companies Act. The industry hopes that the scheme guidelines

of the proposed mega leather clusters would be workable, easy to implement and also cost workings are viable for the industry to establish the Mega Leather Clusters.

The Integrated Development of Leather Sector (IDLS) Scheme is being implemented under the ILDP to assist the manufacturing units in all segments of the leather industry to build up capacities and modernize the production facilities. The IDLS Scheme has proved highly useful to the leather industry to expand its capacities and upgrade the technology by installing modern machinery and equipments. The Council has pleaded for implementation of IDLS Scheme during Twelfth Plan which would pave the way for the industry to increase its manufacturing capacities.

As regards critical infrastructure projects, the proposals to set up Agra Trade Centre, Design Studio and Testing Laboratory at the Footwear Cluster of Agra are currently under the consideration of the Government of Uttar Pradesh under ASIDE Scheme. Further, the CLE has approached the Industry Associations and SPVs to formulate Detailed Project Reports (DPRs) to establish infrastructure facilities such as Common Facility Centers (CFC), Design Studio, Testing Laboratory etc at the export clusters during the Twelfth Plan 2012-17 which could be submitted to the Government for assistance under ASIDE Scheme. The Council expects that several projects would be taken up in the Twelfth Plan to further strengthen the industry.

Several areas of interventions desired during the Twelfth Plan are summarized below:

1. Development of Mega Leather Clusters in various parts of the country
2. Modernization, Technology up gradation & expansion of production capacities at the enterprise levels.
3. Undertake environment management measures in tanning sector including establishment of CETPs, technology upgradation of CETP, installation of RO Plants, Zero Liquid Discharge Systems etc
4. Implement a scheme for improvement of environment protection in individual tannery levels
5. Undertake a socially inclusive solid waste utilization program
6. Implementation of a scheme for Technology Bench marking of tanneries
7. Implement a HRD Mission – inclusive of primary training, secondary training, train the trainers etc.
8. Establish and Upgrade the institutional facilities in the country
9. Implement a scheme for development of artisans
10. Implement a scheme for Indian Leather Mark (branding on the lines of India Design Mark implemented by India Design Council)

11. Establish National Design Studio

12. Undertake R&D and Design & Development activities

13. Establish a Centre of Excellence for development of leather-like material

14. Undertake promotional activities in foreign countries to attract joint ventures and FDI into the leather sector, and also organize Investments Meets in India

15. Assist the industry associations and SPVs to establish critical infrastructure facilities in the export clusters in the form of Common Facility Centers, Design Studios, Testing Laboratory etc

16. Assist the existing CETPs in the country towards installation of additional capacities in the CETP, installation of captive power generation plant for the ZLD systems, Salt purification and processing plants for recovered salt from ZLD system, creation of secured landfill facility etc.

17. Provide certain exemptions and flexibility for leather Sector in implementing the overseas marketing programmes under Market Development Assistance Scheme, Market Access Initiative Scheme etc.

The increase in the scale of production as a result of creation and strengthening of the infrastructure would eventually go on to reduced the unit cost of production, and thus will make the Indian leather sector competitive in the international market and help attain the export target of US $ 14 billion by the end of the Twelfth Five Year Plan 2012-17.

ROLE OF INSTITUTIONS IN 12th PLAN AND WAY FORWARD

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Introduction

The targets for 12th Plan are challenging . They need to be addressed with concerted efforts of all stakeholders of leather industry. The prime movers are Industry, Government and Institutions. In the present economic scenario - the industry is basic driving force , Government to act as a facilitating agency , institutions as enabling partners to make the industry to be competitive in terms of technology innovations , training . The synergy of these wings is of paramount importance to bring in a striking change. The outlook of this change is making Indian leather industry economically viable/efficient , socially compatible and environmentally sustainable.

Focus of 12th Plan

The focus of the 12th Plan is to design appropriate systems to enable holistic development of Indian leather sector. Such a development plan should address every facet of industry. The programs have to cover from the basic resources to global positioning of leather products. A large number of organizations are to be involved and their role is to be defined so as to work coherently to reach the envisaged goal.

Role of Institutions

One of the critical parameters for developing the plan is defining the role of institutions . The expectations are in the form of technology support , tools of training , timely consultancy, testing services etc. Areas of focus should be better utilization of resources and their augmentation , cost effective manufacturing systems, , ensuring the environmental safety, market intelligence for better value, capacity building to prepare the industry to face emerging techno-economic challenges. To work in these areas , India has large net work of research and academic Institutions such as Central Leather Research Institute (CLRI) , Footwear Design and Development Institute (FDDI) , Central Footwear Training Institute (CFTI) , National Institute of Fashion Technology (NIFT) , National Institute of Design (NID) and various colleges offering Degree and diploma courses . The role of Council for Leather Exports is of vital importance in this endeavour as driving force. Further the role of organizations like Khadi and Village Industries Commission (KVIC) , Entrepreneurship Development Institute , Indian Institute of Foreign trade (IIFT) is equally important . Taking this as basis , activities connected with leather industry are linked to various organizations.

Activity	Significance /program	Institutions
Strengthening the basic source – livestock	- Promoting the stall fed commercial farms - Developing the fattening systems for meat industry - Popularization of health care practices	- Veterinary colleges / Universities - ICAR institutions such as Central Institute for Research on Goats, Central Sheep and Wool Research Institute - NABARD for developing the business schemes
Handling of hides and skins and augmenting the supply	- Promotion of carcass recovery centres in the potential locations - Encouraging the Rural Meat Production Centres (for goats and sheep) - Training for meat producers - Identification of newer sources of raw material	- Central Leather Research Institute (CLRI) , Meat Research Institute of ICAR, Khadi and Village Industries Commission - NABARD for commercial schemes
Market Infrastructure for hides and skins	- Designing of scientific market yards in important locations - Promotion of alternative curing systems - Demonstration of better storage practices - Ensuring better handling facilities in hides and skins shandies	- CLRI - Agro–product marketing boards of State Govts
Tanning Technologies – Research and Development	- Developing /Promoting the innovations in terms of quality consistency, cost reduction, cleaner process methods , waste reduction / utilization, less water usage , - Colour and trend forecasting - Strengthening the rural sector with appropriate demonstrations	- CLRI

Activity	Significance /program	Institutions
Product Fabrication and Designing	- Promoting the innovations in terms of quality enhancement, cost control, material saving , functional efficiency, styling and designing - Developing leather like materials for footwear - Documentation and adaptation of ethnic designs - Development and designing of footwear for special purposes such diabetic footwear - Empowering the decentralized sector with appropriate tools and techniques	- CLRI , FDDI, NIFT , NID, CFTI , KVIC
Environmental safety and compliance	- Developing the efficient / cost effective end of pipe line technologies - Promotion of cleaner process technologies - Developing the norms and compliance systems in tune with global trends - Ecolabeling systems / standards	- CLRI, CPCB ,BIS , Trade Associations , NGOs
Academic courses and Training	- Structuring of the courses with emphasis on theory and practice - Introduction newer courses in tune with the trends - Continuous learning systems - Skill development through through outreach programs - Strengthening the design capability	- CLRI, FDDI, CFTI,NIFT, NID, NSDC, state level institutions

Activity	Significance /program	Institutions
Market Intelligence and brand building	- Identification of emerging markets , - Developing competition strategies - Image building systems	- Council for Leather Exports , CLRI, FDDI , Trade associations
Testing , ISO standards , social –eco labeling systems, ethical practices etc	- Building world class testing facility -Promotion of standards and labeling systems through economic measures	- CLRI, FDDI, CLE , NGOs, Trade Associations
Nurturing/strengthening the domestic manufacturing / market	-Large non leather footwear base in India needs technology support , material development -Huge domestic market for footwear needs appropriate strategies for planned growth	- CLRI, FDDI , CLE, CSIR Labs

Way Forward

There is an excellent institutional infrastructure in the country. The first and most critical parameter for way forward is synergy of efforts. The second one is clear demarcation of roles and responsibilities each partner. The third important factor is appropriate delivery systems. The fourth parameter is continuous consultation mechanism with industry for mid-course modifications. The fifth factor is the timely support of funding for the envisaged programs. The larger goal of all the institutions is sustainable and balanced growth of Indian Leather Sector.

MEMORIAL LECTURES

Prof B M Das Memorial Lecture

Late Prof BM Das

Speech of Dr. Dietrich Kebschull, *Chairman IGEP Foundation*
Chennai, 27.Jan, 2012

Ladies and Gentlemen,

It gives me great pleasure to be here in this gathering. I would like to thank CLRI for giving me the opportunity to share a few words with you.

The Indian leather industry needs to be congratulated for having surpassed the export target of US $ 3.75 billion dollars during 2010-11, posting a vigorous growth of 10.26 % over its last year performance. This is really a remarkable achievement considering the volatility in the International markets in the past few years.

It is laudable that the leather sector could muster the strength to achieve the turnaround after the crisis of 2008 and be back on the growth trajectory in a short period of time. It is very normal under the circumstances to lie back and rest on one's laurels. However, ladies and gentlemen, let us not be under any illusion that normal times are back.

The European Union, the biggest market for Indian leather and footwear exports, faces its most serious challenge since the union was conceived way back in the 1950s. The crisis is so deep and complex that at one point people had serious doubts of the very survival of this union of 28 countries. For the Indian leather exporters, this should be a cause of concern as the EU market accounted for 67.89 % of imports of Indian leather and footwear products in 2009-10. The crisis period does not seem to be abetting. What are the implications in this for India? Can the sector maintain the growth trajectory with its main export market in a flux?

Put in perspective, however, this is only one of the many challenges facing the Indian leather sector. Apart from the continuing crisis in the Euro Zone, the industry also faces challenges with a host of other issues such as:

- Shortage of essential raw materials as well as steep hike in prices
- Shortage and retention of skilled manpower
- Infrastructure deficiencies
- Technology and environmental issues
- Design innovation
- Need for Market diversification

The Indian leather sector has set an ambitious target of US $ 14 billion by 2016-17 (by the end of the 12th Five Year Plan period 2012-17). Achieving this goal will depend on how will the industry raises itself to the challenge to solve the above mentioned issues. What will also have a significant bearing is the need for product innovation, identification of niche segment opportunities and market diversification.

Let us now have a look at the present trends in the Indian leather and footwear industry.

All the segments in the Indian leather sector with the sole exception of footwear components have shown a positive growth in 2010-11 in comparison to the previous year. Finished leather and footwear have grown by over 10 % over the previous year. Overall the leather sector has shown a growth of 8.42 %.

Product	April – Jan 2009-10	April – Jan 2010-11	% Variation
Finished Leather	23403.68	27147.32	16.00
Leather Footwear	42841.45	48050.8	12.16
Footwear Components	9379.59	8731.36	-6.91
Leather Garments	14851.83	15177.63	2.19
Leather Goods	25667.57	26925.27	4.90
Saddlery & Harness	1654.02	1678.30	1.47
Non Leather Footwear	645.74	704.21	9.05
Total ➔	118443.9	128414.85	8.42

(Value in million rupees)

During the first seven months of 2011, Indian exporters recording a growth of 27.33 % for the period April – Oct, 2011, totaling US $ 2.741 billion. Despite the depreciation of the rupees during Sept – Oct 2011, Indian exports did well both in rupees and dollar terms.

As per data available in 2009-10, Germany is the largest net importer of Indian leather goods with a 14.5 % share followed by UK at 13.41 % and Italy at 11.72 %. These three countries account for almost 40 % of India's total exports in this sector. Leather goods and leather garments contributed to 22.3 and 12.6 % respectively. Germany continues to be a strong market for Indian exporters.

India's Export To Germany (In Euros)

Category	2008	2009	% Change	2010	% Change
Leather & Shoes	433,233	446,244	3.0	541,332	21.3

Source: Federal Statistics Office, Wiesbaden, Germany

Indian exporters to Germany will be extremely happy to note a 21 % increase in net German imports in 2010 over the previous year. One would hope that this trend continues keeping in mind the robust health of Europe's biggest economy.

Indeed the beginning of 2011 saw business confidence index hitting a 2 decade high in Germany. However events that unfolded during the year in the form of the Greek crisis have put the German economy in great strain. Germany supplied the bulk of the money that prevented the Greek crisis from spiraling into a global meltdown. A report in November 2011 indicated that orders for German goods from its Eurozone partners

fell by 12.1 %. The German economy is therefore not immune to the financial turmoil and economic slowdown in its Eurozone neighborhood. These events have led to a downgrade of economic growth projects for 2012 from 2 % to 0.8 % by a group of financial institutions in Germany. The possibility of a looming recession will make it extremely difficult for the economic heavyweights of the EU, namely Germany and France to help their struggling Eurozone partners, the so called PIIGS, Portugal, Italy, Ireland, Greece and Spain.

How are these developments going to affect the Indian leather exporters and what steps need to be taken by them in order to maintain a steady growth rate?

The European Union has been India's traditional and largest market. The Indian exporters have created a brand value for themselves which will always find a place in the world markets. The present crisis in Europe gives India the opportunity to do some long term planning and bring down this EU dependency from the nearly 70% share to down to about 45 – 50 % levels.

I will now discuss a few things which the Indian exporters along with the leather council have to plan and prioritize for the short to mid term. The focus should be on new strategies.

1. Other promising markets must be explored more vigorously such as North America (including USA & Canada), Australia, Japan, Africa and Russia. As per figures available for 2009-10, the US market accounted for 8.71 % of the leather exports from India. Exporters and policy planners need to find ways to increase this share to about 15 – 20 % levels. The depreciation of the Indian rupees can be a favorable factor for the exporters from India but this alone is not going to help them in the long term. Countries such as Vietnam, Bangladesh and Indonesia have labor cost and logistical advantages which India cannot expect to match. India could also follow the Chinese way of exploring acquisition of distribution companies and brands allowing an easier access to the market. A strategy also followed by Indian IT, automotive and some textile companies in USA.

2. Africa with its geographical proximity to India, offers immense possibilities. Africa on the whole is expected to record a growth of 5.8 % in 2012. Africa is integrating more and more with the world and engaging more with emerging economies like China and India. India therefore must engage more with Africa to take advantages of its geographical proximity as well as other economic advantages. China as expected is today the largest trading partner with Africa. China is today the largest emerging trade partner with Africa at 38%. India follows behind with 14 %. Africa has a population of 1 billion and according to the African Development Bank, a middle class population of 313 million.

3. The Chinese leather industry, the dominant player for many years now, has reached an inflexion point whereby they are confronted with high cost of materials

combined by labor shortages. The main world trade partners of China are reducing the shares imported from China. There is an opportunity here for Indian companies as there some of the orders can be diverted to other countries such as India. Raising environmental concerns and a growing domestic demand are some of the other pressing concerns confronting the Chinese industry. The Chinese industry will be under more and more pressure to reduce their exports and supply part of the production to meet the increasing local demands which is growing at approximately 10 % per annum. Increasing per capita income is boosting consumption patterns in China especially for luxury goods.

4. Despite their dominance in leather exports, a major drawback has been the lack of well know Chinese brands. The failure to build a global brand has been a singular failure of the Chinese leather industry. There are lessons here for India and our Indian exporters and planners need to think about this and try to exploit to our advantage by building internationally reputed brands. An alternative route would be to tie up with existing global players who are eying India as a sourcing base. These initiatives are needed if India desires to be counted as a major player in this sector.

5. Besides the above points that have been discussed, the Indian leather industry also needs to reflect on the other broader problems that makes India, a significant yet small player in the International leather market.

The global leather trade is US $ 116 billion, of which India's share is US $ 3.75 billion. China on the other hand, has a share of 25 billion, or 22 % of the market.

One needs to ask why an Indian footwear unit can produce a maximum of only 2000 pairs a day while it is common to find Chinese units manufacturing 40,000 pairs a day. Out of the total global leather garment trade volume of 120 million pieces, China makes 70 million pieces, while India makes about 16 million pieces. The leather sector in both countries, ladies and gentlemen, was more or less the same size about 20 years ago, about US $ 1 billion. India, like China too enjoys the availability of huge manpower and also a big raw material base.

China has managed to corner a big slice because they have mastered the volumes game. India has unfortunately been a laggard here. It is not the ability to secure orders, but the ability to execute it which has been the biggest challenge facing Indian exporters.

A host of issues confronts Indian leather goods manufacturers, from shortage of power, lack of credit facilities and logistical impediments. The restriction of power usage makes it necessary to use expensive backup power. Loans are not very easy to secure as SMEs are treated as "risky" by banks. Severe congestion in Indian ports and their inability to receive big container ships means that exporters have to pay extra to transship their goods via Colombo or Dubai or Singapore. Adding to these woes is an acute shortage of trained manpower.

Are there any readymade solutions for these serious problems?

We have the potential, but to convert it into the desired goals, calls for fresh thinking or as some people call it "Out of the Box" thinking.

A way can be found to handle big orders by what is known as the "Consortium" approach or is also referred to as the "Cluster" approach. Italy comes to mind immediately which has successfully demonstrated the benefits of such as approach.

Indian exporters need to find ways how to work together and to combine their manufacturing capacities. Raw material sourcing can be combined thereby bringing down the costs. Backup energy can also be shared amongst the users. A unified approach can also increase the confidence of International buyers in the capability of Indians to execute large orders. Agra, Chennai, Kanpur, Ranipet and Ambur are centers where this strategy can be tried and tested.

Globalization has changed the dynamics of international trade in more ways than one imagined even a few years ago. It is no longer important to find the cheapest supplier but also to find a supplier who is ethical as well as socially compliant. What this means is that it is no longer sufficient only to build good infrastructure and production techniques, but the working environment and working conditions of the workers also need to be given adequate attention by the management. To be part of a reputed international supply chain, these social requirements can no longer be ignored today.

Macro Economic Challenges

So far we have dwelt mainly with micro economic issues confronting the Indian leather industry. The Indian exporters have worked very hard to sustain India's growth momentum in the leather sector despite serious challenges confronting him. They need to be applauded for whatever they have achieved so far overcoming enormous challenges.

Let us know discuss things on a macro level perspective. Here we discuss the role of the Government and discuss how macro-economic planning can help India sustain its growth trajectory.

Ladies and Gentlemen, as many of you may know India is entering the 12th Five Year Plan period, 2012 – 17. The government in has announced that USD 1 trillion would be spent to expand and improve India's infrastructure during this plan period. Roads, electricity generation, ports are some of the thrust areas and this is to be welcomed. If India plans to double or triple its merchandise exports, this definitely cannot be done with the present state of infrastructure.

Another milestone which can have far reaching and significant implications on India's economy is the successful conclusion of the Free Trade Agreement between India and the EU.

The India EU Free Trade Agreement (FTA) negotiations were launched in 2007. So far 11 negotiating rounds have been held with the last one taking place in Brussels on 10th December, 2010. Negotiations are expected to be concluded this year, i.e. in 2012.

However, as can be expected, major differences remain. The points of contention are many. For India, the services component of the agreement is of very high importance. Tariffs for Indian agricultural commodities in Europe remain very high. From the EU point of view, though India is no longer the closed economy it was in 1990, it still maintains substantial tariff and non-tariff barriers that hinder trade relations with the EU.

The successful conclusion of the talks can help in increasing trade in both goods and services between the two.

Let us have a look at the trade statistics between India and the EU taking 2010 figures.

Trade in Goods

- EU goods exports to India 2010: Euros 34.7 billion
- EU goods imports from India 2010: Euros 33.2 billion

Trade in Services

- EU services exports to India 2010: Euros 9.8 billion
- EU services imports from India 2010: Euros 8.1. billion

Foreign Direct Investment

- EU outward investment to India 2010: Euros 3 billion
- Indian inward investment to EU 2010: Euros 0.6 billion

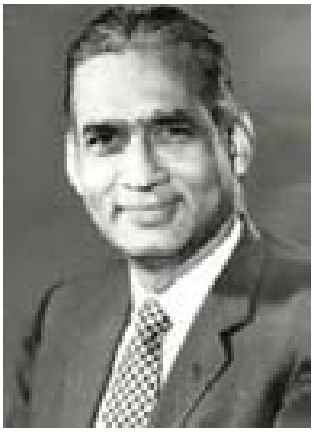
I believe that the speedy conclusion of the EU-India Free Trade Agreement will be an important step towards further strengthening the trade relations between the two regions.

Before concluding I would like to draw your attention to the various non-commercial issues that have come to dominate global trade. Environmental and social compliances have become a pre requisite for doing export, especially to established and well recognized brands and retailers in Europe and the USA. SA 8000, BSCI etc. are some initiatives to help the exporters conform to these requirements. I am sure that the exporting community is well aware of these challenges and has taken steps to meet these. I am fully aware of the tremendous efforts made by the Indian leather industry to meet the social and environmental requirements in different parts of the country. Let me just say that this should not be allowed to become a bottleneck to India's export efforts.

Friends, I am convinced that Indian leather sector has great potential for growth. Somehow, the industry has not yet realized its full potential. The fact that the industry has braved the current global economic crisis well is indicative of its strengths and resilience. I hope that this new found confidence will help the industry to gallop ahead and become a leading player during the 12th plan period.

Thank you.

Prof Y Nayudamma Memorial Lecture



Late Prof Y Nayudamma

ETHICS, ENERGY AND EQUITY

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The earth planet with a population of more than 6 billion, over periods of civilization in different parts of the world, has brought better quality of life to many who celebrate science & technology, management, philosophy and broad variations of capitalism and socialism. The fact remains that more than 2 billions of the living population does not have access to energy, clean water, education and healthcare. The disappointing fact is that deprived citizens which includes expecting mothers and children do not see hope and faith in the organizations in their own countries and the world systems. The population is likely to grow to about 9 billion by the end of 2050 and the climate changes are threatening to deprive the under-privileged more than those who are doing well in the world.

We find that the world is divided between optimism and disillusionment. History is demonstrative of the fact that enlightened human beings can remove disillusionment with their capacity, capability, commitment, approaches and selfless service. The nations and the world bodies require leadership of intellectuals, social scientists, scholars and believers in voice of democracy to guide the systems and societies where politicians and bureaucrats combine their sensitivity to large masses with intellectuals and professionals to have high synergy for enhancing quality of life for deprived citizens of this planet in a systematic and demonstrative manner.

