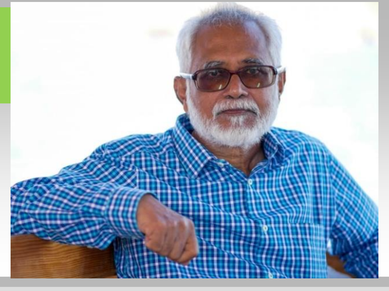
EDUCATION FOR SUSTAINABLE DEVELOPMENT OF LEATHER INDUSTRY- CHALLENGES AND PEDAGOGIC MODELS

PROF. DR. SAYEED SADULLA

Scientist 'G'(Director Grade Scientist) (Rtd),

CSIR-Central Leather Research Institute (CLRI), Chennai, India

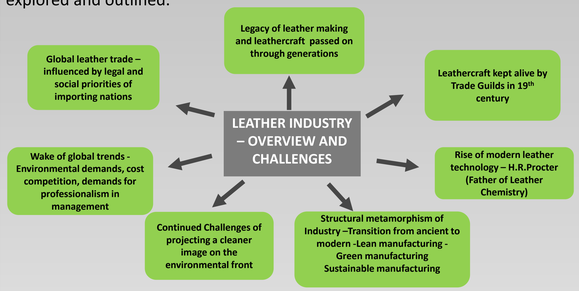
Email: sadullams@hotmail.com

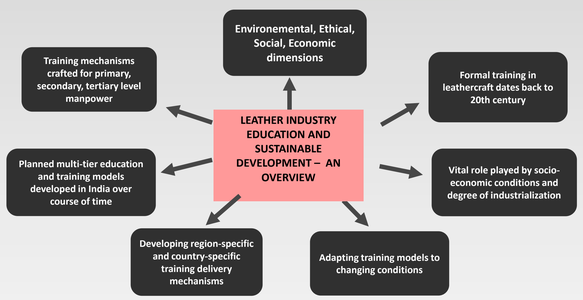


ABSTRACT

Leather is one of the oldest and most sustainable materials on earth. But then sustainability of leather industry is a much discussed topic in recent times. The three sustainability parameters viz., environmental, ethical& social and economic, all converge towards creating appropriate sustainable human resources development for the leather sector. This industry has its own specific challenges which needs to be addressed. The role of leather engineering education and training to meet these challenges and the methodologies and pedagogic models to solve these issues are discussed with a few select successful case studies drawn from different countries. Case studies with limited success stories are too analyzed for gaining insights into effective working models.

Mechanisms to impart leather engineering skill sets suited to address current and future anticipated leather development challenges are discussed. Importance of competitive cooperation amongst different educational and training institutes and agencies is emphatically brought out and appropriate strategies for the same laid out. Ultimately, the rate determining step in the sustainability exercises for any industry is the Human Resources Development. Paradigm shifts in Education and Research Approaches and globally operative programmes to attract the young millennials towards leather sector are explored and outlined.





Progress of Research in Leather towards Sustainability

1st half of 20th century
- Hides and skins and their preservation
- Collagen
- Potential tanning agents
- Tanning
- Large scale production of leathers
- Leather auxiliaries
- Process technologies for finished leather
- Design and fabrication of machineries and end products

2nd half of 20th century
- Accelerated leather processing
- Mass balance and optimization of process parameters
- Aesthetic and high value end products
- Multifunctional auxiliaries
- Cost control, value addition and instrumentation
- Enhancing productivity
- Pollution reduction strategies

1st half of 21st century
- Green manufacturing practices
- Zero waste processing
- Better carbon footprint
- Shift from chemical to bio processing
- Atom Economy
- Sustainability issues
- Environmental
- Ethical and Social
- Economical

Challenges and Opportunities for Leather Technology Education

Common challenges to pursue leather as a career option
- Not a hi-tech profession
- Less interesting option
- Cultural and social reasons

Current scenario and what could be offered
- Multi-disciplinary and transdisciplinary
- Exciting and exhilarating case studies, story telling
- Novel ideas and technologies sustaining the interest of the learners
- Paradigm shift of the industry from labour orientation to new knowledge skills based
- Inclusion of breakthrough innovations and game changing technologies like robotics, AI and VR
- Preparing for interdisciplinary demands of job market

