

Improving chemical management in the textile supply chain

Otto Group's detox activities contributing to the strategic goal of phasing out hazardous chemicals from production processes in Wet Processing Units (WPU's)

otto group

Chemical Management Programs
2016-2021



otto group



KEY ACHIEVEMENTS

3 DIFFERENT TRAINING PROGRAMS IMPLEMENTED

187 WET PROCESSING UNITS TRAINED

96 READY MADE GARMENT SUPPLIERS TRAINED

200+ PARTICIPANTS COMPLETED THE PROGRAM

100+ BEST PRACTICES IDENTIFIED

30+ CASE STUDIES GENERATED

Otto Group's approach in a nutshell

Chemical handling in wet-processing is often not managed adequately

Many chemicals are used in textile wet-processing (e.g. dyeing, washing, printing). Some of these chemicals pose a threat to human health and the environment if they are not applied, managed, recycled or disposed off properly. To improve the chemical management in textile wet-processing factories, access to knowledge as well as on-site support is required.

Otto Group developed as well as participated in training programs on chemical management

In this regard, Otto Group took part in three different chemical management programs to address the need in textile wet-processing units (WPU) since 2016.

As a first step, Otto Group developed "**Detox Training Program**", involving its suppliers to improve chemical management in wet-processing factories in China, Bangladesh, Pakistan, India and Turkey. The project was carried over for 5 years, between 2016 to 2020.

As a second step, Otto Group initiated the follow-up program "**Deep Dive Substitution**" from 2020 to 2021, to contribute to the strategic goal of phasing out hazardous chemicals from production processes. This program involved mostly selected suppliers that joined the previous Detox Training Programs. Focussing on chemical substitution, the program helped the factories to understand the global shift towards eliminating hazardous chemicals in the production units.

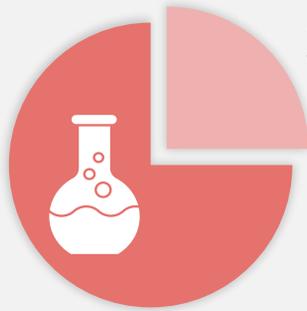
Beside its own programs, Otto Group also took part in a largely recognized joint project "**ACMT – Advanced Chemical Management Training**" together with other industry partners (brands & retailers) between 2019 to 2021.

WPU need support to improve their chemical management. Especially China, Bangladesh and Pakistan can be regarded as countries with significant improvement potential!

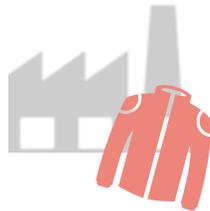
While the requirements of brands on clean production have increased, the operational support to fulfil these requirements is also available in the market!

Training is the key to improve chemical management. However, successful capacity building must consist of more than a single training - it needs to be understood as a process of continuous improvement!

Impact of poor chemical management

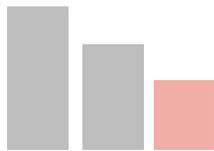


25% of chemicals produced worldwide are used for textiles ¹



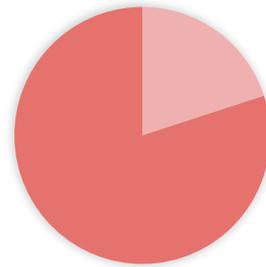
- > Waste Gas
- > Solid Waste
- > Waste Water
- > Sludge

The textile industry is amongst the worst **3** industries worldwide in terms of water pollution and water use.