This brings to focus the importance of ethics of individuals and the organizations. The current scenario also demands coherent synergy between ethical organizations to deliver equity to all citizens on this planet. Equity to me means education with healthcare and equal opportunity. Realizing a developed civilization also means creating an echo system in various parts of the world for wealth generation and management. It is clear that cost effective energy, sustainable, over centuries, for various parts of the world; with or without strong base in science & technology along with addressing the issues of global warming and sustaining and enhancing bio-diversity are the key issues. There is a need that energy, water, health, land and food are considered in a comprehensive and interlinked fashion for sustainable options to provide better quality of life to all the citizens of the plant.

I shall put even higher priority on effective water harvesting and conservation, water purification, water management, etc. as compared to energy. Access to clean water can result in eradicating and mitigating of many diseases, enhance our culture and give

better quality of life and longevity. Many an existing technologies can be harnessed and new science and innovations can lead to affordable and less energy intensive technologies and solutions to unresolved challenges.

Affordable healthcare, discovery and implementing new horizons of thoughts and insights for incurable diseases, healthcare with equity and ethics are equally strong challenges, which are needed to be addressed, on priority. Nano science & technology is a new opportunity for finding solutions of high merit in domains of energy, water and healthcare.

We can have different incomes of different citizens in India, however to be a developed nation, we must commit ourselves to quality health care for all. Holistic approach to education which puts emphasis on learning, building skill sets, appreciation of ethics, sensitivity to all stakeholders in society and wealth generation, is key to India progressing to a developed nation.

I wish to address energy and healthcare. The world requires increased emphasis on renewable distributed energy for all countries and enhanced contributions by nuclear energy for technology capable countries. Each country shall have to make considered decisions for a bouquet of technologies to sustain energy and environment on basis of broad principles as mentioned above. I would describe possible choice for India to meet the energy needs. India has good reservoirs of coal and hydro and these must be exploited with the best technologies, on the immediate horizon of about 50 years. Emphasis on renewable energy, namely solar and wind must be done with best of the science & technology base in the country. Bio-waste is a good option for us while biomass should be carefully considered to ensure that this option does not conflict with the food cycle for human beings, cattle and other species. Strong R&D base in nuclear energy in the country and now that India is being integrated in the world nuclear energy system for civil nuclear energy, allows us to forecast & implement a large contribution from nuclear energy in the coming 50 years. I describe below energy scenario in India, three stage nuclear power programme, fast breeder reactor programme, future of fast reactors, nuclear fuel cycle, long term energy perspective, etc.

Energy Scenario in India:

In the Indian context, the Integrated Energy Policy document of the Planning Commission, Government of India indicates that proven reserves of coal, the most abundant energy resource, at the current level of consumption can last for about 80 years. Of course, coal and lignite consumption will increase in the future and the reserves would last for a limited period. If domestic coal production continues to grow at 5% per year, the total (including proven, indicated and inferred) extractable coal reserves will run out in around 45 years. The reserves of crude oil are merely 786 Mt. These can sustain the 2004-05 level of production for 23 years and will last only for 7 years at 2004-05 level of total consumption of the country including imports. Gas

also is likely to last only about 30 years at 2004-05 consumption level. Considering the increase in production in future, it may run out even earlier.

Unsustainable increasing imports, logistics of supply of coal to existing new coal fired stations, environmental fort prints, energy security, etc. do not allow us to expand on coal share of energy production on the basis of end to end delivery strategy.

India needs, at the very least, to increase its primary energy supply by 3 to 4 times and its electricity generation capacity / supply by 5 to 6 times of their 2003-04 levels. By 2031-32 power generation capacity must increase to nearly 800,000 MWe from the current capacity of around 190,000 MWe. Coal accounts for over 50% of India's commercial energy consumption and about 78% of domestic coal production is dedicated to power generation. This dominance of coal in India's energy mix is not likely to change in the next two decades. Similarly requirement of coal, the dominant fuel in India's energy mix will need to expand to over 2 billion tonnes/annum based on domestic quality of coal. The imports of a large quantity of coal, increasing up to 250 MT per year in next ten years shall pose numerous supply chain challenges. There is a clear need for accelerating clean coal technologies such as advanced ultra supercritical plants, integrated coal gasification plants, retrofilling existing plants for enhanced energy efficiency, carbon dioxide capture and sequestration, etc. The predictions of energy requirements, by 2030 and 2050, done by Tata Energy Research Institute (TERI) and Department of Atomic Energy are broadly endorsed by Planning Commission of India. These predictions take adequate cognizance of currently available resources, technologies and concerns of environment. However, new discoveries, innovations in resources exploration, utilization, recycling, energy efficiencies from cradle to grave technologies and their management, conscious embracing a way of life with reduced carbon foot print but maintaining good quality of life and improvement in ethics are not modeled in this predictions. I am, of the opinion that these can emerge as parameters for paradigm changes in energy generation demands, distribution and policies. The way for India, is to learn from the maturity of western technologies, adopt successful modes of industry-academia-research coherent synergy and leap frog with innovations specific to India.

Meeting the energy challenge is of fundamental importance to India's economic growth imperatives and its efforts to raise its level of human development. It is clear that nuclear energy has to be utilized much more intensely in the decades ahead. India has 20 nuclear reactors (installed capacity: 4780 MWe) operating and 7 more (capacity: 5300 MWe) under construction. Although nuclear power in India provides approximately 3 % of the electricity generated in the country now, it is estimated to go up to 25 % by 2050. India has a special interest in developing Fast Breeder Reactors and use of thorium as a source of energy as it has one of the largest reserves of thorium. Japan, China, France, South Korea and Russia also are interested in development of Fast Spectrum Reactors in order to utilize the uranium resources efficiently. USA, France

and many other countries are interested in using fast reactors as burners of minor actinides and long lived fission products and also to stay with and use this technology on a longer horizon for breeding and energy security.

Three Stage Nuclear Power Programme:

The total energy demand of India in 2050 is envisaged to be about 1300 GWe in terms of installed capacity. The contribution of nuclear energy has to be increased at the fastest possible pace to be able to meet about a quarter of the national electricity demand in 2050. This shall required end to end management in an effective manner, high safety record and robust public and political acceptance. India has rather meager reserves of uranium (61,600 t), the only naturally occurring fissile element that can be directly used in the nuclear reactor to produce energy through nuclear fission. However, nearly a third of the entire world's thorium is available in India. Thorium is a fertile element, and needs to be first converted to a fissile material, uranium – 233, in a reactor. The strategies for large scale deployment of nuclear energy must be, and are therefore, focused towards utilization of thorium. The large growth in nuclear power capacity can be realized only through efficient conversion of fertile materials into fissile materials and utilizing the later to produce energy. A closed nuclear fuel cycle, which involves reprocessing and recycle of fissile materials, is thus inevitable and that too, in a relatively shorter time frame than most of the other industrialized countries. Thorium reserves available in India amounts to 225,000 t with an electricity potential of 155,000 GWe-y through multiple recycling. This means that thorium can feed for 275 GWe capacity power plants for about 560 years.

The three stage nuclear power programme envisaged by Dr. Homi Bhabha consists of:

1. Pressurised heavy water reactors (PHWR) with natural uranium as fuel.

2. Fast breeder reactors (FBRs) utilizing plutonium based fuel and

3. Advanced Nuclear Power Systems with utilization of thorium.

The first stage has now matured into a robust technology with the availability factors of operating reactors touching 90 % consistently. However, the PHWR programme cannot be taken beyond a level of nearly 12,000 MWe due to limited resources of indigenous uranium. We have the possibility of importing advanced water reactors to push the contribution of nuclear energy towards meeting large Indian demands. The effective utilization of the uranium resources is possible only through the Fast Breeder Reactor route by which India can achieve a power capacity of nearly 200,000 MWe for about 200 years. It was Dr. Vikram Sarabhai, who recognized inevitability and complexity of Fast Breeder Reactors in India and put into action the second stage of country's nuclear power programme. For this purpose, he created a roadmap for truly interdisciplinary research, which finally led to the establishment of the Reactor Research Centre, later renamed as Indira Gandhi Centre for Atomic Research (IGCAR).

India has entered into the second stage of the programme successfully, with the design and construction of 500 MWe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam.

A question that is often asked is whether India needs the fast breeder reactors, particularly when other countries have abandoned this technology presently. The countries that have abandoned fast reactors are saturated with energy generation. But a country like India wherein the per capita electricity consumption is a meager i.e. 700 kWh, needs more energy. There is also undue concern of proliferation brought out in some international projections because FBR produces more plutonium than it consumes. Plutonium is a dual-use material, used in nuclear weapons as well as fuel for fast breeders. But in Indian programme, the plutonium generated in nuclear reactors is used for the new coming up power stations, mostly fast breeder reactors. It is to be emphasized that the inevitability of fast breeders in India arises both from resources utilization capacity as well as growth capability. By the use of FBRs the utilization of uranium can reach 60 to 80 % as compared to less than 1% with Light Water Reactors (LWR) and PHWRs on once through cycle or a few present with Pu recycle. If plutonium obtained from PHWRs is straightaway used to sustain the thorium systems, then the total megawatt power capacity that can be installed would necessarily be limited and it will grow very slowly thereafter. To go to a much higher installed power capacity base at a faster pace, it is inevitable that we multiply the fissile inventory and at the present level of technologies, there is nothing better than fast breeder reactors.

Fast Breeder Reactor Programme:

The Indian fast reactor programme started with the 40 MWt / 13.2 MWe Fast Breeder Test Reactor (FBTR), commissioned in 1985 at Kalpakkam. It is the only reactor in the world, which uses the uranium-plutonium mixed carbide as driver fuel. The choice of the mixed carbide fuel for FBTR was necessitated by the technological problems anticipated in the use of high Pu content MOX fuel, and the non-availability of enriched uranium. For the first core (Mark I), a Pu/(U+Pu) ratio of 0.7 was required in the fuel. For the Mark II expanded core, the Pu/(U+Pu) ratio is 0.55. The fuel cycle of FBTR is being successfully closed, thanks to the multidisciplinary, inter-institutional research programmes, which have been pursued in a focused manner. The Mark I mixed carbide fuel has performed extremely well, reaching a burn-up of 155,000 MWd/t, without any fuel pin failure (burn-up of a fuel material is defined as the energy extracted from a given mass of the fuel: it is measured in Megawatt {thermal} days per tonne of the fuel). Over the years, the performance of reactor systems, sodium systems, control rod drive mechanisms and other safety related and auxiliary systems of FBTR has been excellent. The purity of the coolant used in the reactor in the primary and secondary circuits was so high that there is no corrosion in the systems for years together. The four sodium pumps and their drive systems have been operating very well. Visual inspection of the reactor vessel internals has been carried out at two-year intervals and reactor internals have been found to be healthy. Presently FBTR is used as an irradiation facility for fuels and structural materials, in addition to some challenging experiments required to enhance safety of future FBRs.

As a logical follow-up of FBTR, it was decided to build a Prototype Fast Breeder Reactor (PFBR). For PFBR, a uranium plutonium mixed oxide (with PuO2 content of 21% in inner zone and 28% in outer zone) has been chosen as the driver fuel. Unlike FBTR, which is of loop type wherein all the primary sodium components viz. core, sodium pump and intermediate heat exchangers are connected through pipelines, PFBR is a pool type reactor where all the primary sodium components are in a single large vessel called Reactor Assembly. The reactor has 2 primary and 2 secondary loops and 4 steam generators per loop. Austenitic stainless steel type 316 LN is the major structural material for the sodium components and modified 9 Cr-1 Mo is the material for steam generator. The sodium temperatures are 820 K / 670 K for hot and cold pools respectively. The design plant life is 40 y with a potential to extend upto 60 y. The PFBR has many design features to achieve economy. A peak fuel burn-up of 100 GWd/t is targeted. The simple rectangular reactor containment building provides significant economy and construction advantages. The Government of India has accorded administrative approval and financial sanction for the construction of PFBR in Sept, 2003. A Government company, Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI), was formed to implement this first commercial fast breeder reactor project. The first criticality of the reactor is scheduled in Sept, 2010. BHAVINI would be a cradle to grow into a mega organization for delivering 500 GWe of energy through FBRs in the 21st century.

Future of Fast Reactors:

Immediately after the construction and commissioning of PFBR, a series of four 500 MWe fast breeder reactors will be constructed. It is important to reduce the cost of power to increase the competitiveness of the Indian economy, to increase the quality of life in India and to stay competitive in Indian energy market. The construction time could be brought down to five year. With the experience available from nearly 380 reactor-years of fast reactor operating experience available world wide, the present day capital cost are more close to that of water cooled reactors. Future plans are to go in for 1,000 MWe fast breeder reactors (beyond 2020) with improved design features and optimization at all stages. All efforts are focused on developing high burn-up and high breeding fuel, advanced structural materials and longer life of upto 60 years or more. It has also been decided that only PFBR and the next four FBRs will have the mixed oxide as the fuel and the future FBRs will use metallic alloy of U-Pu-Zr as the fuel. The decision is based on the potential of metallic alloy fuel to safely go for high breeding and high burn-up. Beyond PFBR, FBR cores would be so designed that the fuel can be switched to metallic fuels which have special significance to Indian energy scenario, for enhancing the pace of availability of nuclear energy.

To achieve the targeted growth in a sustainable manner, India has followed the philosophy of closing the fuel cycle at all stages. The power programme has thus been supported by the development of all the facets of the associated nuclear fuel cycle, with emphasis on economy, safety, minimum environmental impact, and potential for growth. The design and development activities for FBR as well as fuel cycle have

the strong backup of extensive R&D inputs in the field of high temperature design, component development, thermal hydraulics, structural mechanics, materials and metallurgy, fuel chemistry, computers and instrumentation, safety and basic sciences.

Nuclear Fuel Cycle:

Closing the fuel cycle is a key element of the FBR programme, without which it is not possible to realize growth in nuclear power. For a nuclear reactor, the front end

of the fuel cycle consists of the fresh fuel fabrication plant and the back end consists of the spent fuel reprocessing plant integrated with re-fabrication and waste management. The fuel fabrication plant processes the fresh fuel to the required composition and size, fabricates the fuel pins and assembles them in the form of a fuel sub-assembly. To retain the fuel pins in the reactor for a longer time to extract more energy from the fuel, the primary limiting factor is the clad material that retains the fuel and the wrapper material, which holds the bundle of fuel pins. Hence, development of advanced clad and wrapper materials for achieving high burn-up are being carried out by a combination of alloy design including innovative thermo-mechanical processing routes. Alloy D9 has been chosen as the clad for PFBR. A detailed characterization of D9 was carried out to establish the optimum amount of minor alloying elements needed for better creep, fatigue, creep fatigue interaction resistance and more important resistance to void swelling.

The PFBR fuel fabrication plant will be a part of the Integrated Fuel Cycle Facility to be set up at Kalpakkam comprising the reprocessing plant and waste management plant. The co-location concept obviates the need for transportation of plutonium rich fuel through public domain, thus avoiding the hazards during transportation. By the process of closing the fuel cycle, the high value fissile material remaining in the spent fuel is separated, processed and is recycled again to the reactor in the form of fabricated fuel pins. Minimizing the inventory of fissile material in the nuclear fuel cycle assumes importance due to cost considerations, growth of nuclear power and proliferation concerns. Considering these factors, co-locating the nuclear fuel cycle facility in the same location of the fast reactors is the preferred choice.

Reprocessing activities at IGCAR, Kalpakkam started with processing of irradiated thorium rods for separating U 233. This U 233 has been used for fabrication of mixed oxide fuel test assembly for irradiation in FBTR, before use in fast reactors. A pilot plant scale reprocessing facility has been commissioned and reprocessing of FBTR fuel has commenced successfully. Based on the experience gained in this facility, a demonstration reprocessing plant is under construction and will be commissioned in 2009 to reprocess the FBTR fuel on a continuous basis.

The reliable and trouble-free operation of the pilot plant has also given the confidence to take up the challenge of design and construction of large reprocessing plant with matching throughputs of fuel from PFBR. This fuel cycle facility will be commissioned in the year 2012, to reprocess the irradiated fuel discharged from PFBR and close the

fuel cycle. This presents a unique opportunity to introduce innovations in the flow sheet for the entire facility comprising a fuel fabrication plant, a reprocessing plant and a waste management plant. The high level wastes usually generated in the reprocessing plants is a mine of wealth provided the useful elements such as Cesium and Strontium and other important elements are separated and deployed in medical and other societal applications such as irradiation of food, cancer treatment, sewage treatment etc. Also the radioactive wastes with long life can be recycled to reactors for burning. R & D in the area of development of process flow sheets to separate such elements is in progress.

Long Term Energy Perspective:

With the increasing demand for energy, India has to look for technological solutions for generation of alternate fluid fuels to hydrocarbon fuels. Most of the technologies for this application need temperatures in the range of 700°C to 900°C. In particular, generation of hydrogen from water using chemico-thermal processes needs high temperatures exceeding 800°C. Keeping this in mind, the Department of Atomic Energy has initiated programme to design and develop such a reactor system operating at high temperature. In preparation for the Third Stage, development of technologies pertaining to utilization of thorium has been a part of the ongoing activities of the Department. Considerable thorium irradiation experience has been acquired in research reactors and we have introduced thorium in PHWRs in a limited way. With sustained efforts over the years, a small scale experience over the entire thorium fuel cycle has been obtained. An example is the KAMINI reactor, in IGCAR, the only currently operating reactor in the world, which uses U 233 as fuel. This fuel was bred, processed and fabricated indigenously. The Advanced Heavy Water Reactor (AHWR) programme provides a focal point for a time bound high intensity development in the efficient utilization of thorium and mastering Thorium 232 – Uranium 233 bred reactors and fuel cycle technologies. In the Accelerator Driven System (ADS), high-energy proton beam generates neutrons directly through spallation reaction in a non-fertile / non-fissile element like lead. A sub-critical blanket with lesser fissile requirement will further amplify this external neutron source as well as energy. Development of such a system, which is already in progress in the DAE, offers the promise of shorter doubling time with Thoruium – Uranium 233 systems, incineration of long lived actinides and fission products and robustness to the approach towards realization of the objective of large scale thorium utilization.

Looking beyond fission, we have a mega energy potential in harnessing thermonuclear energy i.e. fusion energy. The International Thermonuclear Experimental Reactor (ITER) project has recently been launched to explore the possibility of harnessing fusion power. Recently India joined as full partner of this mega initiative. On present indications, successful and practical fusion power systems may become available only around 2050. There is global interest in harnessing solar energy, wind energy, energy from biomass, bio-diesel, energy from waves and from ocean thermal gradients. All these will need to be explored and utilized wherever practical and economic. In some

of these areas, more research and development is warranted. The petroleum costs being high and volatile, these options, once considered uneconomic, can become cost effective in not so distant future.

Department of Atomic Energy and Society

A unique feature of Department of Atomic Energy is generating spin-offs to serve the strategic sectors, industries and society in a better way. To highlight a few, ionizing radiations are being used for sterilization of medical and food products and creating higher yield better varieties of pulses and cereals. Non-destructive examination techniques are applied for fingerprinting of ancient South Indian bronzes. A GIS based decision support system for real time application, commissioned in the Centre, is used for the real time atomospheric dispersion model and plume forecast. The resultant radiation dose due to the plume is dynamically synthesized with spatial data base of villages, road networks, schools, hospitals, population and animal husbandry. It provides complete online guidance during emergency situations and can be effectively used in other emergencies, such as chemical releases in plans, cyclones, storms, etc. There are many such applications, which need to be realized through collaborations. DAE is very keen in such collaborations.

IGCAR and Research in Healthcare

I wish to narrate three examples of applications of healthcares, in close collaborations with medical institutes.

1. A Diagnostic Tool

Infrared thermal imaging has been employed for research studies in medical diagnostic related applications. The investigations include studies on breast cancer, wound healing, arthritis, deep vein thrombosis and varicosity. Thermal imaging is the surface mapping of temperature using infrared sensors. The infrared sensor used is made of In-Sb or PtSi, having sensitivity for the spectral range of 3.6 to 5 μ. The temperature sensitivity is of the order 0.05K.

It is well known that body temperature is a useful parameter for diagnosing diseases. There is a definite correlation between body temperature and most of the diseases. The use of infrared thermal imaging for medical diagnostics related applications is based on the fact that human metabolism involves energy conversion. The change in energy dissipation pattern is expected to be the reflection of altered conditions of metabolism and helps in identification of presence of diseases like cancer or for monitoring recovery processes such as wound healing.

Studies carried out using infrared thermography indicated that the technique is effective for non-invasive diagnosis of peripheral vascular diseases, with good correlation to clinical findings. Temperature gradients are observed in the affected regions of patients with vascular disorders, which is attributed to abnormal blood flow in the affected region. The temperature in the affected regions is about 0.7 to 10C

above the normal regions, due to sluggish blood circulation. Studies carried out also indicated that infrared thermal imaging can be employed for detection of carcinoma breast. An important finding made during these studies is that surface texture of the human body plays an important role in optimisation of the procedures for diagnostic studies using infrared thermography. Image processing and analysis technique would enhance the sensitivity for infrared thermography for medical diagnostic applications. While the studies carried out give confidence in the use of infrared thermography for medical diagnostic applications, it is essential that standardised procedures, protocols and, image processing methodologies are to be developed for successful implementation.

2. SQUID Sensors and Magnetoencephotography

Superconducting Quantum Interference Devices (acronymed as "SQUID") are the most sensitive detectors of magnetic signals available today with a sensitivity higher than 10 femto-Tesla. This sensitivity is so high that it is possible to detect even the tiny magnetic fields associated with the physiological activities of human heart (50 pico-Tesla) or the human brain (less than 2 pico-Tesla). These sensors have a wide spectrum of applications ranging from SQUID magnetometers for laboratory research, SQUID based systems for non-destructive evaluation of materials and components, geophysical prospecting of minerals, multichannel SQUID systems for measurement of biomagnetic fields such as those associated with the activity of the neural networks in the human brain etc.

