

Eco-innovation unit (ECO UNIT) for textile processing industry: a way forward for sustainable industrial growth.

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According to an exclusive report by the World Wildlife Fund (WWF)¹, wastewater production in Karachi is about 604 million cubic meters per year, which is about 26% of the total wastewater production of Pakistan. Only 16% of this wastewater is being treated, and the rest of untreated sewage discharges into the Arabia Sea. Wastewater originates from the industrial estates of Karachi contains harmful substances due to the presence of different industrial units. Korangi Industrial and Trade Estate (KITE) is one of the largest industrial estates of Karachi, located in the district east of the city, covering a total area of about 34.4 km² with more than 2000 industrial units². In a recent study, groundwater of KITE and creek flora & fauna have been reported heavily contaminated³. Karachi Water and Sewerage Board (KWSB) has remained unsuccessful in treating industrial effluent⁴. There are some attempts to resolve the problem at the industrial association level, e.g., a combined effluent treatment plant has been installed by Pakistan Tanners Association (PTA) in Korangi sector 7A. The facility has a treatment capacity of 42,000 cubic meters per day of tanning industrial effluent and domestic wastewater⁵. Regardless of the extent of achievements, efforts of the leather tanners association can be considered as a successful initiative to cope with the pollution problem on their own. Textile industries are dominant industrial units in the KITE, and 219 textile units of different types and sizes are functional at the KITE. Textile processing units are considered water-intensive and discharge harmful pollutants in the environment⁶.

¹WWF, "Pakistan's Waters at Risk: Water & health-related issues in Pakistan & key recommendations," Lahore, 2007.

²Mehmood et al., "Metal Contamination in Ground Water of Korangi Industrial Area, Karachi," *J. Chem. Soc. Pakistan*, vol. 20, no. 2, pp. 125–131, 1998.

³Rahman and Sabir, "Ecological Risk Assessment of Ground Water Quality of Two Industrial Zones of Karachi, Pakistan," *Br. J. Appl. Sci. Technol.*, vol. 14, no. 2, 2015

⁴Sahoutara, "Karachi water board's failure can lead to an epidemic, SC fears," 2017. [Online]. Available:
<https://tribune.com.pk/story/1351082/karachi-water-boards-failure-can-lead-epidemic-sc-fears>.

⁵PTA, "Pakistan Tanners Association," 2017. [Online]. Available: http://www.pakistantanners.org/pta_institutions_cetp.html.

⁶PAK EPA, "Draft report 'State of the Environment,'" 2005

Pakistan textile processing industry is facing challenges from its regional competitors for production cost, environmental improvement, and sustainable processing. While sorting coping with this conflicting dilemma, Pakistan's textile industry is growing at a good pace. A few years back, the European Union (EU) has granted reduced tariffs under the EU's Generalized System of Preference (GSP) during the year 2013-14. This reduction in taxes has boosted the export of Pakistan textile in European countries. At the same time, the textile sector is facing pressure for environmentally friendly and sustainable production⁷. Pakistan textile processing mills have implemented a cleaner production program in collaboration with the Cleaner Production Institute (CPI)⁸. Twenty-nine (29) textile processing units of Karachi have conducted environmental audits, and many of them have implemented cleaner production options and end-of-pipe (EOP) treatment plants. The majority of textile processing industries have performed environmental management plans (EMPs), including ISO 1400. However, the targets of EMPs are mainly focused on existing production systems; hence, the possibility of bringing significant ecological damage prevention is considerably low. Taking in view the global pressure for sustainable development and the need for preservation of natural resources, the textile processing industry should be proactive in taking progressive environmental actions. The textile processing industry needs to modify their approach in solving environmental challenges and should adopt sub-system (processing modification) and system-level changes (change in process or system) in addition to componentwise changes (e.g., treatment plants) to increase value addition in their products as well as reducing production cost. In other words, the textile processing unit should adopt a holistic approach to eco-innovation. The path of eco-innovation will help the industry to become more competitive in the global market.

Eco-innovation is a modern and innovative concept, defined as "*the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives*"⁹. It is defined as "the creation or implementation of new, or significantly improved products (goods and services), processes, marketing methods, organizational structures and institutional arrangements which - with or without intent - lead to environmental improvements compared to relevant alternatives¹⁰." The contrast between cleaner production and eco-innovation is mainly the scope of both pathways.

⁷ Memon, "Pakistan textile processing industry facing environmental challenges," *Pakistan Text. J.*, 2013

⁸ Cleaner Production Institute, "Cleaner Technology for Production," 2002. [Online]. Available: <http://www.cpi.org.pk/ProjectCtpTextileEnvEngineering.aspx>.

⁹ Kemp and Pearson, "Final report MEI project about measuring eco-innovation," Netherlands, 2007

¹⁰ OECD, "Eco-Innovation in Industry: Enabling Green Growth," Paris, 2010.