It accounts for 21% of water pollution in China, one third in Turkey and 58% in Pakistan ²

20% of industrial water pollution comes from textile dyeing and finishing ³



In Bangladesh only 30% of effluent coming from textile factories is properly treated by appropriate plants ⁴



1 in 3 people worldwide does not have access to safe drinking water ⁵

About 1.5 million people die each year from contaminated drinking water ⁶

¹ World Bank in 'CNN Style'

Link: <https://edition.cnn.com/style/article/dyeing-pollution-fashion-intl-hnk-dst-sept/index.html>

² World Bank (2014): Water pollution, textile industry (% in total BOD emissions)

³ World Bank in, 'TextileToday - Water pollution due to textile industry'

Link: <https://www.textiletoday.com.bd/water-pollution-due-textile-industry/>

⁴ Water Governance Mapping Report: Textile Industry Water Use in Bangladesh - Phillia Restiani - SWEDEN TEXTILE WATER INITIATIVE

Link: <https://siwi.org/wp-content/uploads/2017/06/Water-governance-mapping-report-Bangladesh.pdf>

⁵ World Health Organization

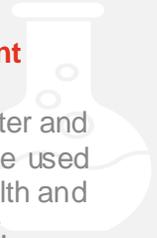
⁶ United Nation

Link:

Background

Textile wet processing can pose a threat to human health and the environment

Textile wet processing (e.g. dyeing, washing, printing) requires high volumes of water and the use of many chemical substances: 25% of chemicals produced worldwide are used for the production of textiles. Some of these chemicals pose a threat to human health and the environment if they are not applied, managed, recycled or disposed off properly.



Insufficient Chemical Storage

In many textile producing countries the management of chemicals is lacking behind, be it that they are poorly managed, stored or disposed off or that waste water is not treated properly. In this way, chemicals are released to soil and water, eventually causing damage to the environment. The result is polluted drinking water and food.



Missing Labels and Warning Signs



Chemical leakage into the ground

The appropriate management of chemicals is still a big challenge for textile production, especially (but not only!) in developing countries and emerging economies. Access to knowledge and experience is the key to change this. Manufacturers and eventually their employees who handle chemicals need to be trained properly and must be made aware of the consequences of wrong chemical handling.

Factories need access to knowledge to improve their chemical management!



Detox Training Program

JAN 2016

DEC 2020

DEVELOPMENT OF ASSESSMENT PROGRAM

Standardized and open assessment procedure for chemical management

DEVELOPMENT OF TRAINING PROGRAM

State-of-the-art training material for 3 workshop days on chemical management

23 support documents (handouts, poster, templates) for direct implementation at factory



TRAIN THE TRAINER

Qualification of 6 trainers

GROUP TRAINING

148 factories in 17 groups in China, Bangladesh, India, Pakistan and Turkey



Combination of workshops and on-site factory visits



Deep Dive Substitution

NOV 2020

SEP 2021

DEVELOPMENT OF TRAINING PROGRAM

Program on chemical substitution



3 support documents (Handout, Substitution Guidance, Road Map)

GROUP TRAINING

29 factories in 2 groups in Bangladesh and Turkey

Combination of workshops (online & classroom), on-site factory visits and calls



Advanced Chemical Management Training

Program management

Content development



MAY 2019

DEC 2021

GROUP TRAINING

Otto Group had 10 factories in 3 groups in China and Turkey



Combination of workshops (online & classroom) and on-site factory visits





Detox Training Program

A training program to improve chemical management at textile wet-processing factories

In view of inadequate chemical management in the textile supply chain, Otto Group developed the "Detox Training Program" as a training approach under the umbrella of the "EMPAct Detox" program. As one of Germany's largest textile retailers, Otto Group works with its suppliers all over the world to improve social and environmental standards.