At IGCAR, we have a comprehensive programme on the micro-fabrication of SQUID sensors that involves deposition of superconducting films under Ultra-High Vacuum conditions, photolithographic processing to realize fine feature sizes in the micron range and plasma etching processes to realize device geometries. SQUID sensors developed at IGCAR are being used in a variety of applications such as SQUID magnetometer for physics research. A SQUID system based on a precision X-Y-θ scanner for non-destructive evaluation of materials is already operational and is being used for advanced research.

A SQUID based system for magnetocardiography / magnetoencephalography is also under development at IGCAR. Since the biomagnetic signals are extremely weak (pico-Tesla) compared to the ubiquitous environmental magnetic noise (nano-Tesla), a magnetically shielded room has been established at IGCAR with a shielding factor exceeding 60dB at 1Hz. This extensive shielding makes it possible to measure and characterize even the tiny magnetic signals such as those associated with human heart and human brain. We are very excited that we have been able to observe the magnetic field signal from the human heart as also the MEG signals corresponding to the alpha rhythm of human brain.

Unlike electrocardiography and electroencephalography (which requires attaching electrical leads), magnetocardiography and magnetoencephalography are non-contact measurements. Electrical signals observed are also distorted by conductivity distribution in the surrounding tissues while the magnetic signals are not so distorted since most tissues are very weakly diamagnetic. SQUID based measurement of biomagnetic fields is expected to complement the conventional diagnostic tools such as ECG and EEG. Source localization accuracies are expected to be much better in MEG compared to EEG. I request the doctors to visit our MEG facility at IGCAR to explore the possibility of collaborative work in this challenging area of research.

3. Biomaterials: Body Parts of the Future

Replacing a worn out part in a machine is no small an issue and the technology behind the replacement is nothing small either. When that's for a machine, imagine how much more it is for a living body. For example, a 40 year old woman has a worn out hip joint or a 30 year old has a fractured leg leaving them immobile for the rest of their life's. In such a situation introduction of biomaterials opened up the dead-end these people came to and promised them extended years of active mobility, that's the achievement the area of biomaterials truly brought about.

During the last 90 years, man made materials and devices have been developed to the point at which they can be used successfully to replace parts of living systems in the human body. These special materials - able to function in intimate contact with living tissue, with minimal adverse reaction or rejection by the body - are called biomaterials. The earliest successful implants were bone plates, introduced in the early 1900's to stabilize bone fractures and accelerate their healing. Advances in materials engineering and surgical techniques led to blood vessel replacement experiments in the 1950s, and artificial heart valves and hip joints were under development in the 1960s.

The number of implants in use indicates their importance to health care and the economic impact of the biomaterials industry. For example, it was estimated in 1988 that 674,000 adults in the US were using 811,000 artificial hips. It was also estimated that 170,000 people worldwide received artificial heart valves in 1994. Artificial joints consist of a plastic cup made of ultrahigh molecular weight of polyethylene (UHMWPE), placed in the joint socket, and a metal (titanium or cobalt chromium alloy) or ceramic (aluminum oxide or zirconium oxide) ball affixed to a metal stem. This type of artificial joint is used to replace hip, knee, shoulder, wrist, finger, or toe joints to restore function that has been impaired as a result of arthritis or other degenerative joint diseases or trauma from sport injuries or other accidents. Artificial knee joints are implanted in patients with a diseased joint to alleviate pain and restore function. After about 10 years of use, these artificial joints often need to be replaced because of wear and fatigue-induced delamination of the polymeric component. Institute engineers are developing improved materials to extend the lifetime of orthopedic implants such as knees and hips.

Design engineers must consider the physiological loads to be placed on the implants, so they can design for sufficient structural integrity. Material choices also must take into account biocompatibility with surrounding tissues, the environment and corrosion issues, friction and wear of the articulating surfaces, and implant fixation either through osseointegration (the degree to which bone will grow next to or integrate into the implant) or bone cement. Although the wear problem is one of materials, it plays out as a biological disaster in the body. Any use of the joint, such as walking in the case of knees or hips, results in cyclic articulation of the polymer cup against the metal or ceramic ball. The average life of a total joint replacement is 8-12 years, even less in more active or younger patients.

When a man-made material is placed in the human body, tissue reacts to the implant in a variety of ways depending on the material type. Therefore, the mechanism of tissue attachment (if any) depends on the tissue response to the implant surface. Although bioactive materials would appear to be the answer to biomedical implant fixation problems, available bioactive glasses (i.e., Bioglass) are not suitable for load-bearing applications, and so are not used in orthopedic implants. This is where R&D comes in, now studies are on to look into the loading of bioactive glass onto sturdy implant materials. We at IGCAR are presently working on the preparation of nanobioactive glass powders and loading them onto titanium surfaces by anodization, this modified titanium surfaces will possess more bioactivity because of the presence of bioglass and the mechanical strength lacking in bioglass is provided for by the titanium substrate.

The science of replacing organs or parts of organs that are crucial to our existence is both exciting and potentially dangerous. Although poor heart valve designs resulting in clinical failures in the past, the current limiting factor for long-term success is the materials themselves. Two types of materials are used for artificial heart valves. “Soft” bioprosthetic materials such as denatured porcine aortic valves or bovine pericardium and “hard” man made materials used in mechanical heart valves, the most successful being pyrolytic carbon. Regular bacterial growth can often be eradicated by cleaning a surface with a disinfectant or by treating our bodies with antibiotics. However, bacteria may irreversibly adhere to surface (both man-made and natural, such as human tissue) that are surrounded by fluids. Therefore efforts are being made to make the implant material surface antibacterial. In these lines, we at IGCAR have anodized the titanium surfaces to produce anatase type of TiO2 which possesses antibacterial properties. Anodization will also increase the wear resistance of the material as well make it less prone to bacterial inhabitation.

Biomaterials research in an exciting and rapidly growing field. The process of wear of implant materials is being studied extensively using sophisticated techniques such as bioferrography, using which the wear particles are mapped and quantified so that an effective mechanism for extending the life of these structures can be devised. Future biomaterials will incorporate biological factors (such as bone growth) drug delivery devices and maybe some self healing factors onto implant materials. Although much

has been achieved, there are still numerous gaps in the area and hence call for more attention. So, biomaterial is one area, which will flourish as long as the human body exists in this universe and as long as wear and tear will lead to the need for replacement.

To summarize, adequate energy, clean environment, nutritious food, clean water, comfortable home, security in terms of law and order, freedom of speech and actions, opportunities for realizing objectives of life commensurate with individual capability, robust gross domestic product of the country, etc. are the indices of a good nation. The good quality of life has to be ensured by robust defence capacity and capability to ensure that the nation occupies a position of earned importance in the community of nations. The countrymen and the management system starting with parliament's law and order and administration system and other allied service functions in society have to be sensitive and philanthropist to work towards the good of the last citizen in the country and the world. A good nation works for enhancing capacity of the deprived nations rather than exploiting the poor nations. The world society has to be need based rather than greed based. Corruption is a disease, which is the result of poor ethics and greed. Parents, teachers, seniors and successful citizens have to take responsibility for rooting out this curse in the societies around them.

I urge all the stakeholders to examine and analyze the robust heritage wheels of the east and chariots of the west without bias. The success lies in combining the best of the east with the west and discovering a paradigm shift and a balance which would enable successes for individuals and steadily increase elements of better quality of life to all the citizens of this planet.

"Abundance of virtues is satisfying and evacuation of egos is bliss"

-- Baldev Raj

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LEATHER TECHNOLOGY AND ENVIRONMENT

LEATHER TECHNOLOGY AND ENVIRONMENT

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Introduction

India has emerged as a major tanning centre of the world, processing about 3000 tons of raw materials per day. The main centres of tanning in India include Jullunder in the north; Kanpur, Unnao and Kolkata in the east; and, Chennai, Ranipet, Ambur, Vaniyambadi, Pernambut, Erode, Dindigul and Trichy in the south. About 45% of country's total tanning capacity is in the south; 18% in Kolkata; 25% in Kanpur; about 7% in Jullunder and the rest scattered in rural areas. Being a water intensive process, tanning generates considerable volume of waste water. On the average, about 35 cubic meter of waste water is generated while processing one ton of raw material. It is roughly assessed that about 100,000 cubic meter of waste water is generated per day by the tanneries in the country. In the process of leather making, a number of chemicals are used in the tanning and post tanning processes. It has been observed that the amount of chemicals absorbed by the leather is not more than 20%, the rest 80% being washed away with the process water. The effluent of tanneries, thus, carries a huge volume of a cocktail of chemicals. Besides, the solid waste generated while processing hides and skins works out to about 65% of the weight of the raw material. This includes hair, fleshings, trimmings of raw, semi processed or finished leather, shavings and leather dust, besides the sludge generated by waste water treatment plants. The solid and liquid waste generated by tanning process thus poses a major challenge of waste treatment and management.

Pollutant Discharge standards

The pollutant discharge standards have been specified by respective Pollution Control Boards in different states of the country. Whereas MINAS (Minimum National Standards) have been prescribed by the Central Pollution Control Board (CPCB), the state boards have been authorized to introduce more stringent norms according to local situation. The standards generally applicable refer to pH, BOD, COD, TSS, TDS, Cr and these vary according to the recipient – such as surface discharge, for irrigation, marine discharge or sewer discharge. Generally there is no limit for TDS prescribed if marine discharge is authorised. With regard to sewer discharge too, depending on the dilution potential available, TDS limits may be modulated.

Nature of liquid waste and treatment process

It is desirable to know a little about the nature of pollutants in the liquid waste. The liquid waste carries both suspended and dissolved solids. The suspended solids consist of dirt and particles of raw hides shaken off the raw material, some traces of dissolved hair, fleshings, leather pieces, leather dust etc. Generally these suspended solids are

either removed by the screening process, by use of fine screens or settled by chemical process and withdrawn as sludge. These are also removed by biological treatment in the aeration tanks or by anaerobic process. In this manner, pH, BOD, COD, TSS and Cr standards are achievable by physio-chemical and biological treatment in the Waste treatment Plants. The suspended solids are removed as sludge from the effluent treatment plants. It has been estimated that 3 to 4 Kg of dry solid sludge is generated by treating one cubic meter of waste water. The process adopted is generally referred to as conventional waste treatment system.

The dissolved solids however pose a major challenge. This consists of ions of sodium chloride, sodium sulphate and carbonates. Traces of dyes are also found. Conventional waste treatment systems do not provide for treatment of dissolved solids. In developed countries the treated effluent high in TDS is diluted in sewage treatment plants before discharge. In some locations, marine discharge is practised. Where such options are absent, such as in Tamil Nadu, for dealing with such pollutants, expensive Reverse Osmosis technology only can be employed. The reject of RO system has to be evaporated either by natural process using solar energy or through suitable mechanical system of evaporation. The mechanical process is energy intensive and very expensive.

Solid waste management

With regard to solid waste management, there are a variety of end uses for the same. Typically, the solid waste generated in tanneries are converted into byproducts as shown in Table 1.

Table 1

Byproducts from Tannery Solid waste

Solid waste	By products made
Hair and wool	Rough blankets, fertilizer
Fleshings	Poultry feed/bio gas/manure
Trimmings of raw hides	Dog chew/glue
Trimmings of wet blue/El leather/shavings	Leather Board
Trimmings of finished leather	Leather board, small leather articles
Sludge	Bricks/manure

It has been observed that the factories in India converting the solid waste into various products are in the micro and small scale sector, employing basic technologies. With more efforts and focus, it is possible to increase value realization from such waste by employing superior technologies and producing better quality and variety byproducts. Italy and Spain have modern factories processing different solid waste of tanneries to produce high value added products.

Currently, the sludge generated within tanneries as well as in the ETPs and CETPs is deemed hazardous in India and many other countries because these contain chromium, though in its trivalent form. It is therefore required to dump such sludge in secure landfills. In advanced countries like the USA, such sludge is not treated as hazardous because trivalent chromium is not deemed harmful. Be that as it may, many experiments have been done in India to demonstrate that such chromium in the sludge could be immobilized. In India bricks, both burnt and unburnt, have been made using such sludge with clay and small quantity of cement. Also manure has been made using sludge and vegetable waste. These products displayed immobilization of chromium. At one point of time, CPCB had allowed use or disposal of sludge containing chromium upto 5000 ppm provided it was trivalent but this notification was withdrawn sometime later. As of date, such sludge in India is deemed hazardous and hence it has to be disposed in safe and secure landfills. Apart from the cost aspect, for creating new secure landfills, land is not easily available in the neighbourhood of tannery districts.

Liquid Waste Management

First, let us briefly deal with the end of pipe treatment before looking at process technology options. The discharge standards vary from location to location, with Kolkata opting for marine discharge standards and Kanpur (Jajmau) for sewer standards. But in Tamil Nadu surface discharge standards have been prescribed which calls for reaching TDS level of 2100 ppm in treated effluent with chloride and sulphate being less than 600 ppm. The TNPCB has directed that all tanneries in the state should go in for ZLD (Zero Liquid Discharge) system of treatment with the twin objectives of recovery of process water and prevention of contamination of ground water and sol. This calls for employment of RO/mechanical evaporation systems. In terms of capital investment, it works out to more than Rs. 1.5 lakhs additional investment per cubic meter of waste water treated. With regard to O&M cost, it is about Rs.120 per cubic meter, about 4 times the operational cost of conventional treatment systems. It is noteworthy that 65% of the cost of operation of a ZLD system is accounted for by energy and fuel for boiler. Of the 15 CETPs in the state, 13 have opted for ZLD system. The rest have the option of sewer discharge. Two ZLD systems are operational at Perundurai and Melvisharam; three covering four CETPs are under stabilization at Thuthipet, Maligaithope and Vaniyambadi; five, covering 6 CETPs at Pallavaram, Ranipet (3) and Pernambut are to be commissioned before end of March 2012. While the one at Dindigul has the option of sewer discharge, yet it is opting to go for ZLD too. Besides, it is reported that about 50 individual tanneries have their own RO systems. Though it has been established that technologically it would be feasible to establish ZLD systems, its sustainability is a major question. Some advantages of the ZLD system include recovery of almost the entire waste water for reuse, less consumption of chemicals due to improved process water and prevention of contamination of soil and ground water by high TDS effluent. In due course of time, the land and ground water contaminated earlier will be able to recoup. But, ultimately, the tanneries have to survive in a fiercely competitive global market!

The issue of sustainability of ZLD system has to be viewed from the points of view of (a) improving process technology thus reducing pollution, especially of TDS, (b) Stabilising process parameters for O&M of the ZLD system, and (c) seeking support of government in critical areas for this unique environmental initiative. While improvements in process technology may help the situation to an extent, unless strong government support is forthcoming, it is quite likely that the industry will face very serious difficulties which may result in closure or migration of a good number of tanneries from Tamil Nadu. It will be a pity if this laudable initiative is not enabled to succeed.

Improved Process Technology

It is against this background that the issue of improved tanning technology has to be viewed. With mounting cost of waste treatment, the question naturally arises as to whether the generation of such voluminous polluting waste water could be controlled. CLRI has been constantly looking for ways of introducing new technologies at different stages which could reduce both volume and pollution intensity of waste water. Without wanting to take the thunder away from the CLRI presentations to follow, a summary of some technologies developed by CLRI and their likely impact on the volume and intensity of pollution by tanneries is presented in Table 2.

Table 2

CLRI technologies for reduction of pollution

Objective	Available technologies/current status
Water conservation	A key objective as tanneries will be charged as per volume of waste water discharged. - Recycling of various streams of waste water such as counter current soaking,, liming, reliming, pickling and chrome liquor - Well demonstrated in actual working environment in tanneries. - Besides reducing water consumption, helps improve absorption of chemicals. Current uptake of these technologies has been few and far between. One reason is that many tanners being job tanners do not want to adopt any new process that could impact on quality of leather as the raw material is provided by others.

Reduction of TDS	(a) Enzymatic / other methods of curing of hides and skins, eliminating or reducing salt used for preservation(50% reduction in volume of salt used possible) (b) Mechanical or manual desalting of hides and skins – about 15% of salt could be removed in this process. (c) Enzymatic unhairing – helps eliminate or reduce use of sulphide in the process and recover hair undissolved. (d) Pickle-less tanning, reduces TDS by about 30% overall. (e) Carbon-di-oxide deliming (f) Chrome recovery and reuse. Adopted by a few but majority do not adopt these technologies. Minimum duration of preservation is 40-45 days and hide dealers are not confident of any preservative other than salt. Perhaps charging tanners according to volume and intensity of TDS may help them move towards these technologies.
REACH standards – RSL – Residual Substances Limit in the European Union	44 chemicals, not all relevant for tanneries, limits prescribed; more on the anvil. CLRI constantly keeps tab, advises industry in advance of alternatives.

New technologies with multiple objectives	***Three step tanning*** The approach involves, removal of hair and flesh as well as fibre opening using biocatalysts and sodium hydroxide at pH 8.5 for cow hides. This is followed by a pickle free chrome tanning, which does not require a basification step. Hence, this tanning technique involves primarily three steps namely dehairing, fibre opening and tanning leading to near zero waste tanning. ***Integrated wet finishing process*** A compact wet finishing process has been developed for making both upper and garment leathers. The process provides leathers having comparable or even better physical and bulk properties to that derived from conventional wet finishing process. The water consumption is reduced significantly by 73% for processing 1 metric ton of wet blue shaved leathers, which is one of the pioneering achievements. This success story led the researcher to design and develop processes for integrating tanning and wet finishing of Leather Processing
	Coloring Leathers Naturally: Gains Importance An attempt has been made to color leathers using natural dyes such as Rhine, Rhine M, Indus, Pacific, Caspian, Henna and modified Logwood. Twenty four shades were developed using combination of seven natural colorants by mordanting with three metal ions16. Developed colors have potential value in the global leather market in the context of environmentally benign leather processing.
	Reverse Leather Processing Through Fundamental Changes A new greener and cleaner processing could be developed, which will revolutionalize the leather tanning industry. Reverse leather tanning works backward from the point where conventional tanning ends. The methodology saves time, energy and chemicals along with reduction in water usage and pollution load.

	Ecoefficient Leather Processing for Clean and Green Leather The revolutionized process developed involves salt-free curing, lime and sulfide-free beam-house process and post-tanning followed by tanning employing a reverse leather-processing technique. The functional performance of the leathers is found to be on par with that of conventionally processed leathers. The rationalized leather process reduces the usage and discharge of chemicals and also makes a significant reduction in pollution loads.
	Zero Emission Research Initiative for Leather: A way Forward Water recycle and reuse method based on zero wastewater discharge from beam house has been developed and standardized at semi-technical scales. In the new methodology, water consumption is reduced from 17 to 1.7 L for one kilo gram of hide in raw to wet blue processing. This approach can, in principle, lead to water renovation and recycle in individual tanneries through applications of membrane and other advanced technologies. While all these new technologies have been developed by the CLRI with a view to help the industry cope with the new challenges faced by them in environment management, given the structure of the industry, with SMEs dominating and many working as job tanners, it is a major challenge as to how to make them take to these very useful technologies.

Stabilising process parameters for the O&M of ZLD systems

As indicated elsewhere, the ZLD system using UF/RO/mechanical evaporators for treatment of tannery waste water has been introduced for the first time in the world in Tamil Nadu. Even suppliers of RO/Evaporators are not quite aware of the ideal process parameters as they are dealing with this type of waste water for the first time. Indian Leather Industry Foundation (ILIFO) Chennai has some experience of monitoring operation of some ZLD systems in ETPs of tanneries but such ETPs do not have mechanical evaporators. They resort to accelerated solar evaporation of the reject of RO. Though some data is available for operation of the ZLD in ETPs, while dealing with the CETPs where waste water is discharged by a number of tanneries producing different types of products, it poses a different set of problems. RO is basically a filter with very minute apertures and through which waste water is passed at great pressure to filter out the dissolved solids. Physical parameters such as pressure, back washing for periodical cleaning of the membranes etc. can be controlled. But with regard to the impact of specific pollutants that cause blockage, corrosion, scaling, etc. there are

no benchmarks yet. Reasonable precautions have been taken to arrest all pollutants including organics through DMF and organic scavenger prior to applying waste water on the RO. Suffice it to say that the O&M operators, contractors and suppliers are jointly working towards stabilizing the process parameters. The longer is the life of the UF/RO membranes and the Evaporator, the lower will be the O&M cost of the system over a period of time.

Areas of government support

Support of the government is critical for survival of the industry at this juncture. The industry has no doubt demonstrated its sincerity towards complying with the TNPCB direction regarding ZLD system despite heavy cost. But, now, the government must extend a helping hand to enable the industry to remain competitive. Some suggestions for consideration of the government are:

- As pointed out earlier, power and fuel for boiler are main contributors to O&M cost of ZLD system. It works out to about 65% of the cost of operation. The power tariff for ZLD systems is on usual industrial/commercial rates. It is learnt that for sewage treatment plants operated by municipalities, the power tariff is different. If the sewage treatment systems in the tannery districts were operational, there may have been no need for the ZLD system at all. It is therefore desirable that the concessional tariff extended to sewage treatment plants may be also extended to the ZLD systems operated by the industry. This will provide some relief.

- The as yet unresolved issue of what to do with the solid salt recovered from the ZLD system needs tackling. Some efforts are underway to segregate these different salts and either use or sell these. After a technology is found, we have to find an investor to invest in a plant to recover different salts. TNPCB had initiated discussion with the industry and R&D institutions in this regard. It is appropriate that the TNPCB may engage its experts to find other alternative means of use or disposal of the same. The CETPs will have to keep the recovered salt stored in safe condition until a viable alternative emerges.

- The members of all CETPs are generally from the SME sector. Virtually these exist from hand to mouth. If any sudden upheaval takes place in the market place, they would be the first to suffer. In order to ensure that such temporary set backs do not result in the ZLD systems not being able to collect the O&M cost from members, a way out has to be found. A designated fund may be created to be kept at the disposal of a state agency, to extend interest free loan to such CETPs as may need it, for meeting such crisis situations. Generally CETPs should be able to overcome such difficulties in a season or two.