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History of Leather Technology Education Initiatives in India

- V Year plans of Government of India Modular Training Programmes Leather Technology Mission Mode
- Projects HRD Mission Vocational, supervisory, Outreach (Reaching the Unreached and Marginalized; Training, Tutoring & Mentoring), Training of Trainer and international programmes
- PG programmes in leather and footwear and doctoral programmes
- Department of Leather Technology of the Univ. getting housed at CSIR-CLRI since 1948 setting academy-research-industry model
- Launch of professional education in leather technology (UG level) by Univ. of Madras in 1945
- World War I prompted the British to set up training institutes in Chennai and Kanpur

Modular Training Programmes in Leather Processing and Leather Products by vocational training Institutes

- Practical intensive programmes
- Built-in flexibility for credit accumulation
- Lateral entry
- Provision of highly skilled supervisors and trainers for the Indian leather industry

Pre-training / Training / Post-training — Require close coordination with the industry

Overview of current educational training offer

- Training institutions/organizations in India, China, Ethiopia, Germany, France, Italy, Turkey, Spain, Romania, UK, Pakistan, US, Brazil, Russia etc.
- Courses from half a year to four years in duration
- Universities, Colleges, Institutes, Schools
- Certificates, Diplomas, Degrees, Higher Degrees

Recent Initiatives

- Leather Sector Skill Council (LSSC) India - to fulfil the existing skill gaps in the leather sector, particularly in the shop floor level and to give basic entry level training on a mass scale.
- The European Council on Education, Training and Employment for Textile Clothing and Leather(EU TCL Skills Council)
- Training programme between CLRI (India) and LLDI (Ethiopia)
- EU's Erasmus+ exchange programme (European Region Action Scheme for the Mobility of University Students)
- REILEAP.KZ (Reinforcing capacities of HEIs in Uzbekistan-Kazakhstan) - capacity building project co-funded by the Erasmus+ programme of EU.
- COMESA – ALLPI (Africa Leather and Leather Products Institute)

Focussing Education and Training in Leather towards sustainability

Need to enhance the level of best technology practices and integrate sustainability mechanisms within the manufacturing chain of the leather industry → Three sustainability parameters viz., environmental, ethical and social , economical converging at appropriate sustainable HRD → Positioning the leather engg. education and trg for sustainable development and future of global leather sector

Proper structuring, implementation and periodic updation of technology education and training is required to be on par with the contemporary industry requirements and nurture entrepreneurship coupled with sustainability.

Orienting Engineering Education towards Sustainability

- ✓ Preparing the youth for future careers has been the fulcrum of any kind of society.
- ✓ Engineering profession should be oriented towards global of sustainability.
- ✓ To reorient a curriculum to address sustainability, educational communities need to identify the Knowledge, issues, perspectives, skills and values central to sustainable development.
- ✓ Three components of sustainability – Environment, Society and economy to be integrated them into the curriculum.
- ✓ Drivers of sustainability
  - Stakeholders, Competition, Future Generation.
- ✓ Factors of sustainability
  - Reduce, Recycle, Renew

KNOWLEDGE → TECHNOLOGY → MANUFACTURE → ECONOMY → INDUSTRY → SOCIETY

Structuring curriculum to incorporate sustainability effectively

Based on organizational set-up of learning	Various pedagogies to enhance teaching- learning experience	Paradigm shifts in leather education and global standard	Timely review of curriculum
•Survey amongst faculty, students, alumni and industry •Validate importance of outcomes	•Project based learning •Activity based learning •Self-learning •Industry internships •Project work	•Prepare educated and employable engineers and technologists •Instill creativity, innovation and entrepreneurship traits	•Project based learning •Activity based learning •Self-learning •Industry internships •Project work

Prime focus: Education → Employability → Employment → Entrepreneurship

Leather Engineering Education for Sustainable development

- ➢ Social ethos and work culture of the society in harmony with leather technology education – A fundamental curricular need.
- ➢ Leather technology education should conjoin the economy, public policy and environmental policy of the respective country.