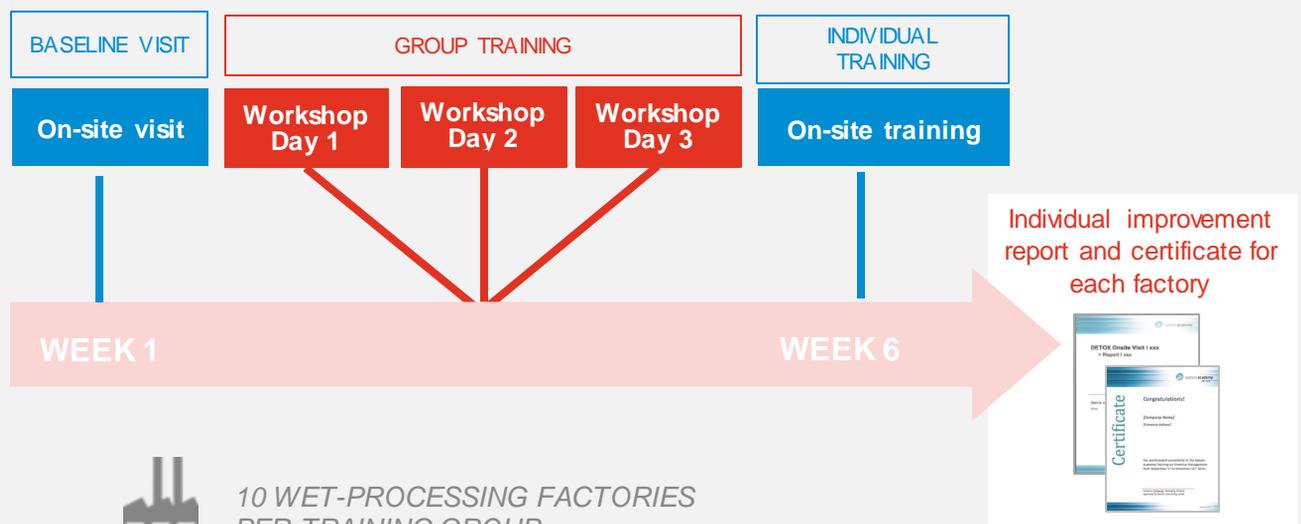
Most textile factories, irrespective of their location, require help in improving chemical management. The Detox Training Program was developed to address this need by increasing the awareness in WPU's through a capacity building program.

OBJECTIVE OF THE PROGRAM



- ✓ Raise awareness in chemical management
- ✓ Improve chemical management practices
- ✓ Avoid environmental pollution and risks to workers' health and safety
- ✓ Comply with local law and international requirements on the way to "Zero discharge Hazardous Chemicals" (ZHDC)

The program's key element is the combination of a three-day group training with on-site factory visits - the first on-site visit serving as baseline visit to define the factories' hot spots and the second visit serving to reinforce the training knowledge. At the end, the factory receives an individual improvement report, based on the content taught within the group trainings. Finally the participants receive a certificate of participation.



Individual improvement report and certificate for each factory



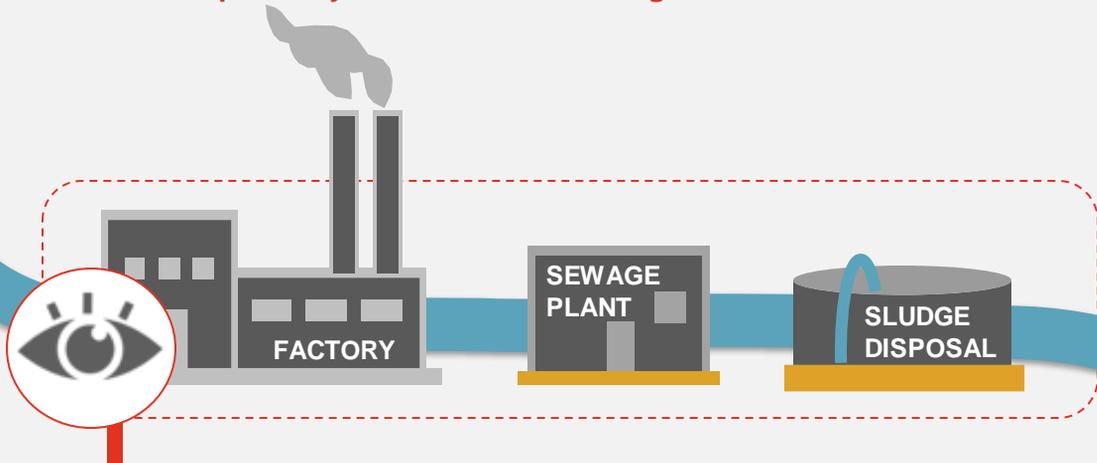
10 WET-PROCESSING FACTORIES PER TRAINING GROUP