- From a technical point of view, it has to be realized that the ZLD system, like any other system, is liable to face sudden technical problems necessitating temporary closure for repair etc. But it would be virtually difficult to halt production in tanneries as they would have commitments to meet. It is therefore

for consideration that over a one year period, CETPs may be allowed to discharge effluent, after secondary and tertiary treatment, or after RO, for a maximum of 20 days, at any rate, not more than 3 days consecutively on any one occasion. Such a provision is necessary to avoid tanneries resorting to subterfuges when faced with a crisis.

- The ZLD systems may need upgradation at an interval of 5 years or so. When major capital expenditures are required to be made, such investments may be treated as upgradation and the CETPs made eligible to draw assistance from the Government towards capital expenditure, to the extent of 50%.
- Wherever alternative to ZLD may exist or emerge, such as dilution by sewage or marine disposal, the tanneries should be encouraged to avail such alternatives without failure.

Way Forward

Zero Liquid Discharge Systems now demanded in Tamil Nadu may, in future, become the norm in some other parts of the country too. In fact some other countries, including Italy, are closely watching the developments in India. If this is an irreversible situation, it makes sense for tanners to look for ways and means of (a) conserving use of water in the process, (b) achieve better absorption of chemicals in leather and (c) reduce the generation of TDS to the maximum extent feasible. Evaporation of rejects is a very expensive component of treatment cost and therefore, it makes eminent sense to reduce TDS content in effluent to the maximum extent by suitable in-process control measures. Modern and new process technologies can only provide answers. Bio processing is a promising alternative. It is necessary for the tanners to have an open mind to embrace these new opportunities. It is equally necessary for the government to keep an open and sympathetic mind and extend a helping hand to the industry to overcome the teething troubles in the initial years. There may be initial hiccups but if the objective is clear and the technology provider is confident, there is no reason why the industry cannot move ahead in this direction.

INCENTIVIZING CLEAN TECHNOLOGY (CT) TRANSFER AND DIFFUSION IN INDIAN LEATHER SECTOR

By Dr K V Raghavan Chairman, Research Council CLRI, Chennai

EXTENDED ABSTRACT

It is often cited that clean technology options in leather sector are like low hanging fruits as far as their implementation is concerned. One still sees several clean technology (CT) options being developed fairly rapidly by the academic / R&D scientific community with little emphasis on creating affordable technoeconomic incentives. In Indian leather sector, dominated by SMEs, insufficient operating experience of clean technology options very often hamper their deployment on a scale needed for realizing full commercialization benefits. The general lack of progress in their diffusion can be attributed to sub-optimal academic / R&D industry linkages and non-availability of commercialization incentives. An attempt is made to identify various means of incentivizing CT programmes in Indian leather sector.

Technology transfer and diffusion of CTs have to be essentially motivated by economic incentives which will encourage capital investment and technology access. Proactive regulatory driving forces which go beyond the end of the pipe treatment concept are highly essential for successful CT implementation which need a number of inprocess pollution prevention measures. Following paragraphs provide the roadmap for incentivizing clean technology programmes in Indian leather sector.

COMPONENTS OF CT PROGRAMMES

Process Intensification forms the core research activity for CT development. It requires multidisciplinary knowledge base in process and product development. The focus has to be on conservation of land, water and surrounding environment. Fig.1 identifies the major components of a CT development programme. It generates reduced amounts of process waste and increased quantities of useful side products. In case of leather processing, the tertiary waste water treatment enables large quantity of water recycle. A major component of CT programmes has to be the sharing of experiences related to their commercial adoption and their technoeconomic viability demonstration.

CREATING AN ENABLING ENVIRONMENT FOR CT ADOPTION

The research teams, government and industry representative bodies have a high stake in creating a broader enabling environment for adoption of various CT options. Following measures are vital for its success:

- **Convincing** the users that CT as an indispensable option to avoid impending enviro crisis.
- **Establishing** that a well planned and designed CT programme will not abandon the prospects for process and economic growth of Indian leather sector

- User **Commiting** to play a central role in turning CT research inventions into commercially viable technologies
- **Focussing** on outcomes rather than CT specifics
- **Evolving** internal and external material and water recycle options with attractive financial returns
- **Nurturing** government and R&D institutes joint initiatives to particularly develop CT foresight amongst SMEs for large scale technology development

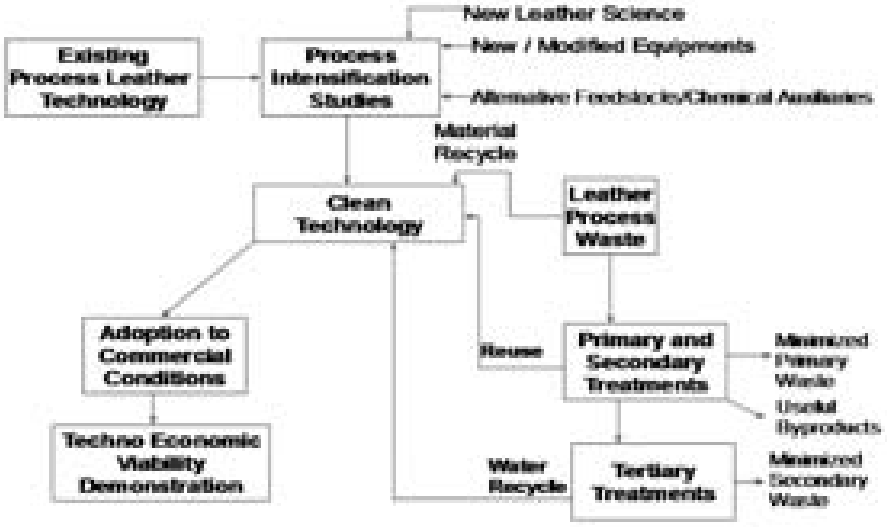

Fig.1: Components of a Clean Technology Development Programme

INCENTIVIZING CT PROGRAMMES THROUGH R&D – GOVERNMENT – INDUSTRY SYNERGY

This is very vital for large scale deployment of CTs in Indian leather sector. The following measures are suggested:

- **Establishment** of CT implementation fund by the Government of India as well as state governments for providing partial grants and soft loans. If necessary, the scope of the existing modernization programme for Indian leather sector can be expanded to accommodate target specific CT programmes requiring modern equipments and other facilities.

- **Providing** early equity for startup companies which are committed to deploy CTs to kickstart environmentally sustainable leather technologies.
- **Funding** of public-private partnership for scaleup and technology demonstration of major CT programmes with soft loans by commercial banks and financial institutions.
- **Introducing** special schemes with provision for capital subsidies and tax holidays for encouraging zero waste concept focusing on water and solid waste recycle / reuse and for establishing byproduct utilization enterprises.
- **Promoting** in-process pollution avoidance measures, internal liquid and solid recycles and preventing fugitive atmospheric emissions through the introduction of differential waste treatment charges by the CETPs based on "Charge more for Polluters" scheme.

For implementation of above measures, there is an absolute necessity to employ phase-in periods with specific achievable milestones with clearcut monitoring parameters.

MISSION ORIENTED APPROACH FOR TRANSFORMING LAB INNOVATIONS INTO COMMERCIAL TECHNOLOGIES

State and Central Government level CT Missions need to be established specifically to transform potential laboratory innovations into commercially implementable technology packages for application in cluster of SME leather processing units. The main stakeholders have to be academic / research institutions, SME industry associations, CETP promoters and government bodies like district industry agencies, commissionerates of industries and department of MSME, Government of India. It is recommended that such major CT schemes are launched during 12th Five Year plan period. Group Demonstration of technologies to be given higher priority for SME clusters.

Summary

Incentive driven development policies are essential for successful development, diffusion and large scale propagation of CTs in Indian leather process units. They can create necessary positive driving forces to motivate and encourage a large number of Indian tanneries to utilize the new CT options to improve their global competitiveness, environment friendly brand image as well as minimizing the public concerns on the long term environmental damages of nonsustainable leather processing technologies.

WEALTH FROM WASTE

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Introduction :

More than 10,000 tanneries are spread across the globe with the annual processing capacity of 9×106 tons of hides / skins (Thanikaivelan, et al., 2004). India has about 3000 tanneries with a total processing capacity of 700,000 tons of hides / skins per year. Major clusters of tanneries in India are located in Tamilnadu, 52%; West Bengal, 36%, U.P., 12% and Punjab, 5%.

Leather industry is classified under the high water consuming industries. Leather industry consumes water of 30-40 m3 to process 1 ton of raw hides/skins and the same volume is discharged as wastewater with high pollution load. However, several technologies have been developed and implemented in the past for the management of wastewater discharged from leather industry. At present, the industry is set to attain Zero Liquid Discharge (ZLD) status through the implementation of water recovery system. But, there is a greater concern only on the disposal of solid waste from leather industry as it generates huge quantity of solid wastes during the conversion of putrescible collagen matrix into finished leather.

One metric ton of wet salted hides/skins yield 300 kg of leather, along with about 250 kg of tanned solid waste and about 350 kg of non-tanned solid waste and 100 kg of raw material is lost in the wastewater (Ganesh Kumar et al., 2008a). The solid wastes are distributed as animal fleshing, 56-60%; chrome shaving, chrome splits and buffing dust, 35-40%; skin trimming, 5-7% and hair, 2-5% . Among the solid wastes generated in leather industry , animal fleshing (ANFL) draws attention of environmental scientists and technologists for its high recovery of value added products.

Elemental analysis as shown in table 1 suggests that about 150 g of elemental carbon is turned out as solid waste for every 1000 g of raw material being processed. The carbon content of the solid waste may be converted into carbon dioxide during incineration or converted into methane gas on dumping . And nearly 50 g of nitrogen content of the raw material is converted into ammoniacal nitrogen during its disposal as solid waste. Hence, there has been a constant research on the utilisation of solid waste for the recovery of the value added products.

The focal theme of this paper is to illustrate the probable value added products that can be recovered from the solid waste discharged from leather industry.

Keratin hydrolysate from animal hair

Bovine hair is composed of over 90% protein . The main component being keratin , a fibrous and insoluble protein , highly cross linked with numerous intermolecular

disulphide and other bonds. In bovine hair , keratin forms the fibrous matrix which are extremely resistant to degradation by proteolytic enzymes. Moreover , the distinctive features of keratin are the cysteine disulphide linkages that make it more resistant to enzymatic digestion. Keratin is degraded by microorganisms that produce keratinolytic enzymes. Keratinolytic micro-organisms have been used for the production of keratin hydrolysate. Keratin hydrolysate are widely used in cosmetics formulations. Keratin hydrolysates find potential application in leather industry.

Enzymatic unhairing is regarded as a reliable alternative to avoid the problem created by sulphide pollution in wastewater discharged from leather industry. The advantages of enzymatic unhairing are the reduction of sulfide content in the effluent, recovery of hair which is of good quality, and elimination of the bate in the deliming process. However, this potential benefit remains unfulfilled as enzymes are more expensive than the conventional process chemicals and also require careful control over the process . These keratinases can degrade keratin without damaging the other structural proteins like collagen, make them an alternate agent to sulphide for use in leather industry.

Acid protease and alkaline protease from animal fleshing

The second important solid waste is animal fleshing . This consists of collagen fibres (a small proportion) embedded in low molecular weight proteins along with fatty substances.

The percentage elemental composition of ANFL as presented in table 2 shows that carbon 36.14 ± 0.58, hydrogen 8.31 ± 0.15, nitrogen 11.6 ± 0.3 and sulphur 0.656 ± 0.15. The ANFL composition in terms of components was TOC 342 ± 21.2 mg/g, TKN 138 ± 14.5 mg/g, moisture content 77.5 ± 5.5 (%), ash content 51.5 ± 2.5 (%) and volatile solids 30.5 ± 3.5 (%).

The amino acid composition (µg/mg) of ANFL, analyzed using HPLC, includes glycine 0.255 ± 0.005, serine 0.088 ± 0.008, histidine 0.407 ± 0.012, threonine 0.171 ± 0.04, alanine 0.044 ± 0.017, arginine 0.069 ± 0.012, tyrosine 0.179 ± 0.022, valine 0.097 ± 0.2, methionine 0.065 ± 0.015, phenylalanine 0.038 ± 0.004, isoleucine 0.009 ± 0.001, leucine 0.065 ± 0.002 and lysine 0.011 ± 0.2.

The ANFL has been considered as the substrate (carbon and energy) for the production of the enzymes , protease and lipase, as valuable products.

Microorganisms elaborate a large array of proteases, which are intracellular and/ or extracellular.The intracellular proteases are important for various cellular and metabolic processes, such as sporulation and differentiation, protein turnover, maturation of enzymes and hormones , and maintenance of the cellular protein pool.

Extracellular proteases are important for the hydrolysis of proteins in cell-free environments and enable the cell to absorb and utilize hydrolytic products.

At the same time, these extracellular proteases have also been commercially exploited to assist protein degradation in various industrial processes.

Proteases execute a large variety of functions and have important biotechnological applications. Proteases represent one of the three largest groups of industrial enzymes and find application in detergents, leather industry, food industry, pharmaceutical industry and bioremediation processes (Gupta et al. 2002).

Today, proteases account for approximately 40% of the total enzyme sales in various industrial market sectors, such as detergent, food, pharmaceutical, leather, diagnostics, waste management and silver recovery.

The largest application of proteases is in laundry detergents, where they help removing protein based stains from clothing. For an enzyme to be used as an detergent additive it should be stable and active in the presence of typical detergent ingredients, such as surfactants, builders, bleaching agents, bleach activators, fillers, fabric softeners and various other formulation aids.

In textile industry, proteases may also be used to remove the stiff and dull gum layer of sericine from the raw silk fibre to achieve improved luster and softness. Protease treatments can modify the surface of wool and silk fibres to provide new and unique finishes. Proteases have been used in the hide-dehairing process, where dehairing is carried out at pH values between 8 and 10. Proteases are used to decompose the gelatinous coating of X-ray films and further to recover silver .

Proteases are also useful and important components in biopharmaceutical products such as contact-lens enzyme cleaners and enzymic debriders. The proteolytic enzymes also offer a gentle and selective debridement, supporting the natural healing process in the successful local management of skin ulcerations by the efficient removal of the necrotic material.

Alkaline proteases account for the major share of the enzyme market all over the world (Godfrey and West 1996; Kalisz 1988). Alkaline proteases from bacteria find numerous applications in various industrial sectors and different companies worldwide have successfully launched several products based on alkaline proteases (Table 1).

Acidic proteases

These are found in animal cells, moulds and yeasts, but seldom in bacteria. Many of them contain aspartate as the active amino acid and their specificity is defined by the presence of aromatic or bulky side chains at both sides of the cleaving bond. The carbohydrate content of these enzymes confers heat stability to these biocatalysts . Production of acid proteases from thermophilic Penicillium sp. has also been reported .

The most significant property of acidic proteases is the ability to coagulate proteins, as is evidenced by their widespread application in the dairy industry for their ability to coagulate milk protein (casein) to form curds from which cheese is prepared after the removal of whey .

Animal Fleshing as fish meal

Protein is a critical component in complete fish feeds and generally the most expensive component accounting for more than 50% total feed cost in intensive aquaculture . Protein intake by fish is important to provide the amino acids required for synthesis of new tissues or replacing worn out protein (maintenance) . Protein is also the major organic material in fish tissue making up 65-75% of total weight on a dry matter basis . Therefore , dietery protein is always given priority in formulation of complete feeds to avoid inadequacy which may lead to poor growth and loss of weight . Animal proteins are preferred due to their superior nutritional qualities (such as protein content, amino acid profile) but they tend to be expensive . Fish meal in particular is very palatable , highly digestible and rich in essential amino acids, fatty acids, energy and minerals .The proportion of global fishmeal used for aquaculture has increased to a greater extent.

Animal fleshing as raw material for the production of bio-organic manure

Bacterial composting is recognized as a cost-effective method for the solid waste management. Composting allows wastes to be disposed off after reducing their mass and volume. During composting, solid wastes containing carbonaceous and nitrogenous compounds are transformed through successive activities of different microbes into more stable and complex organic matter, which chemically and biologically resemble humic substances. The extent of these transformations depends on the nature of the organic matter and the experimental conditions under which composting is being carried out.

It has been demonstrated that only small proportions of the total carbon and nitrogen were utilized by microbes during bacterial composting and the complex molecules were left unutilized. There are certain reports on emission of the greenhouse gases (CO_2, CH_4 and N_2O) during bacterial composting of solid wastes . The N_2O emission and its relationship to nitrogen cycle during composting process was established. The residence time of 70-90 days was required for the composting of tannery waste into mature manure. Green house gases emission and requirement of high residence time are considered to be the limiting factors in this conventional composting process for the degradation and conversion of solid wastes into organic manure. The pretreatment of solid wastes with the emphasis to reduce the residence time for the conversion of solid waste into bio - organic manure may be regarded as a viable option.

Vermicomposting process

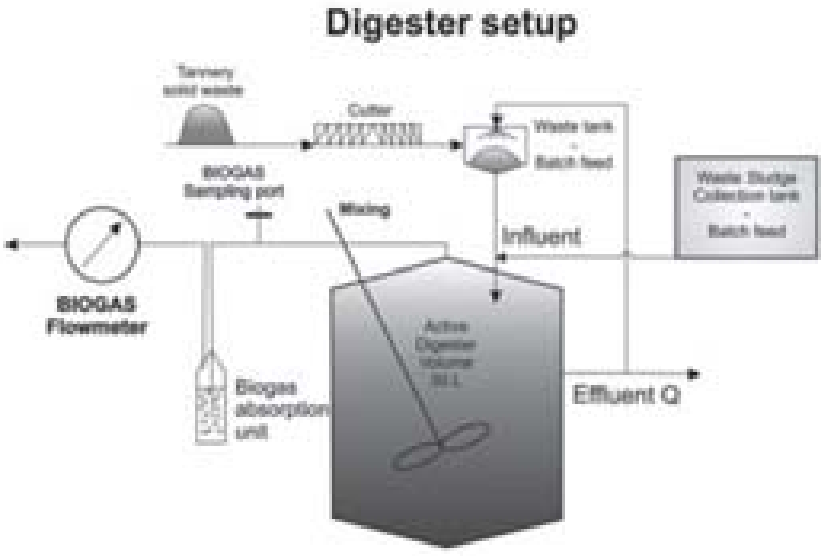
Vermicomposting is a viable, simple, and an economical process by which organic solid wastes can be efficiently managed by converting them into organic manure (Garg et al., 2006). Vermicomposting is a mesophilic process, utilizing microorganisms and earthworms at 10–32°C. Earthworms can be used in solid waste management, organic matter stabilization, soil detoxification, and vermin compost production. Considerable work has been carried out on the vermicomposting of wastes from domestic and industrial origins. However, vermicomposting is the stabilization of

organic material involving the joint action of earthworms and microorganisms. Although microorganisms are responsible for microbial degradation of organic matter, earthworms are the important drivers of the process, conditioning the substrate and altering the biological activity concluded that in vermicomposting process, the inoculated earthworms maintained aerobic condition in the conversion of organic wastes, a portion of the organic material into worm biomass and respiration products, and expel the remaining partially stabilized product (vermicompost). There are several reports regarding the potential utilization of epigeic earthworms in organic waste management. During vermicomposting, earthworms eat, grind, and digest organic wastes with the help of aerobic and some anaerobic microflora, converting them into a much finer, humified, and microbially active material. The generated product is stable and homogeneous, having desirable aesthetics such as reduced levels of contaminants.

Earthworms can be used for management of animal fleshing , organic matter stabilization, soil detoxification, and vermicompost production. The generated product is stable and homogeneous, having desirable aesthetics like reduced levels of contaminants. The process is faster than composting; because the material passes through the earthworm gut, whereby the resulting earthworm castings (worm manure) are richer in microbial activity and plant growth regulators. There would also be an ample opportunity to reduce conventional energy use and lowering of greenhouse gas (GHG) emissions in vermin compost production .

Animal fleshing for biogas recovery.

Anaerobic biomethane formation from animal fleshing is a complex process, in which organic compounds are mineralised to biogas. It consists of several phases, such as hydrolysis, acidogenesis, acetogenesis and methanation, carried out by different groups of microorganisms, which partly stand in syntrophic interrelation and depend on different requirements in the environment. For instance, lipids are first hydrolyzed by acidogenic bacteria to glycerol and free long-chain fatty acids; furthermore glycerol is converted to acetate, while fatty acids convert to acetate, propionate and hydrogen. Finally, methanogenic bacteria which utilize methanol, acetate or hydrogen and carbon dioxide, produce methane and . The methane recovery from anaerobic digestion of animal fleshing is 0.15 m3/ kg of AnFl.



Biodiesel, Bio ethanol, bio hydrogen, Biomethane from tannery solid waste:

Animal fleshing on fermentation produces long chain fatty acids and short chain fatty acids. The long chain fatty acids may be trans esterify to produce bio diesel. After the separation of bio diesel the residual carbon will be fermented further to get bio ethanol. The fermented liquor after the extraction of biodiesel and bio ethanol may be further digested to recover bio hydrogen and bio methane.

Tanned leather for the production of fuel gas

Tanned leather particulates known as buffing dust may be regarded as the refractory organics and heavy metal ions are embedded in collagen matrix. Hence, the disposal of buffing dust in an environmentally sound manner is an important task.

The production of useful materials from different kinds of leather waste was attempted through pyrolysis in a fixed bed reactor at temperatures of 450 and 600^{0}C. It was concluded that gas, oil, ammonium carbonate and carboneous residue could be obtained by pyrolysis. The pyrolysis oils could be used as fuel or chemical feedstock after re-treatment. The carbonaceous residue (chars) were between 37.5% and 48.5% and their calorific value were in the range between 4300 and 6000 kcalkg-1, suitable for use as solid fuel . A process has been developed to draw fuel gas from buffing dust without converting trivalent chromium into hexavalent chromium under pyrolysis-pulse air incineration.