While cleaner production utilizes technological changes and process improvements within the textile processing industry, Eco-innovation adopts a vision of idea generation to value creation based production. Eco-innovation employs a holistic approach inclusive of technology improvements, organizational innovations, institutional framework reforms, and market strategies. The idea of sustainable production and eco-innovation are closely linked. Eco-innovation can be categorized based on target (product, processes, marketing methods, organizational structures/institutions), mechanism of implementation (i.e., process modification, redesign of product, alternative), and environmental impacts¹¹. In a recent study, the importance of non-technological interventions is suggested more critical than technological changes¹².

Eco-innovation and sustainable production are closely linked. For example, pollution control can be connected to products and processes modifications; and cleaner production interventions are tied directly to the redesign of products and production techniques. A conceptual linkage between sustainable production and eco-innovation is given in Figure-1¹³.

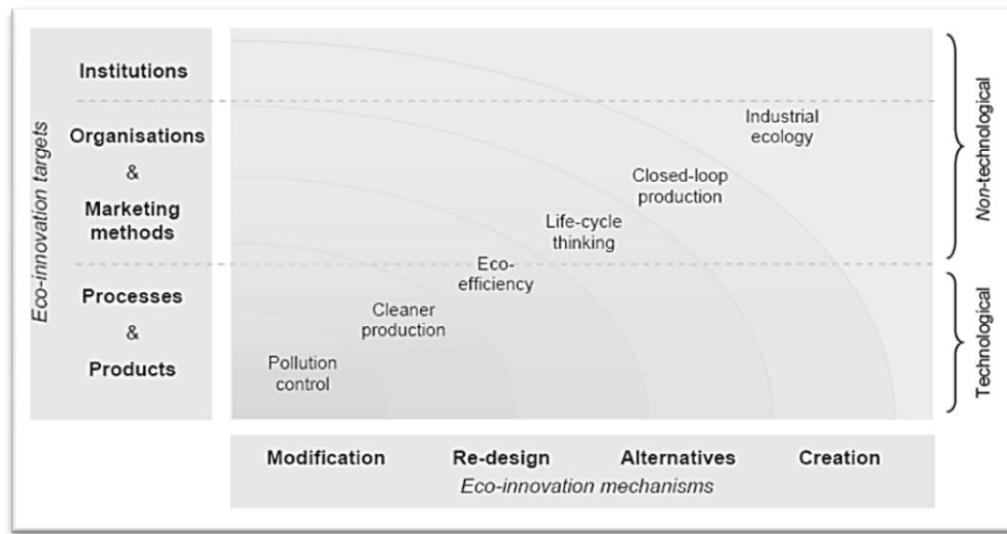


Figure-1: Conceptual linkage of sustainable production and eco-innovation¹⁴.

It is the right time to promote eco-innovations within the textile industrial sector of Korangi (KITE). Textile industry managers should review their production technologies, associated environmental impacts and mitigation measures, innovative environmental technologies, the necessity of organizational reforms, new market strategies, and the need and scope of end-

¹¹Rashid et al., "Eco Product Innovation in Search of Meaning: Incremental and Radical Practice for Sustainability Development," *Asian Soc. Sci.*, vol. 10, no. 13, 2014

¹²Alasdair and Meidzinski, "Eco-innovation Final report for sectoral innovation watch," Brighton, 2008.

¹³OECD, "Eco-Innovation in Industry: Enabling Green Growth," Paris, 2010

¹⁴OECD, "Eco-Innovation in Industry: Enabling Green Growth," Paris, 2010

pipe-treatment inthe textile processing industry of KITE. The focus should be on enabling the KITE textile processing industries green-competitive as well as cost-competitive.

The US-Pakistan center for advanced studies in Water (USPCASW), MUET, is progressively engaging partners in different industrial sectors in Pakistan, such as textile industries, sugar industries, Oil and Gas industry, fish processing industry, etc. The faculty at USPCASW has conducted environmental audits and initiated projects, in collaboration with faculty at the University of Utah, USA to solve environmental problems of selected industries such as treatment/recovery of indigo dye in a denim processing mills at Karachi, treatment of wastewater of a shrimp processing industry at Karachi. It is realized that administrative and managerial staff in different sectors engaged in environmental initiatives lack the necessary knowledge and skills to increase the impact of their work in pursuit of solving local, regional, and international environmental challenges. Academia can fill the existing knowledge gap and provide necessary tools to the environmental managers. A structured industrial eco-innovation unit (ECO UNIT) is established within the USPCASW. The main objectives of the ECO UNIT are the following.

- Provide environmental and sustainability training to the industry as per their needs
- Develop and reform environmental management courses to provide necessary skills to students as per the requirement of the market
- Enhance applied research skills and capabilities of the center
- Strengthening networking with all stakeholders in the environmental management of different industrial sectors

The ECO UNIT will assist industrial units, particularly textile processing units, for the implementation of eco-innovation options. The unit will also develop and execute an environmental management course for managers and executives of industrial units. The ECO UNIT will also be engaged in creating new business strategies while fulfilling the demands of environmental challenges in international markets. The ECO UNIT is the first initiative from academia in Pakistan to provide direct services to the industry in Pakistan.