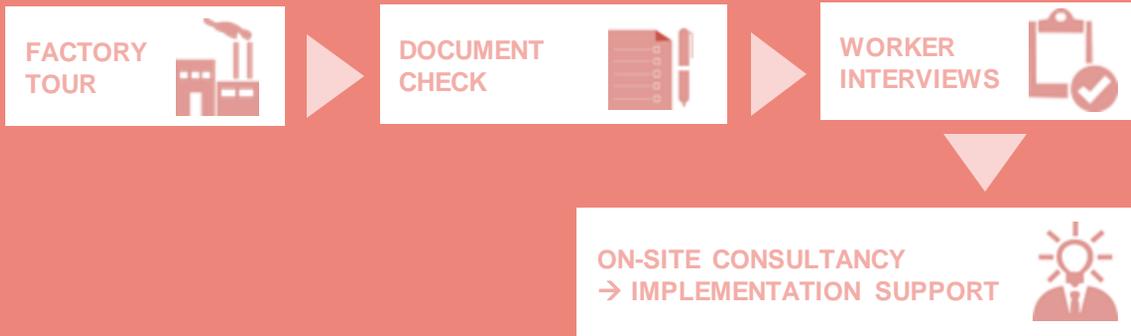
Detox Training Program

On-site training

To facilitate the implementation of the workshop's content, participating factories are visited for a hot-spot analysis and on-site training



1. DETOX ON-SITE TRAINING



2. EVALUATION

Data is gathered during the on-site training and factories are evaluated and ranked based on their performance.

SUPPLIER PERFORMANCE RATING:

Best Practice 100 – 81 %	Good 80 – 61 %	Medium 60 – 41 %	Improvement Needed 40 – 21 %	Hot Spot 20 – 0 %
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3. IMPROVEMENT REPORT

Each factory receives an individual improvement report and certificate including support documents on how to fulfil the requirements.





Deep Dive Substitution

To support the learning outcome of the EMPact Detox Training Program and take it one step further, the follow-up program “Deep Dive Substitution” was developed

The follow-up program “Deep Dive Substitution” was initiated to contribute to the strategic goal of phasing out hazardous chemicals from production processes. It was piloted in 2020 with selected factories which mainly participated in the previous Detox Training Programs.

Under the EMPact Detox program umbrella, “Deep Dive Substitution” aims to enhance knowledge and skills for professional chemical management. Focussing on chemical substitution, the program also helped factories understand the global shift towards eliminating hazardous chemicals in the production units.



OBJECTIVE OF THE PROGRAM

- ✓ Follow-up sustainable chemical management
- ✓ Monitor progress on chemical input
- ✓ Raising awareness for substitution
- ✓ Developing an effective and lasting chemical substitution process

WHY IS CHEMICAL SUBSTITUTION NECESSARY?

Large quantities of chemicals are used in textile manufacturing. Some of these are hazardous and pose a threat to health and the environment. The use of such chemicals might also damage the business and be a financial threat, e.g. through litigations and product recalls.

Substituting hazardous chemicals with safer alternatives is a very effective way to reduce the toxic footprint of the products.