Separation of edible grade salt from evaporated residue of R.O reject

The secondary biological treated wastewater is subjected to membrane separation process for the recovery of water in the presence of refractory organics and inorganic salts. Membrane separation has become increasingly attractive for the recovery and reuse of recovered water .But, the efficiency of the process is limited only upto 70% and the rest 30% of feed stream is discharged as reject stream. The reject stream is evaporated in evaporators leaving behind a solid residue. However, the evaporated residue lacks the reusable option as it contains high concentration of impurities . The disposal of evaporated residue onto secured land fill sites is banned because the constituent ions are leached in aqueous solution and the treatability of leachate becomes more difficult for its high salinity.

Hence, the salt laden evaporated residue is being heaped in leather industry. No single report is available on the recovery of sodium chloride from the evaporated residue of RO reject stream containing high concentration of organic salts. Central Leather Research Institute (a constituent body of Council of Scientific & Industrial Research) has developed a patented technology known as SRIOM (Salt Recovery from Inorganic and Organic Mixture) process for the management of evaporated residue . This consists of recovery of edible grade sodium chroride from the evaporated residue . The SRIOM process was demonstrated to experts from Leather industry .

Conclusion

Leather industry generates solid wastes in a considerable quantity (700 kg/ ton of raw material) besides generation of wastewater. The solid wastes constitute carbon , hydrogen , nitrogen and sulphur. The intensive research carried out on the solid waste generated by leather industry end up with the production of value added products with huge returns . Hence, management of solid wastes either in isolation or in clusters may yield a substantial return to the tanners besides the final product.

Table 1. Composition of animal skin

S.No.	Parameter	Value , in %
1.	Water	65
2,	Proteins	33
3.	Mineral matter	0.5
4.	Fatty substances	2-6
5.	Carbon	45-55
6.	Hydrogen	6-8
7.	Oxygen	19-25
8.	Nitrogen	16-19
9.	Sulphur	0.5-2.5

Table 2. Characteristics of Chromium tanned solid waste

Parameters	value
Moisture content	11.15±2 %
Ash content	45.4±3.8 %
Bulk density	0.16±0.02 g cm-3
Fat	4.69±0.26 %
Cr (III)	10.68±1.98 mg/g
Cr (IV)	BDL
Gross calorific value	4096±97 kcal /kg
Carbon	37.23±3 %
Hydrogen	6.19±0.7 %
Nitrogen	6.43±0.72 %
Sulfur	1.422±0.24 %
Oxygen	24.285±3.1 %

Table 3. Chemical characterization and CHNS analysis of ANFL substrate used in fermentation

Parameter	Values
Total Organic Carbon mg/g	340 ± 21.2
Total Kjeldhal Nitrogen mg/g	130 ± 14.5
Moisture content (%)	29.5 ± 5.5
Ash content (%)	21.5 ± 2.9
Total protein (%)	67.8
Fat (%)	4.3
Carbohydrate (%)	0.175
Collagen (%)	3.5
N (%)	14.6 ± 0.3
C (%)	39.14 ± 0.5
S (%)	0.456 ± 0.1

Table 4. Amino acid composition of the purified protease

Amino acid	Value, mol%
Aspartic acid	27.9 ± 0.14
Glutamic acid	32.6 ± 0.8
Serine	0.9 ± 0.06
Histidine	5.5 ± 0.9
Glycine	3.34 ± 0. 6
Threonine	0.75 ± 0.15
Alanine	0.6 ± 0.05
Arginine	3.5± 0.1
Valine	4.4 ± 0.4
isoleucine	0.69 ± 0.18
lysine	19.5 ± 0.3

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Salt Free Zero Emission Chrome Tanning Process

Dr Chellappa Muralidharan
(Extended Abstract)

Conventional chrome tanning implicates generation of large quantities of Total Dissolved solids due to neutralization of acidity arising from hydrolysis of tanning salts. Further the uptake of chromium is only 70% and hence 30% chromium is let out in the effluent. Such large quantities of chromium and TDS in process liquors pose problems for recycle and reuse resulting in economic & environmental constraints. In the present work, the reactivity of collagen is enhanced so as to effect >95% exhaustion of chromium. The methodology developed also generates TDS less than one-Fifth of conventional system, through regulated hydrolysis of chromium tanning salts and insitu-neutralisation of the acidity. The process liquor at the end of tanning contains minimum levels of chromium and hence can be reused for subsequent batch without any chemical treatment. Because of the high reactivity the method affords 25% reduced chromium input compared to conventional process.

The salient features of the system are:

- Near zero emission of chromium in tanning effluents
- 25% saving in chromium input
- Suitable for all substrates and all types of chrome tanning salts
- Reduced process duration
- No acidification is needed for this tanning methodology and hence the process is absolutely salt and mineral acid free (Pickle- free)

The technology has provided a long lasting scientific solution to an environmental concern with substantial economic benefits changing a century old process.

Achieving sustainability of ZLD through the adoption of In-process Control Measures

NK Chandra Babu, Chief Scientist, CSIR-CLRI, Chennai-600 020

Abstract

The tanneries in Tamil Nadu State which contributes to nearly 50% of the tanning industry have been facing challenges on the environment front for the last 16 years. In 1996, nearly 400 tanneries were closed in the state for non-compliance of norm for Biological Oxygen Demand (BOD) on the orders of the Apex Court of the country based on Public Interest Litigation. Tanning Industry again faced a major crisis in the new millennium as they were asked to comply with the stringent pollution norm of 2100 mg/L for TDS. Recently, the tanneries have been ordered to install Reverse Osmosis (RO) plants to recover water from the treated waste water by the judiciary and reuse it in processing again. Zero Liquid discharge has thus become mandatory now in the state of Tamil Nadu. The infrastructure required for complying with ZLD norm has been created with huge investment and the initial experience with the system as it is being implemented now has raised questions about the sustainability of the system in the long run. Apart from the large capital investment, a very high operational cost may make the system unviable in the long run and may eat into the already a small margin of the tanneries.

On going through the scheme of technologies for achieving ZLD, it is clear that the options relating to in-process control measures have not been given due importance. The requirement to comply with ZLD through RO based technologies has weaned away the tanneries which have experimented/implemented in-process control measures including salt-free and salt-less curing methods. On the whole, there has been over-dependence on end-of-pipe treatment options without the incorporation of in-process control measures in the current approaches to comply with ZLD norm.

The main focus of in-process control measures aimed at ZLD should be on

- TDS reduction measures aimed at reduced discharge of salinity in the effluent
    - Salt-free and Less-salt curing methods (Chilling, Freeze drying, Salt-chemical additive based options)
    - Pickle-less and chloride-free chrome tanning
    - Rationalizing the beam house operations aimed at TDS reduction through use of enzyme and other chemical based options
- Reduction in Volume of waste water generated in Processing
    - Recycling options in unit operations which contribute to hydraulic load as well as to TDS without any treatment

- Rationalization of beam house operations in combination with salt-free curing aimed at processing steps/washings reduction
- Achieving near-zero discharge through recycling schemes by suitable treatment of sectional waste streams (ZLD Process developed by CLRI).

The integrated approach should include the available options which have proven successful from the experience in any parts of the world which are best suited to achieving the above mentioned objectives.

Various options and the integrated strategic approach will be highlighted in the presentation.

“Leather Creativity & Design Innovation”

"Leather Creativity & Design Innovation"

DESIGN Sojourn

Shri PR Aqeel Ahmed, Regional Chairman (SR), CLE as CHAIRMAN of the Session on "Leather Creativity and Design Innovation" at LERIG 2012 on 29th January 2012

As a primarily export oriented industry, the Indian Leather and Leather Product manufacturing sector is focussed on design and production, based on different parameters. The process of design, which is usually associated with a different kind of work flow, is now changing.

Transformation from Raw Material to Finished Products

Leather today seems to have acquired all kinds of adjectives. It is no longer just chemically treated hide. Every texture of leather available today is representative of creative exploration. The Indian Leather industry has long since moved from being a supplier of raw hide to a supplier of first-class products.

Cow hide that was used a few decades ago to manufacture low-end products has now acquired the kind of texture, finish and design that exceeds its humble origins. This evolution is because leather is no longer just a material that is manufactured en masse but has become raw material for making garments, belts, wallets or footwear. The journey of hide, from a material used historically as footwear, clothing and as water casks and the like, to a high-end fashion material that is cut and pieced together into myriad shapes and forms is fascinating.

The process that goes behind the designing of a humble wallet or bag is more than just sketching, ideating and construction. As the industry's horizons look west towards Europe and America, this process involves creative thinking, trend tracking and analysis.

There are many approaches that a designer takes when creating a product.

Each of these has one driving thought behind them - the product has to be consumed.

For the primarily export-oriented market of the Indian Leather industry, the consumer's needs are studied for almost 18 months, before designs and trends are finalized.

In the global foreyards of Leather Fashion

While the environment for transformation of the industry was provided by government policy, without required technological support, the industry could not have moved forward.

CSIR-CLRI was at the forefront to help the industry speedily convert itself into a modern forward looking sector. It's help was of immense value to the tanners who were moving over from being traditional tanners of semi finished leather to those making ready to use, finished leather.

The progression towards converting finished leather into a variety of products such as shoes, garments and leather goods was aided to a large extent by the valuable design inputs from CSIR-CLRI.

The MODEUROP endeavour, piloted by CSIR-CLRI, forecasts the colours and textures of leather for different seasons at least three seasons in advance. Its inputs have been considered as important pointers by the tanners and product makers all over the world.

CSIR-CLRI has been an active member of the global fashion forecasting forum – the MODEUROP Colour Club, so much so that now most of the colours selected by this organization emanate from India. CSIR-CLRI's leading role in sustaining MODEUROP has been widely acknowledged. The Indian industry has been the fortunate recipient of the benefits of CSIR-CLRI's initiative in this regard and the advance information on Colour and Texture trends through CSIR-CLRI has helped the industry always stay a step ahead of competition.

In the last decade alone, leather design has seen a change from the conventional shapes to some geometry-defying shapes that have caught the fancy of many a user.

The consumer has become more discerning over the years and wants to use accessories as the defining aspects of his/her personality.

The industry today is focussed on product development, which is different from designing but retains the spirit of creative thinking and exploration. The process involves consultation with design experts from abroad and experts from the fashion industry, for a trend forecast. As much as six months are spent at the drawing board, pondering the kind of products that will grace boutiques across the world. Six months of prototyping and approvals later, the final leg of the 18-month cycle is spent in manufacturing and shipping the products to overseas markets.

A working knowledge of the anatomy, pattern and construction is mandatory and an immense knowledge of the material is a pre-requisite when using it to create a design. Unlike cottons and silks that have their own graceful way of draping over the human form, leather requires closer attention and more complex treatment to get that kind of finish.

Leather from India has grown from functional to fashionable. It has acquired a niche in the retail space. A niche that is discernable by the quality, volume and the sheer variety in design that leaves these shores.

Design and style statements

What has worked is the fact that everywhere the consumer seems to be waking up to the fact that individuality is the biggest style statement.

It is not about being trendy or current. The entire storyboard is created and products manufactured, keeping this one objective in mind.

The user is regaled with products that satisfy an inherent need to be pampered, to stand out and make a statement quite simply by carrying a beautifully designed and executed wallet or handbag. A product that has spent a long time being conceptualised and actuated for the simple pleasure of individuality!

Designing a product is not merely only about aesthetics.

For example, one cannot concentrate only on color and design of a footwear. Its fit, size, comfort and functionality are most important. One must make footwear that a wearer feels comfortable in and yet it blends with the dress and stands out.

One has to be aware of fashion trends and one must be creative, have an eye for detail and be able to work with different materials.

One has to be passionate and most important be original. Besides catering to fashion conscious customer one can also make special footwear for a specific purpose and so one has to be aware of customer's requirement and be able to deliver accordingly.

Customers can see an abstract concept quickly becoming a shoe or a sandal. Trained technicians listen to customer's ideas and requirements and use world-class equipment to translate ideas into products.

Seeing beyond the horizon

Success in being able to work with high-end customers requires building design capabilities that enable us to offer exciting collections that can compete internationally. To achieve this one has to build not only in-house design capabilities, but also work in consultation with design companies internationally that have a deep understanding of lifestyle and fashion trends in Europe and the US, which will continue to be primary markets for the foreseeable future for upmarket products.

Seeing beyond the horizon we can foresee a future for the Indian Leather and Leather Product sector driven by innovations and stronger coupling of technology and trade resulting in the Leadership of India globally.

The session today will feature presentations on the following topics:

High End Leather Processing:

The quantum jump in value addition for leather can be made possible only through novel innovations like developing smart leathers. I am sure that the speakers would throw some light on this.

Unique Designs for Best Value from Medium and Low Priced Products:

In today's volatile economy, creating superior value for users is shown as a way of achieving competitive advantage.

I would be glad if the speakers presented an analysis of competitive models based on design for upgrading in global competiton.

Fashion/ Design Incubators – Recent Developments & New Opportunities

Design incubation requires research, knowledge of design, skills to realize what has been visualized. Design incubation cells are integral to most design led organizations in the world and consist of a dynamic team drawn from across-disciplines. Boundaries are constantly challenged to be able to dream.

I look forward to the thoughts to be presented today.

"INNOVATION" and "where the Indian leather Industry ranks as an Innovation Industry?"

Shri Motilal Sethi, President ILGA as EXPERT TALK in the Session on " Leather Creativity and Design Innovation" at LERIG 2012 on 29th January 2012

In a globalising economy, versatility in design and concept are key to the business.

India also needs to aim to be a leading influencer of global design and must have a focused multi-pronged strategy to enhance the quality and spread of Indian designs and to increase India's share in the world economy through this major value addition.

India needs organised effort and adequate investment, both in the public and private sector, to improve productivity of land, labour and capital, and thereby, its competitiveness. Innovativeness and lateral thinking can help it rise in the global innovation index.

Nations which topped the global innovation list...

1. Iceland
2. Sweden
3. Hong Kong
4. Switzerland
5. Denmark
6. Finland
7. Singapore
8. The Netherlands
9. New Zealand
10. Norway

To be able to climb to the pinnacle of Innovation any country must have the following features:

- New Age knowledge economy,
- Green technology,
- Creative output,
- Market sophistication,
- Highly skilled work force,
- High tech agricultural sector,
- Up-to-date small scale industry,
- World class universities,
- Comfortable living standards,
- Extensive social welfare policies,
- Innovation ecosystem,
- Enlightened governance system,
- ICT and infrastructure,
- Quality of education and scientific research,
- Legal framework,
- Intellectual property protection,

- Rich pool of creative and commercially minded scientists with world-class research and development facilities,
- Political stability and venture capital.

India too has two companies among the world's top innovative firms:

Hindustan Unilever: India's largest fast moving consumer goods company was formed in 1933 as Lever Brothers India Limited and came into being in 1956 as Hindustan Lever Limited through a merger of Lever Brothers, Hindustan Vanaspati and United Traders Ltd.

BHEL: It is one of the oldest and largest state-owned engineering and manufacturing enterprise in India in the energy-related and infrastructure sector which includes power, railways, transmission and distribution, oil and gas sectors and many more.

The question that needs to be asked now is "**Where does the Global Leather Industry rank as an INNOVATION INDUSTRY ?** "

To begin with "INNOVATION" can be defined as – "A new process, product, idea or design which has proved and reached its intended target: Consumer, Market, Business, Society, Security.

Normally expected to confer benefit to a vast segment rather than individual interest."

An invention becomes an innovation only when it is utilized. Till then it is just an invention.

Innovation has different 'Dimensions.'It can be classified as:

Incremental Innovation

- Continuous or discontinuous improvement in products in response to changing user needs such as design, quality, comfort, price, applications etc.

Large System Innovation

- Green, White, Blue, Brown Revolutions, Supercomputers

Radical/ Breakthrough Innovation

- Bell's telephone: Xerox, Polaroid, Supersonic Jets, Space Satellites, Space Vehicles, Antibiotics, Integrative Medicine, Designer Therapies, Mobile telephony

We now have to determine as to "**What Innovation Dimension is the LEATHER INDUSTRY in?**" We need to slot the Innovation in the LEATHER Industry.

❖ **Leather** has emerged as a **fashion product**.

❖ Colour, texture and other highlights add to the fashion values of creatively designed leather products. These add significantly to the value realization from leather products.

- "**To emerge as a strong global player in the world leather trade, all efforts to take proactive measures to be ready with the fashion leathers when the fashion does emerge, is crucial**."

In a globalizing economy, **design** is being perceived as a **new engine of economic and industrial growth**.

Design and breakthrough innovations can play a pivotal role in positioning of Leather and Leather Product industries in the global arena by value addition apart from enhancing competitiveness.

"Success in being able to work with **high-end customers** requires building design capabilities that enable us to **offer exciting collections** that can compete internationally."

How can this be achieved ?

To achieve this one has to build not only in-house design capabilities, but also work in consultation with design companies internationally that have a deep understanding of lifestyle and fashion trends in Europe and the US, which will continue to be primary markets for the foreseeable future for upmarket products.

In the footwear area, for such an output to be possible it is necessary to set up a state-of-the-art Design Studio which encapsulates conceptual designing as well as Computer Aided Pattern engineering.

The various stages from '**concept' to 'market**' encapsulating the processes of SHOE Engineering in a value chain are shown and need to be followed diligently.

Design and brand driven value chain need to be developed as core strengths of Leather Products Manufacturing Industries through engaging in pattern development, engineering and sample prototype development.

The time to move up the value chain has come.

'**Merchandizing & Retailing**' would be another crucial area of attention and synergies would have to be built with international agencies to master this art.

A lot of attention is to be paid to honing 'Design' capabilities, introduce technologically advanced tools to aid in the 'design process' and to develop 'merchandizing' expertise amongst our product design teams in the footwear companies.

The vision to be in the vanguard of global fashion and Design Innovation should employ a collaborative approach to leverage the strengths of the international & national institutions and industry, and develop an integrated nexus of Design - Technology - Market Linkage.

The thrust should be on Design and Innovation to establish an edge for the Indian leather industry globally.

The way forward would be to adopt a holistic approach in developing design capability for leather and leather products by integrating the components of Design & Innovation, Technology Fusion, Market Intelligence, Business Incubation and IPR creation.

Research - Academia - Industry synergy is a **prime driver of Innovation. The best example of this is LERIG, where we have a meeting of minds of the above TROIKA**.

With this synergy INDIA would gain ***and we will be among nations in the foreyards of INNOVATION!***

I now eagerly await to listen to the speakers and their presentations.

Leather Industry and its Potential

Shri K Srinivasan, Finished Leather Panel Convenor, CLE as EXPERT TALK in the Session on " Leather Creativity and Design Innovation" at LERIG 2012 on 29th January 2012

The Indian Leather industry harnesses a huge potential.

The world recognizes us as an industry that is creative and capable of producing high-quality products.

The last decade has seen, within the leather industry, an increasing commitment to environment-friendly production processes.

The industry, today, is synonymous with quality and niche products and has a share of the exports to almost every global market.

The success that the industry has enjoyed has been largely due to its growth as a consequence of customer satisfaction, combined with a conviction to excel and deliver quality outputs.

Travel of INDIA in 'fashion forecasting' for leather

Leather has emerged as a fashion product.

Colour, texture and other highlights add to the fashion values of creatively designed leather products. These add significantly to the value realization from leather products.

Nations like India have remained in the backyard of fashion world in Europe for long. If India were to emerge as a strong global player in the world leather trade, all efforts to take proactive measures to be ready with the fashion leathers when the fashion does emerge, is crucial.

Travel of INDIA in 'fashion forecasting' for leather is an initiative in this direction to bring to the fore the ability of the Indian Leather Industry to take pro-active measures in fashion forecasting and design development by providing a scientific leather product development focus in the areas of colour forecasting, range building, design and retail analysis.

CSIR-CLRI are the Lead partners in this endevour and in tandem with the Indian Leather Industry have been successful in placing India in the GLOBAL FASHION Map for leather.

The outcome envisaged is to strengthen the Indian leather product design capabilities which would be reflected in product quality enhancement.

Advance Information to stay ahead

The best way to beat competition is to develop focused niche products based on 'Advance Information" which gives us the key to develop 'right products for the right season and for the right market.'

In this direction, the CSIR-CLRI initiative to participate in the MODEUROP Round Table and win colours in the MODEUROP Colour Card for India is indeed laudable.

This endevaour is very useful because in addition to the colour card texture trends are also brought out. This is done by reviewing the textures of the season past and looking at how it will behave in the coming season. New concepts and ideas in the Leather and Material texture trends are also closely monitored to interpret it correctly for the industry to follow.

As an example, if we want to track the behaviour of the Patents and Metallics over the last few seasons and see whether these continue for another season or two then we have to review the L&M TRENDS for the previous Spring Summer seasons and look ahead to the Autumn Winter next season.

The chronology of events which define the 'Calendar of Events' for providing 'Fashion Intelligence' in advance to the industry consists :

- Study of Anteprima Trends and Lineapelle reports which is a test bed for ideas and the exhibitors gauge the response to their latest developments before finalizing their collections in time for Lineapelle.
- Preparation and dissemination of CSIR-CLRI's Trend Reports which help towards better preparedness for showcasing at International fora

Fashion Forecasting initiatives benefitting the Indian Leather industry

- The Tanners have been involved in the process of Fashion Forecasting and this has enabled them to present leather/colour proposals, ahead of the season.
- The GLOBAL COLOUR SHADE CARD is first released in India giving a tremendous lead time over the competition.
- The Scientific Analysis of the market trends has helped the shoe manufacturers to understand the Trends in Retail and gear up with apt products for exposition at leading International Fairs such as Garda, WSA, MICAM and the GDS.
- The MODEUROP initiative has been very successful in catapulting India into the foreyards of fashion. We dictate the world's fashion colours today.
- Customized COLOUR CARDS for leading exporters conceptualized, designed and brought out by CSIR-CLRI have helped the world recognize India's capabilities of being abreast of fashion and delivering quality leathers and products.