Crafting learning models for eco-concern at different levels

Attributes to integrate sustainability skills
- Organized systemization
- Coordination
- Well structured development

Learning models
- •Education
- •Training
- •Skill development
- •Skill up gradation
- •Retraining

Disseminating sustainability principles to different levels of manpower
- Primary Shop-floor level
- *Secondary* Supervisory level
- *Tertiary* Middle-managerial level

Need to reengineer leather technology education towards sustainability

Environmental aspects that can be incorporated in Undergraduate programme in Leather Technology	Postgraduate programme in Leather Technology
1.Waste Water Management	1. Environmental Microbiology
2. Bioremediation in Environmental Engg.	2. Occupational Hazards and industrial safety
3. Environmental Biotechnology	3. Sustainable development
4. Solid Waste Management	4.Nanotechnology
5. Sustainable development	

Strengthening the fundamentals and way of thinking of tertiary manpower

Requisites
To gain technology/ innovation driven status and position the leather sector towards sustainability via leather engineering education

- Critically analyse manufacturing systems and provide solutions
- R&D planning and execution
- Principles of basic cum interdisciplinary sciences and technology
- Entrepreneurial capabilities
- Contemporary international trade demands and market dynamics

Soft skills critical at all levels

i. Leather education to impart skills and technical knowledge required to become successful within a highly competitive fashion industry.

ii. Programmes can place an emphasis on technical finesse, balanced by creative exploration and material investigation. The design management and marketing elements of the course will also make the syllabus more holistic.

- Decision-making
- Planning and Organizing
- Customer Centricity
- Problem-solving
- Analytical thinking
- Critical thinking
- Reporting
- Documentation

Way forward & Innovations

- •Leather and Leather Products Manufacture is highly multi- disciplinary.
- •Education → Technology → Industry → Education
- •Innovative vocational programmes meeting the needs of specific sector and aiming at creation of Skill base in large numbers.
- •Modernization and remedies for environment degradation - elements needing empowerment
- •Industry - academia interaction will aid in harnessing the best outputs via leather engineering education and research.
- •Global consortia amongst academia, Institute and Industry should be created to drive innovations in Leather.

Deploying skilled manpower in Industry for operational excellence towards sustainability

- Excellence is Sustainability Implementation
- Structured mechanisms to measure KSAs
- Deploy behavioral approach to apply knowledge and skills
- Train manpower to meet global competitiveness
- Endow manpower with Knowledge, Skills and Abilities (KSAs)
- Well defined nature, scope, knowledge and skills of job roles
- Identify job roles based on contemporary industry requirements (along with sustainability requirements)

GLOBAL ALLIANCES

Need for one to one interaction, co-operation and collaboration among professional institutions offering leather technology programmes across the globe. Changing nature of international co-operation through globalization Partnership & twinning at National and International levels

Success Story: CSIR-CLRI (India) and LIDI (Ethiopia) Training programme

ISSUES

- 1. Study kinds of organizational structures involved
- 2. Circumstances under which institutional linkages succeed or fail
- 3. Strategies to create mutually beneficial relationships
- 4. Mechanism to maintain strength of individual institutions
- 5.Sustain global reach and maintaining individuality

PROPOSED STRUCTURE OF NILE

NILE
- General Body (all participating members) — Selected by General Body
- Executive Board (rotational basis – 6 to 8 members) — Chairman, Vice-Chairman and 4 to 6 members
  - •Formulate and approve the plans, programmes and budgets
  - •Set guidelines for training and research

STRATEGIES

- Network of Institutions of Leather Engineering (NILE)
- Membership – Participating institutions and centres of research in leather
- Complement the competence of an individual institution/ country
- Exchange information, experience and expertise

International Online Leather Forum

A specific online platform "Engineering for Leather Industrial Technology Enrichment" (ELITE) programme may be evolved involving the international community of leather engineers, scientists, professional organizations and the innovators working to solve global leather industry problems to tackle the perennial as well as suddenly springing problems and challenges confronting the industry.

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