6-STEP ROADMAP TO CHEMICAL SUBSTITUTION



1
**Documen-
tation**



2
**Prioritise
chemicals**



3
**Define key
functions**



4
**Inform &
research**



5
Piloting test



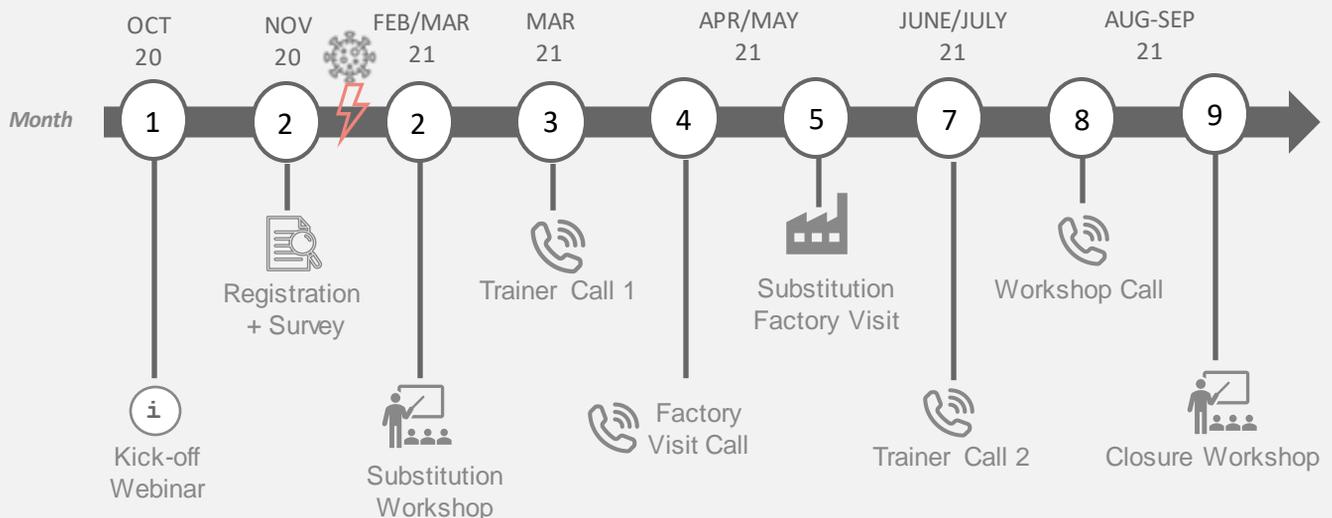
6
**Implemen-
tation**



Deep Dive Substitution

Program Content

The program extended over 9 months with 9 contact points between trainers and factories



The program combined four modules

Substitution Workshop

Recap on chemical management topics

- Current brands requirements
- Introduction to online chemical assessment tools
- Introduction into chemical substitution steps
- Case study analysis



Zoom meetings & calls

- Individual coaching with each participating factory;
 - To communicate on the substitution roadmap
 - To guide on the existing chemical management challenges
- Review of homework Roadmap & CAP to report on the ongoing & completed improvements



Factory Visit

- Individual factory visit with a focus on substitution
- Individual coaching
- Subsequent assessment using the detox assessment questionnaire to define the current corrective actions / bottlenecks

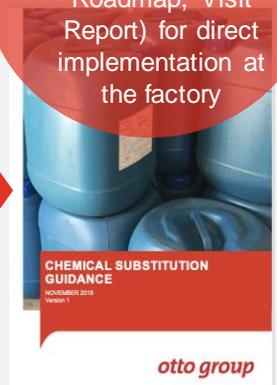


Closure Workshop

- To reflect on the project outcomes
- Supplier implementations on the findings that were defined during the project time period since February 2021



Ready to use training materials (Guideline, Handouts, Roadmap, Visit Report) for direct implementation at the factory





Deep Dive Substitution

Results overview

Factories which participated in the “Deep Dive Substitution” Program improved their performance level substantially

In total, 29 factories - 7 in Turkey and 22 in Bangladesh - initially participated in the program. Out of these 29 factories, 26 of them were able to complete it successfully. 100% of those worked on their chemical substitution program.

100% of factories in Turkey and 30% in Bangladesh successfully substituted the hazardous chemicals that were detected in their discharged waste water test reports.

Moreover, 100% of the factories in Turkey and 85% of the factories in Bangladesh intensively improved their chemical inventory list by using online chemical inventory tools such as ZDHC Gateway and BHive.

Out of the total 29 factories, 14 of them participated in the previous Detox Training Programs - in 2016, 2017 and 2018 - and as the table below shows, 12 of them improved their chemical compliance level.

In 2021, the factories’ overall performance is 78% and the average overall improvement rate per factory is +28%.