- Enhanced 'IMAGE INDIA' at various national and international for a through the Theme / Trend pavilions.
- Outreach TREND seminars to disseminate the design intelligence; FOOT PRINTS: Shoe and Shoe Component Trends; Children's Shoe Trends; REVISIT: a series of Retail Photopacks; ADVANTAGE 24; Leather & Material Trends; the BAG PICTURE: Shoe Accessory Trend reports published by CLRI help the industry gain access to "input information" for their collections 18 to 24 months ahead of the season in address, which is a tremendous 'Business Advantage'.
- Fair reports & analysis from Anteprima & LINEAPELLE give a rare insight on the developments in the footwear world and access to markets.
- The URL: www.indiadesignclub.com is a dedicated portal for dissemination of fashion trend reports, analysis, fair reports, technology tips and market information, well in advance so as to help the Indian footwear industry always stay a step ahead of competition.
- The SHOE STYLING COURSE equips budding designers develop an awareness to fashion and integrate these ideas into design collections. A CAD intensive module also exposes them to modern techniques in shoe designing.
- The CLRI India Design Club includes in its ambit information dissemination in all areas of Leather and Leather Products and with fortnightly updates is your 'window to International fashion'

The above initiatives have made India as the most preferred destination for sourcing of quality leather and Leather products. The Indian industry has become more competitive and more global in its outlook. This is a welcome sign. This attitude demands products that match International Styles and standards. Manufacturers have to understand their customers, anticipate the changes and envision the future of fashion.

Reach for the future

Information is the key to success especially so in a fast changing and dynamic world and in this context the members of the Leather industry are particularly enlightened and are enabled to gain access to the vast international information base on 'Fashion and Trends' in Leathers & Materials, Colours and Textures, Shoe Design & Retail, Shoe Component & Accessories.

'Advance preparedness' is vital to stay ahead in today's competitive business world and it serves as a "**beacon**" to the industry to light their way and guide them with '**input information**' to help design collections in line with the latest Trend Directions and thus achieve a higher success rate in the acceptability of the designs and collections.

The mantra of the Indian Leather industry is to be positive and contemporarily in tune with the latest in fashion globally.

In the realm of International marketing of fashion related products, advance information relating to changing trends is a major business advantage. The leather industry of India is beginning to realize the importance of fashion forecasts to be able to cater to the buyers with original materials / products in leather.

Reach for the future with the Indian Leather industry.

With these thoughts I would now welcome the other speakers to present their views and enlighten us further.

"Challenges that our Industry needs to address to stay ahead in this competitive field."

Shri SV Kumar, Vice President ISF as EXPERT TALK in the Session on " Leather Creativity and Design Innovation" at LERIG 2012 on 29th January 2012

Let me first analyse the Indian Leather Industry. The major highlights are:

- It is a **Large leather industry**.
- It has **Strong craft skills**.
- It makes some of the **best men's footwear in the world**.
- It is a **fragmented industry**.
- It has **limited infrastructure**.

We need to ask the question: **How does India exploit the opportunities ?**

I have the following suggestions:

- We must have a **global mindset** – as you are competing against the rest of the world. Be the **first in the world**.
- We must realize that **Value for money** in the **price/product** relationship is **critical**.
- We must '**Deliver on time**.'
- We must **Invest in infrastructure**
- We must **Invest in Design and Development**
- We must **Leverage Technology Tool towards Leadership**

Let us take a case study of "**FOOTWEAR**", where the current system of manufacturing is labor dependent and sector is market driven. The Volume market is already taken by China leaving little scope for new entrants.

Therefore can footwear become innovation driven?

If so India has advantages with low expertise costs and talent base in footwear.

But a careful strategy had to be worked out to leverage innovation into to creation of new market space.

In the case of **Non-Leather Footwear** we could gain both price and market advantages. The Non-leather footwear could command more than 80% of total market and would emerge the major product of mass production and derive benefits from economy of scale catering to merchandise marketing and volume production.

Leather Footwear could become a niche product segment and with Leather footwear as a niche product it will start determining its own price.

Leather footwear may move towards customized product segment with market and price advantages but there are several questions that need to be answered, such as:

- Will it become innovation driven manufactured product? Will economy of scope become the USP?? Is there a new space for India to arrive?

We should transit from comparative strength of the present into competitive leadership based on technological innovations which seems the way of the journey ahead in footwear sector.

We must ensure that we manufacture Products for Niche Market with the following features:

- Design innovation
- Value addition
- Value optimization
- Advance insight
- Expertise augmentation
- Fast response
- Consumer sensitivity
- Economy of scope model

While we hace Comparitive Advantages such as:

- Raw material base
- Installed capacities
- Skilled manpower
- Domestic market
- Cost of money
- Government policies
- Economy of scale
- Merchandise market

It is the Competitive Advantages that we need to take care of, such as:

- Innovative ability
- Technology culture
- Ability to create consumer value
- Fast response time
- Economy of scope
- Risk bearing strength
- Aggressive marketing

We must "**Do things Differently from the past**" like Innovation-led manufacturing, innovation clusters; new strategic partnerships for value creation and market positioning

We must also change our mindset and have **Competition Foresight and Risk Mitigation** which could be achieved through:

- Partnerships and Strategic alliances
  - ☐ Strategic alliances of India with other Nations
- JVs and technology tie-ups
- Partnerships / Bilateral Agreements
  - ☐ Partnerships could be converted into actions.
- Private Sector Initiatives
  - ☐ Private-Private partnerships

Technology and Human Resource Initiatives are a MUST and this is where platforms such as LERIG give us the platform to interface with Institutions like CSIR-CLRI, FDDI, NIFT, NID, CFTi etc. to synergise both Technology and HR initiatives.

In Summary, I have the following to say:

- Global leather sector cannot resist the change of wind for long where innovation and competition will overtake the present.
- Seeing beyond the horizon of global leather sector, I foresee a future for the sector driven by innovations and stronger coupling of technology and trade
- Technology and research in leather will command higher relevance
- Those who break the barriers of knowledge will prevail over others
- A National Think Tank with back up on marketing innovations is the step ahead.
- Leveraging our economy of scope model through innovation clusters and creative marketing are needs to be met.

In conclusion, if we can leverage our innovation advantage in leather, then we would be World Leaders in this field.

Thanking you and looking forward to a stimulating discussion ahead.

High End Leather Processing

Tim Amos, Stahl India Limited, Chennai
J Raghava Rao, CSIR-CLRI, Chennai

The title that has been given to me is in itself a huge topic, and if we talked for a couple of hours I would still have things that I should have said. I do still remember well the words of my professor at college that " leather is made or spoiled in the beamhouse" but, given the time available, and given that I have been mostly involved in finishing during my career, I will focus today on those aspects of making High End Leathers.

It is easy to see that title itself was fixed by my friends from the CLRI – genuine blue sky thinkers. It is a very broad and thought provoking title, but how do we interpret it in real life – in the tannery? what do we mean by it, and how do we gain something to take away from today's programme?

So what is a High End Leather?

Is it a high performance Automotive Upholstery Leather?
Is it a very high priced article for one of the international luxury brands?
Is it leather made with a new piece of machinery or a state of the art process?
I guess it could be all of the above, but what makes them high end?

Many of those in the audience today who are involved with tanneries making leathers for shoe factories, garments or leather goods, have one real objective in mind, which is sometimes a taboo subject. That is they want to fill their factories, and make a profit by means of value addition.

The problem is that today we operate in a global business environment, with worldwide pricing and costing information easily available, this is not as easy as it was 20 years ago to achieve our objective.

In crude terms, there is no money to be made by buying a high priced raw material, and selling it at a high price, the best way to make a profit is to buy a low priced raw material and sell it for a much better price.

So for the purpose of my presentation – a High End Leather is one, which has some special characteristics, which differentiates it from our competitors, which means we can sell it for a higher price.

How do we do this? I will split it into 3 broad areas.

1. Giving the finished leather or product some superior physical performance characteristics, which attract the buyer to pay the higher price for it
2. Upgrading the raw material
3. Adding fashion content

High Performance Leathers

When we talk about high performance leathers, the first group which comes into mind is Automotive Upholstery. This is perhaps the pinnacle of technical achievement in our industry, and in reality is where leather manufacture and engineering meet. In today's world where car exteriors are designed by computer, they all look very similar in shape, so the designers use the interiors to put their own stamp on the brand or model. Whether the theme is sporty or opulence, leather is a winner in cars today. The demands from the car companies increase almost on a monthly basis, both in terms of aesthetics and performance. Also in terms of the removal of banned substances or those perceived to be harmful from the interior of the vehicle. This has pushed chemical companies like Stahl, and the machinery companies very hard, but also paved the way for products or systems, which have found uses in other avenues of leather manufacture. The automotive leather tanners went to water based topcoats before the rest of the industry. Such examples as Waterbased Topcoat and Crosslinking systems, Polymatte dullers and high performance pigments like the PP39100 range, as well as the removal of substances like DOP, OPP, NMP have all been adopted by Shoe Upper, Leather Goods and Garment Leathers at a later date. In days gone by, the leathers used in cars, made with Nitrocellulose topcoats cracked and flaked, but today's leathers have to look good for the life of the vehicle and the latest phase of this mantra, is that pale coloured leather used in today's vehicles have to resist dirt and soiling from dyed components in clothing – such as blue jeans, and the water based topcoat has to be easy to clean when it does start to age.

We also have to consider the changes in the way that finishes are applied to the leather and as machinery companies have brought out new technology to make finishing leather faster, better or cheaper new products have been developed to work on and compliment those machines. I am thinking about pre base coat sealers to fill defects, and new topcoats, which can be applied to textured surfaces by rollercoater to cut down on wastage. Stahl has worked alongside machinery manufacturers over many years to jointly meet these challenges.

Aircraft leathers, both for private jets and commercial airlines, are another very specialized area, where the performance characteristics often mirror those of the car industry, however there are some additional requirements in terms of flammability and emissions, which need to be addressed. Today we are facing another challenge. As aviation fuel costs have risen and hit the profitability of airlines, weight is suddenly an important factor. Whilst leather is preferred to textiles for aircraft seating, not only for the luxury and comfort it offers, but also because it is easier to clean when soiled and it is quicker to replace when worn out. It is heavier than textile alternatives. Stahl has now developed a process, which we call Stahlite, that offers genuine weight savings, and hence fuel savings for airlines.

Some of the world's most expensive leathers are made for Leather Goods sold by the big brands. In some cases these are made on the top selection hides, but in many

cases they are quite heavily finished and from lesser quality raw material – they still demand a very high selling price. In a world where a comb case costs a hundred euro, and a handbag can cost several thousand euro, the leather has to look good and perform very well. We get asked to provide leathers, which have superior wet and dry rub fastness, resistance to abrasion in use, and resistance to hair oil, ketchup, sweat and coffee. These are all possible today using water based systems. Meeting higher physical requirements mean you are in a good position to get a better price for your product.

In the past, Lining leathers for shoes were largely unfinished, or very lightly finished. Today there is a big demand for lining leathers, which can withstand very high wet and dry rubs and also very high sweat rub resistance. These can be finished using special acrylic and polyurethane base coats, with high performance pigments, and then topped with crosslinked water based topcoats.

Fashion Leathers

Fashion leathers are a great way to upgrade leathers, and add real value to our leather or article. This is the way in which Italy has remained until today as one of the leading leather producing countries in the world, and that, in Europe where manufacturing generally, and hence leather production has largely disappeared. Italy still dominates and dictates leather fashion, and there is a lot that we in India can learn from them.

To make and sell fashion leathers, you have to get information on fashion trends and timing from Italy, you have to have a strategy and the R&D to develop those articles and then you have to market and sell the product properly. If I am honest, India has not done this well. In India the trend has been to sit back and wait until the buyer walks through the door and throws a cutting onto the desk – saying "copy this" or make the same leathers you made for the last 20 years. The only thing you can do then is be cheaper because the buyer is holding all the cards. In the past, the people buying leather or leather products were leather people, they understood the market, they understood the product, they understood your problems. Today, the buying decisions are made by 21 year old kids, with no leather knowledge just a good idea what will sell, at what price, and what will not sell.

If you can make a fashionable article, you can be first, you select the raw material quality, and you have more control over the selling price, because you are placing your product into a certain price bracket. You are competing against a high priced source, so you have more freedom than you would have had.

Fashion advice is easily available, and it doesn't have to cost the earth, but you have to work to make sense of what can sometimes be a foreign language, and you have to stick at it and make your collections to show the buyers.

Great fashion advice is readily available from the CLRI, they do sterling work on both colours and textures. Great fashion advice is available from the Stahl Fashion Studio,

delivered by our local staff. We at Stahl have invested a lot in this area, because we feel that it is the way forward in emerging markets. We have done this by working with a fashion and design studio in Italy and setting up a department with our European organization to translate fashion advice into leathers and ideas, which can be understood by us mere mortals.

Upgrading

As I said at the outset, there is no money to be made in our industry today by taking a high cost raw material and making a high cost finished product. The aim has to be to take a low end raw material and sell it well. If you can upgrade your raw material by one grade, the cost of conventional finishing becomes almost immaterial, easily said?

When India first stated to produce finished leather, anything finished, which stuck to the leather and covered the defects could be sold. Today India competes on a fairly level playing field in a global industry with the rest of the world, so there are no favours and no shortcuts.

The raw material we work with has defects of many types, usually either in colour variation or grain quality. In the past we could say that we have to cover these defects. Today we have to hide these defects, leaving the leather as soft and natural as possible.

If you want to hide defects you can use mechanical means, such as snuffing the grain or good quality embossing (remember that some of the most expensive leather products sold today are embossed) or chemical means, that is a manufacturing process, which hides or minimizes the defects in the hide or skin.

The reality is that you have to use a combination of both.

The Fashion today is for super soft leathers, with a natural or naked look – all with good physical properties, has made life even more difficult for us all.

We at Stahl have worked hard on this aspect of our working style, as this requirement is not going to go away, it will only get more.

One of the more common methods for making lightly pigmented leathers with a very natural touch is by using Cationic finishes, which have a chemical charge, which allows them to penetrate more evenly over the grain surface whether it be intact or damaged. Cationic finishes give a very natural look and a very nice feel to the leather but can give poor physical properties such as wet and dry rub fastness, because they depend so heavily on waxes and oils as a base.

We at Stahl have developed a nonionic system, which we call Beauty Maker, which gives the look of cationic finishes, with a very natural level film, but relatively good physical properties. We have a complete range of BM waxes, binders, fillers and resins to make the maximum use of the system.

Waxes and Oils are very much in fashion today, and these present problems for the finisher in terms of quality. We at Stahl have worked on this in two directions, first by making the defects a part of the effect, and second by developing waxes and oils which will not highlight the grain defects but will fill, mask, and hide them. We can today make fashionable leathers, which have good "opacity" or hiding power, but with no pigment at all.

I have tried in the time available to give my views on what constitutes high end leathers and how they can be made, I hope that I have at least created some thoughts on how we go forward. We can all comment on the economic conditions that we have in force today, but I would say that these are the challenges that we have to deal with – so let's just get on with it!

High End Leathers: CSIR-CLRI Initiatives in the Twelfth Five Year Plan

The Indian leather industry is one of the major established manufacturing industries in the modern as well as traditional sector. The industry has undergone a structural change during the last three decades, from merely an exporter of raw material in the sixties to that of value added products occupying a place of prominence in the Indian economy. For the twelfth five year plan, the planning commission has recommended special attention to the leather industry owing to its high employment potential, rich technological capabilities and global competitive advantage with earnings through exports.

The industry has set an ambitious projected target of USD 14 billion to be achieved by the end of 12th plan period from the present export realisations of USD 3.75 billion. This dream can be realised either through increased productivity or value enhancement. In economic terms, a quantum leap in value enhancement from the existing average of 400 per cent is needed to meet the set enhanced export earnings for the 12th Plan.

A survey of the customer preferences in leather indicates that the users are in two strata. The fashion and quality conscious, value leather as a classy material and accessorizes themselves with products, shoes etc. The leather upholstery market is yet another example of a luxury leather market where innovation to provide quality for money is important.

CSIR-CLRI Value Engineering: The quantum jump in value addition for leather can be made possible only through novel innovations like developing smart leathers. The main use of leather is to protect against external environment. If the leather is made to sense conditions in environment it becomes 'smart' and respond to them then it becomes 'intelligent'. Development of properties found in skin when animal was alive to be made available in the leather as well viz. 'making leather function as a living skin' is the way forward to be explored. This opens up not only new areas of application for leather such as developing value added products but also enhances the value of present areas of application including upholstery leather for air crafts,

automobiles, aerospace, defence and medical applications. There is large demand for natural colorants, fluorescent and scented leathers for making high end products like women garments, and golf leathers. In the processing side, the value engineering can be practiced by the use of polypropylene drums to reduce energy consumption, use of flow meters for optimum utilization of chemicals, finally rationalization of leather processing for improving the process efficiency.

Value engineering for leather processing in the 12th five year plan will be addressed both through a molecular level understanding of the process steps as well as providing physical chemistry and chemical engineering inputs to enhance the wettability and spread of chemicals on the skin surface, diffusion of chemicals, nanoparticulate technology, etc. Modifying the active sites in collagen and introducing functionalities for improved chemical uptake will reduce the role of substrate.

Value enhancement can be feasible through

a) new texture addition, surface profiling, property enhancement for new applications;

b) developing chemicals, which can provide customer desired properties such as thermochromic effect, fire retardance, stain resistance etc;

c) technologies and engineering aspects towards improving the diffusion of chemicals, enzymes etc complete with tools for fault diagnosis;

d) smart leather products such as children footwear, therapeutic footwear for diabetic and obese and smarter leather upholstery and garments;

As more than 70% of Indian leather is exported to EU and US, the smart leathers should comply with REACH and RSL norms.

Leadership through capacity building in innovative smart materials and leather life style products is required to enable the institute to provide indigenous support in design and brand and also image building for the Indian leather sector.

"Brands and the Customer"

Shri PV Gopalakrishna Bachi, Leather Footwear Panel Convenor,
CLE as EXPERT TALK in the Session on " Leather Creativity and Design Innovation"
at LERIG 2012 on 29th January 2012

Market success comes from the understanding of **customer reverberation**.

A brand echoes the sentiments of the customer. It creates trust, dependability, understanding and care.

In Leather, all these parameters are associated to the quality of the leather, achievable through technological excellence and innovativeness.

Today's **customer demands more** from his leather. There are customers who wish to see their leather smarter. Major brands which source Indian leather, have started echoing the sentiments of the consumer.

As one of the world's most-preferred destinations for leather products, India is fast-emerging as a true global leader in every aspect of the trade.

Brands from all over the world have been showing a marked interest in India as a major supplier of leather products.

The political stability of the country - the world's largest democracy, a strong legal system, the availability of good raw materials, a skilled labour force, good working conditions, lower labour costs when compared to other leather goods producing nations - India is shaping up as a force to be reckoned with and is poised to take over the spotlight as a leader and trendsetter in the field over the next few years.

Being creative can be easy …

If you are a designer you will know that nothing is more important than trends, and having the right information leaves you with more time to do what you do greatest.... *create best selling design*.

Business intelligence for creative leaders

Market information and analysis are ideal tools for professionals who need to keep their finger on the pulse of the fashion industry.

Most international brands have an in-house design team which designs a minimum of two new ranges per year - one for Spring/Summer and one for Autumn/Winter. Work on each range starts as much as a year in advance of the new range going on sale, when International Colour Panels meet to try and forecast forthcoming colour trends.

Suppliers of leather, materials and components, across the country follow these trends

and produce samples that are exhibited at International Trade Fairs. Armed with samples of leathers, fabrics, lasts, soles and heels, designers work on their ranges and produce sketches of the new styles they wish to develop.

Following the initial sketch and selection process, the design team spends time in the factory and produces prototypes for each style. These are then taken back to the international brand's home country for review, where the final range is selected and the next season's range is finalized. Final modifications, if any, are made to the styling and the style is then signed off for the **commercialization process** to begin.

They Comprise:

Trend Research: Popular culture, design, fashion, lifestyle, entertainment & economics
Colour Forecast: Four seasons ahead, Trend-led colour palettes
Trend Forecast: Three seasons ahead, Includes textures and silhouettes

INDIAN LEATHER: a LIFESTYLE CHOICE for the World" s leading BRANDS

An alligator briefcase, supple patent leather shoes, the smart leather strap of your Omega and a subtle Hermes belt all make a definite statement anywhere in the world. Indian Leather is what makes this style statement of ultimate luxury and class.

With the explosion of fashionistas across the globe, there is no dearth of women who long for their very own Jimmy Choos or Manolos.

In popular media, it is a glamorous world these people live in; these Prada-toting, martini sipping women, clad in the softest suede and cashmere, while men are portrayed as the cigar-smoking investment banker, who holds a Dunhill briefcase and wears Ferragamo shoes.

This glamorous world is strewn with snazzy couches, fast cars, leather headboards or a chic martini bar with walls swathed with leather.

Whether it is leather accessories, clothes or furniture, it spells luxury.

Design and comfort come together with leather as a lifestyle choice - from plush leather seats in one's smart Mercedes to a deep couch that engulfs you when watching television, leather upholstery defines the quality of one's furniture.

When choosing leather, Indian leather, with its myriad forms, strives to be the best, surpassing many other sources in both quantity and quality. While at one time, Indian leather suffered from a lack of consistency in output, it has grown by leaps and bounds, not only to be equal to but lead the rest of the world as the premier destination.

Indian leather has come out of hiding and created a brand that will surely be worthy of the product.

Indian leather lines the couches of New York, London, Hollywood, Milan, Paris and

Rome with the best international designers liberally covering their furniture with suede, nubuck, nappa made from cow, sheep and goat leather. A braided leather carpet woven from strands of sensual suede, with a few cushions thrown on it, creates the perfect aura of allure.

From pop art to antique, the images of leather are deeply ingrained in the psyche of the human mind and to capture the essence needs a lifestyle choice. The choice is that of luxury.

With so many alternatives to choose from, leather is clearly ahead of the pack in terms of style, variety, durability and comfort. Leather spells comfort as much as style. Coupled with its ability to be made into anything at all, it transcends international barriers in its statement and appeal.