Performance comparison of factories over the time						
Factory	Country	2016	2017	2018	2021	Improvement
Factory 1	Turkey	53%			68%	15%
Factory 2	Turkey			65%	81%	16%
Factory 3	Turkey	91%			89%	-2%
Factory 4	Turkey	81%			64%	-17%
Factory 5	Turkey				89%	
Factory 6	Turkey				51%	
Factory 7	Turkey				60%	
Factory 8	Bangladesh		74%		84%	10%
Factory 9	Bangladesh	31%			77%	46%
Factory 10	Bangladesh				87%	
Factory 11	Bangladesh				89%	
Factory 12	Bangladesh	24%			74%	50%
Factory 13	Bangladesh				86%	
Factory 14	Bangladesh	43%			84%	41%
Factory 15	Bangladesh	26%			87%	61%
Factory 16	Bangladesh				84%	
Factory 17	Bangladesh		85%		91%	6%
Factory 18	Bangladesh				58%	
Factory 19	Bangladesh				93%	
Factory 20	Bangladesh				92%	
Factory 21	Bangladesh				88%	
Factory 22	Bangladesh	29%			89%	60%
Factory 23	Bangladesh	0%			73%	73%
Factory 24	Bangladesh				80%	
Factory 25	Bangladesh				44%	
Factory 26	Bangladesh				86%	
Factory 27	Bangladesh		35%		74%	39%
Factory 28	Bangladesh				62%	
Factory 29	Bangladesh	33%			67%	34%
Overall Improvement		41%	65%	65%	78%	28%

0 - 20 %	21 - 40 %	41 - 60 %	61 - 80 %	81 - 100 %
Zero Tolerance	Improvement Needed	Medium	Good	Best Practice



The ACMT program aims at supporting production facilities with wet processes in the long-term improvement of their chemical management.

Otto Group also took part in the largely recognized joint project "ACMT – Advanced Chemical Management Training", together with other industry partners from 2019 to 2021.

WHY IS ACMT DIFFERENT FROM OTHER PROGRAMS?

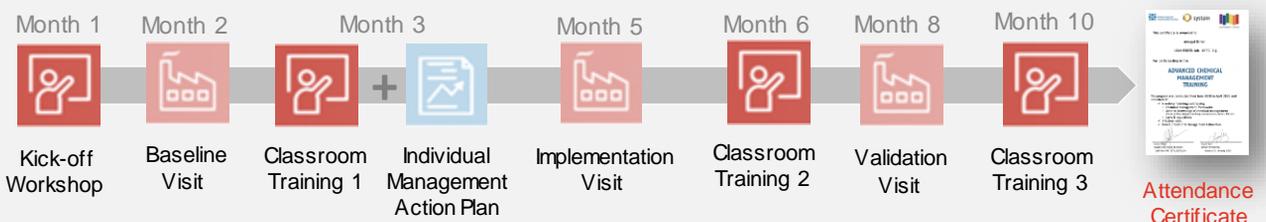
- ✓ The training groups include factories from different brands & retailers to establish one voice in the market
- ✓ Commonly shared chemical management requirements
- ✓ Long term – 10 months support by the local trainers
- ✓ Possible to acquire effective progress tracking and benchmarking within the WPU's

OBJECTIVES



- ✓ Empower to control input of chemicals and to advance towards zero discharge of hazardous chemicals
- ✓ Coordinate activities between different organization
- ✓ Contribute to sustainable chemicals and environmental management in the textile sector

The program extends over 10 months with 8 contact points between trainers and factories



IMPLEMENTATION PARTNERS





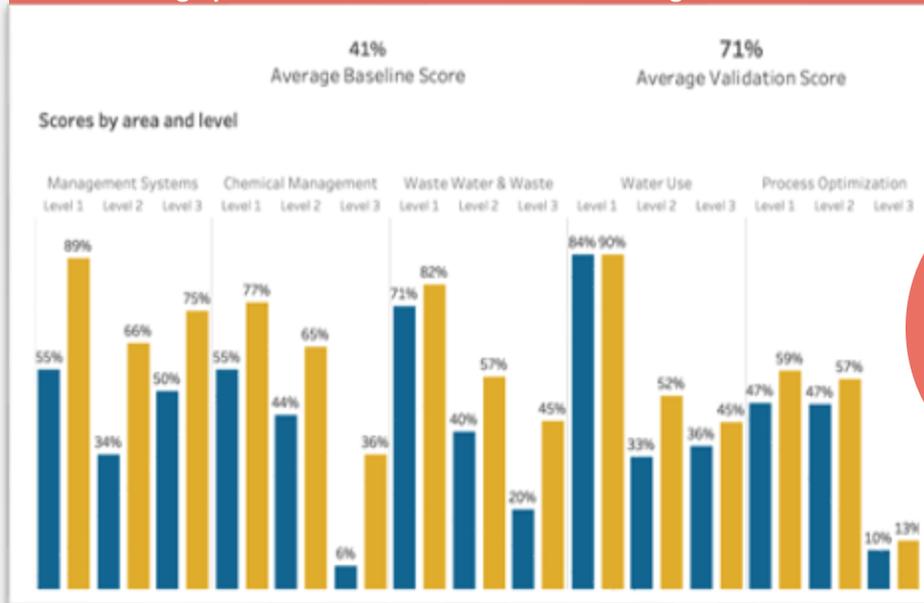
Factories which participated in the ACMT program also improved their performance level remarkably

In total, 10 factories - 5 in China and 5 in Turkey - participated in 3 groups in the program in the period of 2019 to 2021. All completed it with a successful rate at most of the performance levels.

As seen in the chart below, the average performance level of 41% in the baseline visit increased to 71% after the implementation visit, which shows a high improvement rate.

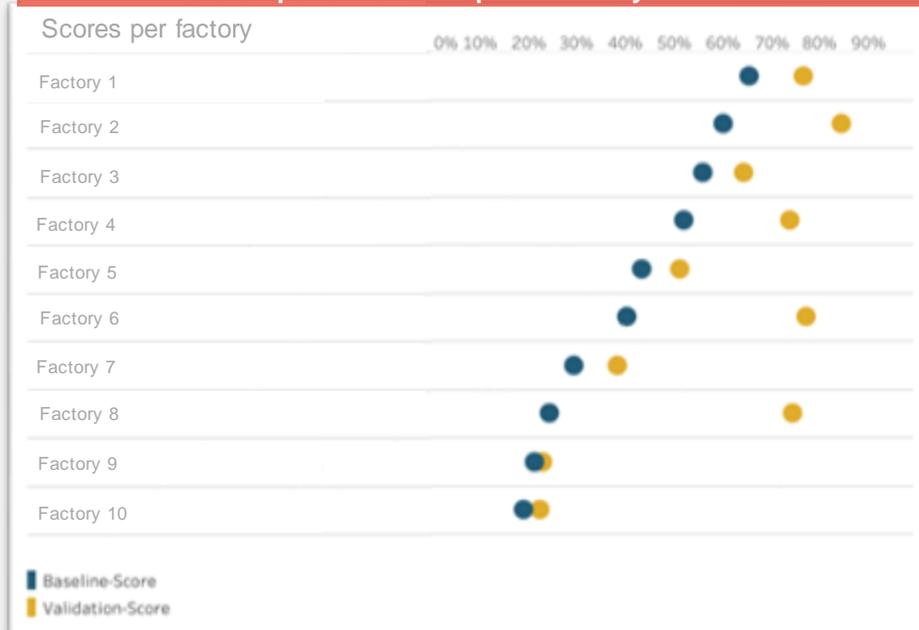
The chart also indicates that the factories still have improvement potential mainly in the waste water, water use and process optimization areas.

Average performance level in chemical management areas



Factories improved substantially - on average from 41% to 71%

Overall performance improvement by factories



Detox Training Program

During the Detox Training Program, Deep Dive Substitution and ACMT programs, best practices and case studies have been collected and shared to encourage replication in the textile sector. Some best practices identified regarding chemical management include the following:

MSDS Management



Abstract MSDS at chemical containers



Advanced MSDS management

The Material Safety Data Sheet (MSDS) helps to determine whether any hazardous chemical agents are present at the workplace and to assess any risk to the health & safety of workers arising from their use and how to control them.