That is also why the finest luggage for travel, made by the famed Louis Vuitton uses Indian leather. It immediately sets apart the jetsetter who carries an elegant leather case. It conveys the image of the rich and famous.

Indian Leather finds an echo in the leading BRANDS of the world. Some of them are:

ACCESSORY BRANDS THAT SOURCE FROM INDIA: Coach, Liz Claiborne, Harrods, Yves St Laurent, Tommy Hilfiger, Etienne Aigner, Geoffrey Beene, Marks & Spencer, Guess, Next, Pierre Cardin

FOOTWEAR BRANDS THAT SOURCE FROM INDIA: Acme, Ann Taylor, Bally, Charter Club, Clarks, Coach, Colehaan, Daniel Hector, Deichmann, DKNY, Double H, Ecco, Elefanten, Etienne Aigner, Florsheim, Gabor, Geoffrey Beene, Guess, Harrods, Hasley, Hugo Boss, Hush Puppies, Kenneth Cole, Liz Claiborne, Marks & Spencer, Nautica, Next, Nike, Nunn Bush, Pierre Cardin, Reebok, Salamander, Stacy Adams, Tommy Hilfiger, Tony Lama, Versace, Yves St Laurent

GARMENT BRANDS THAT SOURCE FROM INDIA: Pierre Cardin, Tommy Hilfiger, Versace, DKNY, Hugo Boss, Liz Claiborne, Ann Taylor, Nautica, Kenneth Cole, Charter Club, Daniel Hector.

Leather is about sensation and as much as it pleases the eye, it also feels good and smells amazing. The smell of new leather spells romance as much as it is iconic of masculinity. Leather smells of power and speed and BRANDS respond to this CUSTOMER need and craft the most exquisite merchandize of Leather which spells sheer class and elegance.

Designer Leatherware is here to stay and India will increasingly play a BIG role in it. With the opening of the Reatil Domestic market, **exciting times are ahead for UNIQUE DESIGNS for BEST VALUE!**.

I await patiently to hear our experts present their perspectives.

Unique Designs for Best Value from medium and low priced products

Ms Shinju Mahajan, Chairperson, Leather Design, NIFT, New Delhi

Globalization of businesses brings opportunities as well as failure. In today's volatile economy, creating superior value for users is shown as a way of achieving competitive advantage. However, there is a little agreement of what exactly constitutes user value and how design can contribute to its creation. The importance of design in product innovation has grown dramatically during the last few years. Traditionally, design was considered an exception reserved for luxury segments and sophisticated niche markets that could appreciate a product's aesthetic and artistic values. Now, design is becoming the synthetic expression of a range of managerial processes, including product innovation, that are innovating products by adding value through design or technology intervention. On the basis of the analysis of case study, the paper aims at pointing out competitive models based on design for upgrading in global competiton.

FASHION DESIGN INCUBATORS- RECENT DEVELOPMENTS & NEW OPPORTUNITIES

Shalini Sud
Head,CE Diploma, Corporate Communication Cell,NIFT, New Delhi

"Design Incubation concept is about rethinking how things can work, whether we can help the industry to explore new ways that can make life better- through design" –Asia One.

I take this opportunity to compliment CLRI creating a platform for all stakeholders to come together for discussion on the role of institutions in design innovation in the leather sector and emphasizing the value of design for business and society in general.

It is said that the future economy of world will be the 'creative economy'. How prepared are we as a country, society and market to understand the reality that is yet to unfold? We are aware that the dynamics of market shifted to consumers in the 90's. The transparency era aided by communication boom has further ensured that the consumer today is aware and conscious; not willing to accept the mediocre when better design is available to them. Opening of global market further makes accessibility to good design possible to everyone. In this scenario, consumer knowledge about design cannot be challenged, only aspirations answered.

Last decade has also shown dynamic trends for the leather sector in India. While on one hand every prominent luxury brand of the world is establishing their presence in targeting the Indian consumer. On the other they have been increasing their manufacturing scale in India for export to all over the world. Either ways the entire supply chain geared towards addressing the needs of this business has been compelled to address the aspirations through design in a manner that is conscious and responsible.

How is 'design' understood in the sector? Is design integrated into core strategy of leather business to harness its power? Does the business provide the right kind of environment conducive to innovation? If we are to explore new ways that can make life better, are we looking for systems that are ethical and sustainable to the environment in which they are being conceived? Are we looking at design 'inclusivity' or 'exclusivity'? Are institutions training personnel for the leather sector prepared to understand design opportunity as understood in the context of India? It is these thoughts that I seek to place before this dynamic sector.

"Design opportunity" as Prof. Ranjan from NID says is – "a combination of perception and imagination – excludes the viewer or reader from "seeing" the imagination part of the designer's statement and therefore it compels the designer to take the idea far down the visualisation and realization path before it can even dawn on others that the idea is truly credible. This means that we may need to create a platform or even a multitude of

platforms for design incubation and development that can be accessible to many across numerous areas of application and these kinds of ***platforms just do not exist in India today.***"

Design incubation requires research, knowledge of design, skills to realize what has been visualized, consumer insights and above all willingness to allow freedom of thought and expression. Its progress cannot be measured in terms of growth and metrics but experienced in terms of value and consumer satisfaction. Design incubation cells are integral to most design lead organizations in the world LV, Cavalli, Prada etc and consist of a dynamic team drawn from across-disciplines. Anthropologists, architects, engineers today work together with designers to create future designs. Boundaries are constantly challenged to be able to dream an idea and actualize it within a timeline to create products that have an ability to touch our lives and make it better.

Innovation here bears a hallmark for differentiation which becomes a crucial point in the entire chain. While under the NLDP programme in the early 90's a lot of investments were made in setting-up institutions for training personnel for human resource development and research in the technological aspect of leather industry, little has been invested in the area of research in design thereafter. Recognition of design professionals as mere stylist, a sub-set of scientific research has constantly led to design struggling for recognition and its rightful place in business and academia both. Exploiting technology without the use of design process that inherently understands the needs of users and environment can lead to results that can have disastrous consequences on the society. Yet the percentage of investments in design institutions has been far less than those undertaking scientific research.

There is also a larger tendency to view design from a western centric perspective of 'market-consumer focus' and 'quality benchmark' which does not take the reality and diversity available as a resource in India into account. It is my firm belief that if we are to make any mark in the world design platform, we can only do so by exploring our cultural diversity in a manner that is inclusive. Only then can 'Brand India' stand forth in a sea of 'masstige' wave globally to carve out a distinct niche.

I will take examples from our experiences at NIFT to put forth my ideas where imaginative approaches have created products, services and systems that are beyond just a "form-giving activity" associated with design and takes into account aspirations and cultural preferences of the context/ market within which they are placed in a manner that is "inclusive" and sustainable.

Leather Design Centre at NIFT was set up with the help of CLE under the MAIS scheme of Government of India in 2006 to provide design options to a vast export industry. The idea took fruition of looking at global trends in fashion and interpreting them for Indian retailers. Analysis in the form of 'Trend Book' each season was generated and 'road presentation' at various leather hubs across India was conducted twice a year to impart the message. Similar activity has been undertaken by CLRI- Modeurope since

many years as platforms in promoting and informing all stakeholders the use and processes of design. Such activities constantly brought home the point of approaching design activity as 'story-building' process that connects product design to aspirations and communication of those to buyers, sellers and consumers. Encouraged by feedback and exposure to export retail markets design centre generated a huge amount of design intelligence and sensitivity towards importance of new look each season. Providing design support services that enables the entrepreneur in the leather sector to access and manage designs was a core objective. The project team hand held the client (manufacturer) through the process to ensure that design delivers at the end of the process.

NIFT, in the last twenty years has been trying to impress upon the importance of design through every interaction with the industry. From the first batch of leather graduate in 1995 the journey has been full of highs and lows. Leather industry has benefited from these professionals who constantly interface between design and business to add value. Industry is replete with examples of initiatives and contributions by these design professionals that have lead to many international labels like Ralph Lauren, Fossil, Coach, Prada, Tommy Hilfiger, Nautica and many others gradually looking at India for design. Unfortunately the tendency to react rather than be prepared to make an impact has always placed us at a disadvantage in the world platform. Design is being discussed today perhaps not as a sub-set but as a crucial tool only once a demand has been created by the external pull. There is scope for planning and creation of a framework of encouraging creativity and innovation specific to our country that will place us at an advantage.

Design research initiatives at NIFT has always encouraged understanding the context in which design should evolve through strategies that add value to each stage of supply chain and uses local resources and strengths. Approaching the process of design ideation in a manner that is participative, inclusive, continual and therefore sustainable is the cornerstone of each approach at the institute. India is a country where mythology and story weaving is in-built into the culture. Delve into this culture and what we have is the 'story-telling' as understood from 'western- centric' perspective translated into trend stories. Do we really need to look outwards is a question I pose today? There is a huge amalgamation of ideas, skills, techniques, resources albeit strengths those are available here. Perhaps as institutions with strong connect with industry, policy-makers we would need to create a framework that projects a design identity steeped in Indian ethos but assimilating world perspective. Above all ensure that design serves the purpose for which it was initially envisaged.

However, these ideas need the support and continuity of an establishment which is many a times struggling against centralized, regulated and managed approach adopted towards the creative industry. The answers are perhaps complex as are the issues. Design would require to be viewed as a system activity and all constituents of the system would have to be addressed if a holistic framework of 'design incubators'

have to be thought of. A mapping of opportunities within leather sector would have to be undertaken by all stake-holders to clearly define the goals. Perhaps, Public Private Partnership model that ensures equal stake would provide for right environment for sustaining what has been created could be explored.

To make design actionable, creating an environment that is 'free' and encourages 'experimentation', perhaps by creating units with 'innovators' would be important. Giving autonomy and value systems that encourage innovative work could act as a catalyst to a new mind-set of an organisation that leads by design. Simultaneously, research policies for academia in design would also require to be liberalized which seeks to combine "People", "Processes", "Form" and "action" not so much as dependant on "testability and reproducibility" but on "contextuality" that makes it resonate with public and market. Funding and support to new directions for research in design – people, form, processes or action would have to be made to be able to stay far ahead.

Bringing skilled workers who fashion these designs into the fold of inclusive development approach would further be the objective of sustainable design governance. Creating fashion systems that would take into cognizance the cultural and social milieu is critical if we are to make design actionable. Indigenous machinery, tools, processes of interaction that is sensitive to historical and cultural background of the workers would be important. High percentage of women workers in this sector requires mechanisms that understand role of women in an Indian society and provides flexible working environment for them. There are some examples in the industry which provides for the model to be adopted for a larger impact.

The challenge is to allow design to lead by disentangling it from control. Creating strategies that decentralizes and give autonomy of actionable design to institutions and organizations including the industry to formulate new approaches to design from India.

Brand Building in the retail space

Ms Sumitra Roy, DIRECTOR, TERRA Handbags as EXPERT TALK in the Session on " Leather Creativity and Design Innovation" at LERIG 2012 on 29th January 2012

I have been actively involved in promoting my BRAND – "TERRA" in the Retail space and I would like to dwell on the WAY FORWARD in BRAND BUILDING for Leather Products.

Since, India manufactures about 18% of world leather and is the second largest footwear manufacturer after China, and is a large supplier to several International Brands gaining a wealth of knowledge and hands-on experience over the years in catering to these brands; it can be concluded that Indian companies have the wherewithal to create their own Brands to be a major player in the market.

Consequent to India emerging as a manufacturing destination in view of competitive advantages, and also considering that India has huge domestic market in footwear and leather products due to growth of affluence levels of consumers, there is a need to focus increased attention on the concept of Branding in the leather sector.

Importance of a Brand

A Brand is understood as the key to 'Wealth Creation' and is used as a vehicle to create demand. It is integral to the business building process; it is a wholesome experience which embodies quality assurance, product service, customer familiarity, repeat purchase and fulfillment of one's expectations.

Indian Footwear & Leather Products Market Size is valued at INR 15 - 20,000 Cr. approx. which is dominated by unorganised trade (80-85%). Branded/ Taxpaying businesses contribute towards 15 - 20% approx. of the market-size. Footwear Industry/ Segment has no forum or governing body to represent its Vision, Growth plans, Challenges, Issues & Concerns to the Government.

Putting in to perspective, the long-term potential of the industry and the macro benefits that will be realised, it is important to boost the Indian Market for Footwear and Leather products by looking at the following:

- Increase Industry Size from 15000 Cr. to 50,000 Cr. approx. in the next 5 years
- Attract FDI in to Retail/ JV & Tie -ups
- Increase Domestic Manufacturing & Capacity Building in the Organized Sector
- Create Skilled Manpower for Organized retail
- Job Creation & Greater Employment
- Create Brands as Assets & Higher Valuations.
- To bring Unorganized sector in to Mainstream for Greater Tax Revenue Generation
- Minimize Chinese Low Quality Products invasion in to Indian Markets
- To shore up Bottom lines & Top lines of the Sector

- Create Quality Consciousness amongst Consumers
- Improve Shoppers' Experience & Delight
- To bring about Lifestyle Change for the Youth

India has the right mix of factors which can act as catalysts in the growth of this industry such as an assured market of 1.2 billion people (as an asset), world's largest livestock, current operational model of low cost & high quality products and the cost effective manpower for this labour intensive industry.

All the above listed issues are crucial for the growth of the 'Leather & Leather Products' Industry, and corrective action is a necessary condition to take the Domestic Industry to the next level of growth. However, there is no National Level Governing Body to address such issues leading to loss in Domestic direction, Vision & focus. This must be corrected.

I do hope that have managed to kindle few thinking points in your minds which can be discussed and an action plan worked on.

Thank you.

“HRD for Change and Innovation”

Knowledge Sharing: New Inter-institutional HRD Gateway

Dr B Chandrasekaran, Senior Principal Scientist & head of CHORD, CSIR-CLRI

Preamble: The world is witnessing alignment/re-orientation in most of the manufacturing sectors. Value addition is not only for the products. Quality and availability of existing manpower also witness change. Job turnover has been consistent in leather products sector as well. Existing skilled manpower shift their jobs for better remuneration and other benefits. Over a period of time their Per capita income also has increased which also reflects in higher cost of production in many of the developing countries.

HR Needs for Leather and products sector: Leather and leather products sector is poised for strategic advancements. In view of the growing demand for increased skilled manpower, strategic plans need to be implemented for meeting the targets. Increased wages also pose threat for the very existence of this sector. The situation faced by many developed countries in early 80's is looming large over most of the Asian countries including China and India. The situation is further complicated with technological advancements and other rapid developments. Stringent environment conditions have also resulted restructuring of the sector.

In view of these developments, the available manpower and their quality need to be enhanced significantly. The growth of other allied sectors such as textile and apparel sector also has to be taken into account. Several new avenues and opportunities have to be considered for optimum results.

Training Programmes and Methodology: Academic and vocational programmes of varying nature have been devised over the years to meet the growing demands of the sector. However the inelastic supply/demand position for raw material also prevails for skilled manpower. This calls for strategic preparation in designing curriculum, which can provide adequate human resources, any time and every time the industry demands. Most of the developing countries are standardizing the vocational curriculum through innovative processes and linking them with industry needs. Industry participation in the organized training is being made mandatory.

Synergy with Allied Sectors: There is also grater need to synergize our efforts in developing skilled manpower for the leather products sector. Combined effort of textile and leather will be more appropriate in developing skilled manpower. Instead of competing with each other, efforts should be made to swap or mobilise available manpower. Such synergy is also required among various other agencies (various ministries) which are funding for the development of human resources.

Role of National Institutions: There are many national institutions which cater to develop manpower required for this sector. However, these institutions should play an enabling role in supporting many organized industries and other agencies by providing appropriate curriculum and technical assistance. These institutions also

need to forecast the future specialisations and demand for HR needs. Product design, fashion and trend forecast are some of the areas where more efforts have to be put in.

Role of Industry: It is needless to say that roles played by the industry are imperative. Continuous input by industry in developing newer manpower is essential for sustainability. When the HR requirement is large, institutions alone cannot provide adequate skilled manpower. Participation by industry has now become mandatory.

XII Plan Initiatives: Government of India has identified leather as one of the thrust segment for the country in terms of FE realization as well as societal development through employment generation. In continuation to various developmental measures during X and XI plan, the Government is planning to support HR development as one of the major programmes in the XII Plan also.

Summary: It is imperative that all the stakeholders need to join hands to realize the common goal of generating adequate HR for the leather sector. Expertise gained by individual organisations need to be shared and replicated for effective realization of envisaged benefits. Successful intervention by CLRI and FDDI in providing knowledge both at National and International level is an example for inter-institutional partnership for obtaining global eminence. Alternative approaches also have to be planned in case the country is not in a position to provide necessary manpower for this sector. Strategic plan includes subletting some of the preliminary preparative works to other players (located in other countries) and carrying out value addition components indigenously. This would help the Indian leather product sector meet the global requirements and achieve our XII plan targets.

"Skills and Competitiveness Challenge" - "What the Industry could do to lead change?"

Shri Intisar M Mohammed, Youth Committee Member, CLE as EXPERT TALK in the Session on " HRD for Change and Innovation" at LERIG 2012 on 29th January 2012

The Indian leather industry as a whole employs around 3.0million persons.

- The skilled and semiskilled workers constitute nearly 50% of the total work force.
- Key production units are located in Tamil Nadu, West Bengal, Uttar Pradesh, Punjab, Karnataka, Andhra Pradesh, Haryana and Delhi.
- Indian leather sector includes a complex grid of artisansal, tiny, cottage, small and medium enterprises (MSME's).
- The share of employment in the self-employed/unorganized sector comprising raw material collection, Curing, trading and household footwear production units etc. are 19 Lakhs (76%). The remaining 6 Lakhs (24%) are employed in the organized sector.
- Among the sub-segments, footwear and footwear components is the largest, providing employment opportunity to approximately 1.1 million people, mostly from the weaker sections of the society. Out of this about 0.2 million are employed in the organised sector, (30-40% women). Remaining 0.9 million people are engaged in unorganised footwear sector like rural artisans, cottage and household units etc.
- Leather garments and other goods (including gloves, saddlery and harness, etc.) is another major sub segment employing approximately 0.3 million people and mostly in organised sector.
- Tanning and finishing is the third major sub-segment employing approximately 0.1 million people currently.

The influx of trained manpower across all verticals is highly critical for the development of this sector.

It is a fact that having a relatively well trained and educated work force is a critical element in the rapid export & domestic growth of this sector.

In one of the recent studies carried out by Office of the Economic Adviser to the DIPP, it has been estimated that 4.6 million incremental human resource will be required till 2022 and Leather & Leather Product sector has been identified as one of the ten most important sectors of the economy which need greater thrust and special emphasis in terms of skill development initiative.

The projected human resource requirement in India till 2022 in the Leather & Leather goods sector is :

(in '000s)

Segment	2008	2012	2018	2022	incremental
Flaying and curing	1,000	1,302	2,122	2,856	1,856
Tanning and furnishing	100	142	212	286	186
Footwear and footwear components	1,100	1,698	2,334	3,141	2,041
Leather garments and goods	300	503	637	857	557
Total	2,500	3,645	5,305	7,139	4,639

The present global scenario and the target of doubling the export figures by 2013-14 needs more focused initiatives with widened scope and area of operations in the 12th Plan period.

Focus should be on the creation of the training infrastructure for catering to the HR needs of the operators, supervisors and the managerial level and extension of high end support services across all functional areas to enhance the global competency of the sector.

Special initiatives for operators level training needs to be launched to ensure adequate supply of trained manpower for carrying out shop floor level operations.

Also measures may be created for addressing the skill gaps in the upper level of the HR Verticals and other specialized services and bringing in more qualified professionals.

The Educational infrastructure for leather industryis as listed:

- Finished leather
- 5 institutions producing B Tech, M Tech)
- 8 institutions (State Government 250 diploma holders (Supervisors)
- NIFT Fashion designers – Manager level
- Footwear & other leather products industry
- 25 institutions (FDDI, CFTI,CFTC, ILT) 53% diploma (middle level managers/ supervisors) 47 % short term courses (assistant supervisors or skilled workers)
- Private company
- Shop floor workers, machine operators, stichers
- On the job training
- Some rganizat efforts by IL&FS and FDDI

There is a lack of facilities to train shop floor workers and this segment constitutes 80-90% of workforce !

The various talent pain points of the Leather industry ?

- Shortage of talent with right competencies
- Having to invest resources in new hire & training
- Lack of industry standards to align –competencies, curriculum
- Lack of industry driven accreditation, certification
- Competition for talent within industry
- Competition for talent with other industry segments
- Lack of research on labour market and best practices
- Lack of trainers
- Non-availability of training organizations for 80 -90 of training needs
- Passive involvement of industry in the shaping of policies to boost productivity, thereby improving company competitiveness and individual employability.

Approach and Solutions to addressing the gap:

- Linking Education to Employability in the Global Knowledge Economy.
- No One Solution. Every Region demands an innovative approach.
- Undertake fundamental reforms across the education system (primary, secondary and higher) to
- improve overall quality / outcomes,
- increase retention and
- ensure seamless integration with vocational training
- Significantly enhance Government-driven vocational training efforts
- Increase scale of PUBLIC PRIVATE PLATFORMS to better utilize Government infrastructure
- Foster Private sector / Industry participation in skill development.

And finally, What the leather industry could do to lead change?

The Industry must work together to ensure:

- Talent Of Right Quality
- Talent In Right Quantity
- Sector Driven Competencies
- Training Organisations Responsive To Industry
- Low Cost Of Training
- Certified Trainers, Curriculum, Assessments
- Skill Gap Analysis, Forecasting Of Manpower
- Study And Integration Of Best In Class Training
- Industry Sector Attracts Right Talent

I do hope that I have set your minds thinking and look forward if we can have a debate on the above and work out a Detailed HR Plan for our Industry.

BRIEF WRITE UP FOR BDS MARKET DEVELOPMENT PROJECT-CHENNAI LEATHER & LEATHER PRODUCT CLUSTER-LERGI-2012

Shri DM PARIKH, Associate Senior Faculty
Entrepreneurship Development Institute, Ahmedabad

1. EXTENDING BDS TO MSMES

Small Industries Development Bank of India (SIDBI) is providing support for fostering the growth of a strong and sustainable nexus between MSMEs and BDS Providers through a new project, namely, BDS Market Development Project. As the Nodal Agency, SIDBI has selected 18 clusters for this World Bank-led multi agency-IBRD, DFID, GTZ and KfW- funded project. In view of the huge contribution of Chennai Leather Cluster for the overall manufacture and export of leather and leather products in the country, it was selected for this project and the implementation has been entrusted to Entrepreneurship Development Institute of India (EDII), Ahamadabad.

2. EDII THE FACILITATING AGENCY

In order to co-ordinate the implementation of the project, EDII has constituted the Cluster Co-ordination Committee (CCC) consisting of leaders of various sectors of the industry in the cluster, associated institutions and experts. EDII after extensive consultations with all the stake holders has prepared the Diagnostic Study and Action Plan embracing all sectors of the industry. The findings of the DSR and Action Plan were deliberated in CCC and after incorporating the suggestions the package of initiatives for making BDS available for all sectors of leather industry in the cluster were launched on 30.9.2009.

3. GEOGRAPHICAL AREA COVERED BY THE PROJECT

Geographical area of Chennai Leather Cluster consists broadly tanneries clustered in Pallavaram, Nagalkeni and Chromepet, Madhavaram and Kelambakkam areas. Sizeable number of product units located in Guindy, Ambattur and Arumbakkam Industrial Estates and others spread in all over the city were included.

4. PROFILE OF THE CLUSTER

Chennai Cluster has the advantage of being located in a state that accounts for major share of about 60% of the Indian Leather Industry's output. The clusters in Tamil Nadu are located in Chennai, Ambur, Ranipet, Vaniambadi, Trichy, Erode and Dindigul. The Chennai Cluster alone accounts for about 25% of the sector's production in Tamilnadu.

The Chennai Leather Cluster produces approximately Rs.4000crores worth of leather and leather products out of which Rs.2000crores is exported worldwide as per CLE for the year 2010-11.There are 170 tanneries and 300 product manufacturing units functioning in the cluster employing about 40000 people.

The Chennai Cluster has the advantage in terms of access to raw material, port facilities, skilled labour and the cluster hardware in terms of service providers in training,

R & D and promotion of exports. These service providers include the Central Leather Research Institute (CLRI), Central Footwear Training Institute (CFTI), National Institute of Fashion Technology (NIFT) and Council for Leather Exports and initiatives by cluster stake holders.

5. BDS MARKET DEVELOPMENT PROJECT-PROCESS

I. Based on BDS gap assessed through Diagnostic Study report initially we have organized more than 60 awareness programmes, workshops in emerging thematic areas , training on Skill Development and focused short term courses on product designing to enhance the capacity of MSMEs in the Chennai leather & Leather Product Cluster.

ii. During the course of the Project, we have demonstrated usefulness of interventions viz., Energy Efficiency Measures, Lean Manufacturing, Enterprises Resource Planning, Cleaner Production Technology, SA-8000, arranging of Collateral Free Loans and Website Creation through pilot implementation in various Leather and Product units. The interventions in these areas were possible due to the active services and involvement of private Business Development Service Providers. The fact that 42 BDSPs have been empanelled and 27 BDSPs utilized to execute 104 voucher cost activities in the cluster clearly indicate the acceptance of such services in the Chennai Leather Cluster.

iii. BDS Project has developed the skills of 400 employees on IT/MIS, Soft skills, Management Development Programme, Advanced and Basic Design Courses which enhanced their employability and wage earning capability.

iv. While implementing all the above interventions, the BDS Project has introduced capable & competent 37 BDS providers and created effective natural linkages among the MSMEs and BDSPs which will be sustained in future through various Associations & public BDSP for the mutual benefits.

v. With these interventions MSMEs realized the improvements in cost reduction, profitability, sales turnover, working environment, better visibility of cluster and enterprises. MSMEs in the Cluster realized that their competitiveness can be sustained with the use of BDS providers & they can remain vibrant in the open economy.

vi. Some of the strategic interventions introduced for the benefit of the Chennai Leather Cluster comprises of

1. Formation Special Purpose Vehicle (SPV) for bulk purchase of dyes
2. Improvements / Modifications in Pilot Tanning Drum
3. Establishment of Energy Efficiency Cell at Pallavaram Tanners Industrial Effluent Treatment Company Ltd. (PTIETC) - Revenue model for BMO
4. Formation of New Association called Association of Footwear Components

Accessories and Machinery Manufacturers of India (AFCAMMI)- Missing link

5. Setting up of Information cum Display Centre for Components in Central Footwear Training Institute (CFTI) - Industry - Institution - Association linkage

vii. Initiations were taken towards Capacity Building of BMO like Pallavaram Tanners Association (PTA), Pallavaram Tanners Industrial Effluent Treatment Company Ltd. (PTIETC), Indian Shoe Federation (ISF), Madhavaram Leather Finishing Society (MLFS), Association of Footwear Components Accessories and Machinery Manufacturers of India (AFCAMMI) to keep the BDS Market Development initiative sustainable even after the tenure of the project.

All these events, interventions and introduction of BDSPs were possible due to the immense co-operation and support received from the leather and product units in the cluster.

6. INCREASE IN BUSINESS TURNOVER AND PROFITABILITY OF MSMES

I) Energy Efficiency Measures implemented in 15 MSMEs had resulted in saving of energy to the tune of 15 to 20%.

ii) Bulk purchase of dyes and chemicals through SPV at Rs.260/kg as against Rs.400/kg has registered 30% gain in material procurement.

iii) Intra cluster visits organized & have resulted for 3 MSMEs (First timers) to source wet blue leathers from Kolkatta at Rs.34/kg as against Rs.38/kg at local market.

iv) Collateral Free Loan availed by 5 units obtained 1.64crores and another 5 under pipeline had resulted in improved working capital cycle, increased credit facility and market expansion.

v) 21 MSMEs trained for filing up of application form for IDLS and 7 applied.

a) MSMEs obtained Rs.4crores as investment loan with the subsidy of Rs.1.20corres.

vi) Implementation of Lean Manufacturing in 4 units resulted in

- Increase in production from 50% to 75%.
- Improved machinery utilization from 50% to 65%.
- Reduction in rework level from 12% to 4%.
- Overall operation cost reduced from 10% to 5%.

vii) Implementation of Enterprises Resource Planning in 10 (ten) units has led to

- Improved Purchase Management
- Reduction in Inventory
- Better Decision making
- Reduction in non-moving items

- Smooth flow of funds
- Generation of Quick MIS system

viii) Adoption of Cleaner Production Technology in 2 tanneries resulted in

- Saving in Water by 20% valued at Rs.1.12lakh/year
- Recovery and Re-use of Chemicals leading to a saving of Rs.14.40lakh/year
- Reduction in effluent discharge

ix) Certification of SA-8000 in 11 units resulted in

- Commitment of employer to social accountability
- Increased productivity and reduced absenteeism.
- Response from workforce increased
- Increase in safety consciousness

x) Development of Website by 48 MSMEs resulted in

- Publicity profile of companies
- Increased market enquiry
- Increased turnover due to enlarged market penetration.
- Renewal of 70% of units without project support.

7. IMPORTANCE OF BDS FOR GROWTH

- Implemented 104 Voucher cost activities for the benefit of MSMEs
- 261 Participated in Skill Development programmes and obtained certificates
- 900 participants attended in awareness programmes
- 27 BDSPs first time introduced in the cluster

8. MAJOR UNIQUE ACHIEVEMENTS

I. Formation of SPV for Common Procurement to Reduce the Cost

After prolonged motivation of the benefits of common procurement, A Special Purpose Vehicle (SPV) in the name and style of M/s. Pallavaram Tannery Cluster Company Pvt. Ltd. (PTCCPL) was formed and 22 MSMEs joined as members. Commercial transaction emerged since April 2011. Till July 2011, 5000kgs of Chemicals and Dyes worth of Rs.13.50lakhs had been procured. The procurement cost is Rs.250 to 260/kg as against local market rate of Rs.375 to 400/kg. The intervention has resulted in reduction of procurement cost by 30%. If extrapolated for the entire cluster, the saving / reduction will amount to Rs.42corroes/annum. SPV is planning to procure formic acid from Gujarat Narmada Fertilizer Company Ltd. which is expected to save Rs.19/kg. This intervention had also helped the Chemicals and Dyes cluster in Ahmedabad Cluster. Scope exists to adopt the success of this intervention to other clusters in Tamilnadu.

ii. Drum Development / Up gradation

The activity of Energy Audit was implemented mainly to reduce cost of Energy and increase profitability. So far in 15 units Energy Audit had been carried out. During Energy Audit, BDSP M/s. Indian Leather Industry foundation had come out with an innovative concept / idea for up-gradation / development of existing tanning drum, which will save energy by 50%. SIDBI approved the new activity. M/s. Noor & Sons one of the tanning units had come forward to implement the suggestions / improvements in their drum. Total cost of project is Rs.4lakhs with beneficiary contribution at 30% (Rs.1.20lakhs).

The changes in the driving mechanism viz. Ring Gear, Gear Box, Motor etc. will result in increase in load bearing capacity from 300kg to 600kgs. The development is in progress and expected to be completed by 20th Oct.2011. If this intervention is adopted / replicated in the cluster of 450 drum (on an average) will result in saving of Rs.18 crores / annum.

iii. Energy Efficiency Cell

One of the activities is setting up of common set of Testing Measuring and recording equipments in BMO premises. M/s. Pallavaram Tanners Industrial Effluent Treatment Company Ltd. agreed to undertake the activity in their premises for common use by their members and other tanners.

The Instruments / equipments required for Energy Audit was identified by BDSP M/s. Indian Leather Industry Foundation. The total cost of the project is Rs.5lakhs with BMO contribution of Rs.1.50lakhs. The equipments were purchased under Hire purchase scheme and the training for personnel of PTIETC is being organized by suppliers and BDSP.

The benefits of the intervention were also disseminated at Ranipet Leather Cluster, through awareness programme organized on 14.7.2011. This intervention is a revenue generating model for BMO and self sufficient in Energy Audit. This has emerged as a model to address the cause involving BMO and MSMEs.

iv. Formation of Association and Establishment of Information and Display Centre – An Institute – Industry Linkages

BDS project observed a missing linkage among leather products units in the cluster. Considering the importance, an open house discussion was organized during Nov.2011 to fulfill missing gap. In view of enthusiasm shown by the product units, active persuasion and hand holding services were made by BDS Project and an Association was formed in the name and style of M/s. Association for Components, Accessories and Machinery Manufacturers of India. The growth of the Association due to active participation by organizers is very appreciative. So far 40 members had joined the association and expect total membership to

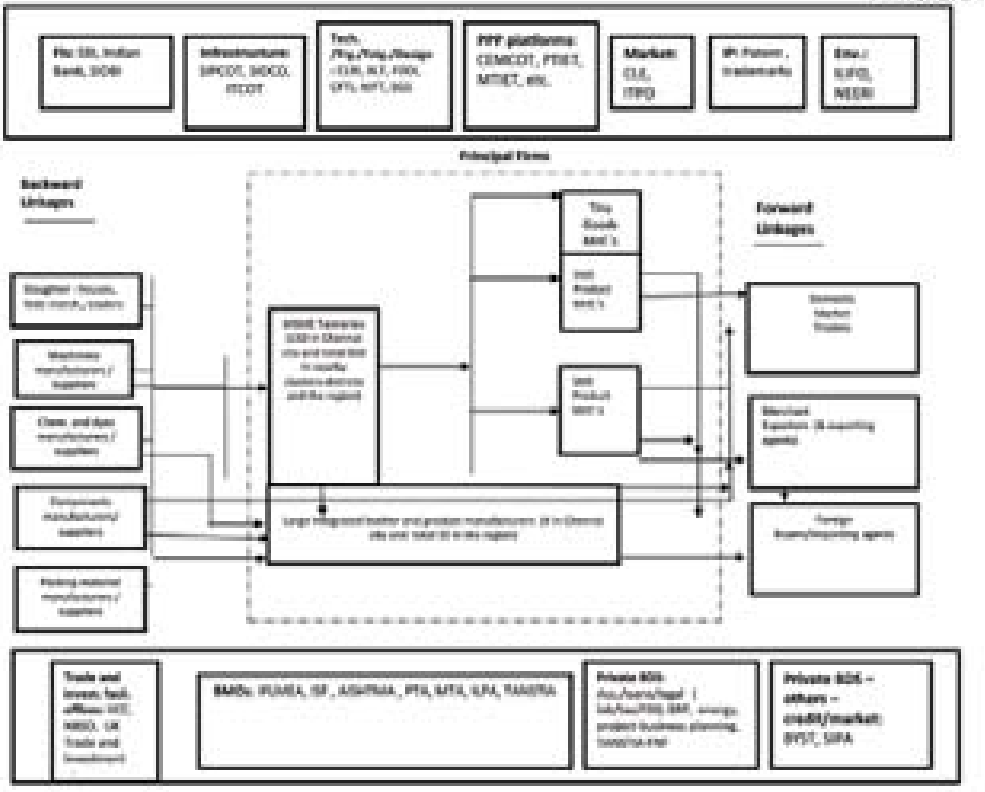
reach 80 shortly. The newly formed Association participated in Ambur Open-2 exhibition held in July 2011 to publicize and popularize the activities.

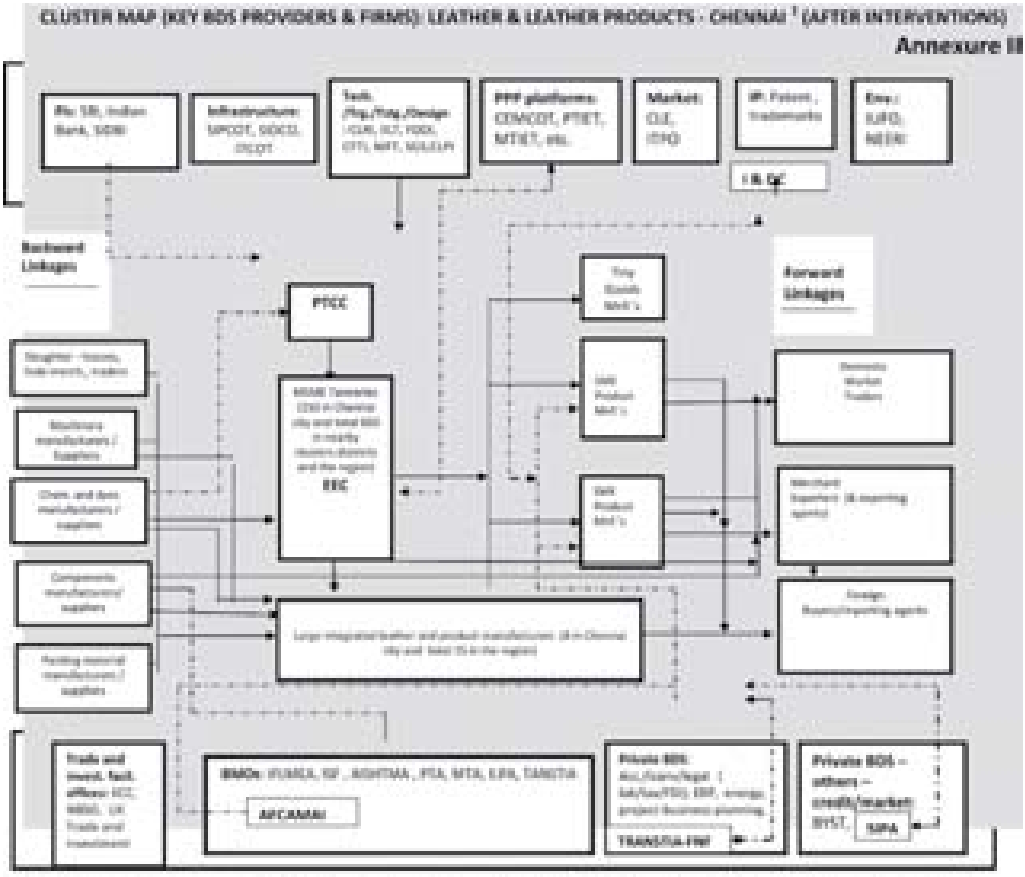
The newly formed association is taking step to establish "Information and Display Centre" at Central Footwear Training Institute which is under consideration of Development Common MSME-DI. The display centre will serve as a single point source to draw components off the shelf. It will also network suppliers of domestic and agents of foreign suppliers. The display centre aims to organize the sale of buffer stocks / unsold items with wide publicity. It also proposes to involve Mutually Training Institute (CFTI), Industry (MSME) and Association (AFCAMMI) which will be a role model in reaping the benefit. Indian Shoe Federation has adopted this model and is establishing an E-Portal for sale of buffer stocks. (Circular of ISF in Sept. 2011).

THE CLUSTER MAP BEFORE & AFTER THE INTERVENTION IS GIVEN AT ANNEXURE-I & II RESPECTIVELY.

Cluster Map (Key BDS providers & firms): Leather & Leather Products - Chennai
BEFORE INTERVENTION

Annexure I





[1] Services of many BDS providers such as BYST, SIPA, trade and investment facilitation offices, and energy-related are yet to be linked to sector firms.

9. SUMMARY OF BDS MARKET FUNCTIONALITY WITH FUTURE ROAD MAP

i. A SPV formed to procure Chemicals / Dyes at a competitive price.
   - Aimed to cover 120 units in the cluster.
   - Also take up to other clusters like Ambur, Ranipet etc.
   - Scope exists for SPV in other clusters.
   - Coverage in long run 550 tanners in Tamilnadu.

ii. PTIETC has taken over a common Energy Efficiency Cell and contributed 30% and will run for their members. A revenue model is being created.

iii. Formation of Association for product group and components / accessories display centre in CFTI to create and start functioning.

iv. Pilot drum improvement and involvement of ILIFO to replicate in 120 tanneries and add in 3-5 BDS providers for new concept of modernization of drum.

v. For skill Development BDSP and MSMEs linkages established

Designing	-	CLRI / NIFT
IT/MIS	-	SIPA/TALLY/NSIC
Soft Skill	-	Vision Unlimited / Cortex Consultants
Management Dev. Programme	-	Specialists in each subject

vi. Voucher cost intervention has already created demonstration effect which is visible in SA-8000, CPT, and Energy Efficiency & ERP for its adoption by more units. This nexus will be there for other voucher cost activities.

vii. Use of BDSP directory & Success Case Study
   - Directory furnished to all BMOs for circulation to all units / members and uploading in their website.
   - Case studies to be circulated to all BMOs and upload in their website.

viii. BDS clinics will be continued by BMOs

ix. Capacity building of BMOs (PTA, AFCAMMI, MLFS).

x. CLRI shall work as nodal institute to bring BDSp-MSMEs on common platform at least once in a year whenever they are organizing LERIG in Chennai.

xi. Association PTA shall organize Skill Up gradation Programme in their hall periodically and carry on voucher cost activities on productivity improvement etc. to at least 50 units.

xii. Association PTIETC shall carry out Energy Audit for at least 20 units/year and also encourage adopting Cleaner Production Technology to reduce effluents.

xiii. Association AFCAMMI shall enroll more members and provide space for more product units to display their products and also organize fair to expand market for member units & IMPROVE THE LINKAGES WITH DOMESTIC –INTERNATIONAL MARKET AS WELL AS WITH THE INSTITUTE.

xiv. SPV (Pallavaram Tannery Cluster Company Pvt. Ltd.) shall identify new avenues for Raw Material and Optimize the price / cost.

xv. ILIFO Shall facilitate the drum up gradation to all tanners for improving energy conservation & up scaling the production

Expression of Sincere Gratitude

FROM THE PATRONS,
CONVENORS & SECRETARIAT TASK FORCE

THANK YOU FOR MAKING LERIG 2012 SUCCESSFUL!


Prof Dr AB Mandal


Padmashri
M Rafeeque Ahmed


Shri D Chandramouli


Dr N K Chandrababu


Dr G Sekaran


Dr B N Das


Dr C Muralidharan


Dr B Chandrasekaran


Dr J Raghava Rao


Gautham G


K J Sreeram


J Kanakaraj


Sri Balakameswari


K Srinivasan


Md Sadiq


K Dayalan


D Suresh Kumar


E Paneerselvam


B Hema


Md Rizwan


R Saraswathi

With the Best Compliments from:

L C M A

Leather Chemicals Manufacturers Association

Thane Belapur Road, Navi Mumbai, Maharashtra 400 705, India
Phone: 6791 7380 ; Fax: 6791 7230

Members of LCMA:

1. Abhilash Chemicals Pvt. Limited
2. ATC Chemicals India Pvt. Limited
3. Auchtel Products India Limited
4. BASF India Limited
5. Balmer & Lawrie Company Limited
6. C & E Limited
7. Clariant Chemicals (India) Limited
8. Fenasia Limited
9. G.G. Organics Private Limited.
10. Haryana Leather Chemicals Limited
11. Indofil Chemicals Company
12. Lanxess India Private Limited
13. Stahl India Private Limited
14. Sellam Chemicals
15. TFL Quinn India Private Limited
16. Viswaat Chemicals Limited

With Best Compliments from

Leather Industry Members from Kanpur Region

1. **Rahman Industries Limited**
2. **Calico Trends**
3. **Zazsons Exports Ltd.**
4. **Alig Tannery**
5. **Allied EXIMS**
6. **Ruksh Exim Pvt. Ltd.**
7. **Swan Tanning Industries**
8. **Omega International**
9. **Upper India Tannery (P) Ltd.**
10. **Homera Tanning Industries Pvt. Ltd.**
11. **Saba Exports**
12. **Seema Exports**
13. **Penza Tanning Industires (P) Ltd.**
14. **Alig Industries**
15. **Everest Tannery (P) Ltd.**
16. **Model Group**
17. **Associated Chemical Industries (Kanpur) Pvt. Ltd.**
18. **Karamat Tanning Industries**
19. **Super Tannery Limited**
20. **Mirza International Limited**