Automatization



Automatic dosing and dispensing system

Benefits of automatization:

- ✓ Improved right first-time performance
- ✓ Reduction of waste water pollution and wasted chemicals
- ✓ Safer and healthier working environment

Chemical Storage



Advanced dye storage

Proper management of chemical storage is a key element to avoid economic losses and risks to health and property.



Advanced Chemical Management Training

Best practices



- ✓ To completely remove the use of coal, **steam generators working with natural gas were purchased**



- ✓ Advanced worker notification boards and **worker training system**

Proper worker trainings are the core of any chemical management program. This enables the workers to recognize health and safety hazards.

Investing in new technologies will reduce the energy use and contribute to the use of clean energy with less emission.



- ✓ Dyeing machines' **isolation** for energy saving

Segregated chemical containers will reduce the chemical leakage into the ground/soil and prevents work accidents (fire, explosion, etc.).



- ✓ Chemical tanks **were segregated as per each item** and the non-compliant ones are totally segregated to inhibit any chemical reaction.



Deep Dive Substitution

CASE STUDY

FACTORY 01



FACTORY PROFILE

LOCATION: Bursa / Turkey
 PRODUCTION PROCESS: Dyeing & Printing
 NUMBER OF WORKERS: 65
 PRODUCTION VOLUME: 3.205.947 mt/year
 WASTE WATER TREATMENT PLANT: Off-site ETP

IMPLEMENTED IMPROVEMENT MEASURES:

EXAMPLES

Process water test report 2020

TEST ITEMS	Discharged Waste Water
Conventional Parameters	Please refer to the information in TEST RESULTS
Anions	X
Metals	X
Alkylphenols (APs) and Alkylphenol Ethoxylates (APEOs)	o
Chlorobenzenes and Chlorotoluenes (COCs)	o
Chlorophenols	X
Azo dyes	X
Carcinogenic dyes	o
Disperse dyes	o
Flame retardants	o
Glycols	o
Halogenated solvents	o
Organotin Compounds	o
Perfluorinated / Polyfluorinated Chemicals (PFCs)	o
Phthalates	o
Polycyclic Aromatic Hydrocarbons (PAHs)	o
Volatile Organic Compounds (VOCs)	o

- ✗ The factory had restricted hazardous chemicals in the process water test report (RAW wastewater)
- ✓ The factory then worked on the chemical substitution process and was able to eliminate the **AZO dyes** and **chlorophenols**

✗ Still, heavy metals and APEOs were detected in the latest process water test report

- ✓ Currently, the usage of **Blue 8** has been restricted for **heavy metal** detection
- ✓ The factory has started to use A level disperse dyestuff, as well as Blue ECGS (B79) instead of Blue PSG and red EC2G (R167) instead of Red P2G.

Process water test report 2021

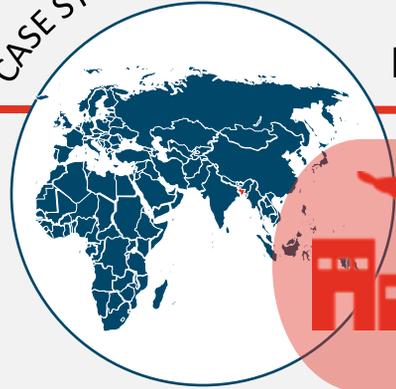
Test items	Sample / Wastewater (Raw)
Cyanide	ND
Sulfide	D
Sulfite	D
Heavy metals	D
Alkylphenol ethoxylates / Alkylphenols	D
Chlorobenzenes and Chlorotoluenes	ND
Chlorophenols	ND
Azo dyes (Forming restricted amines)	ND
Carcinogenic dyes	ND
Disperse dyes	ND
Flame retardants	ND
Glycols	ND
Halogenated solvents	ND
Organotin compounds	ND
Perfluorinated & Polyfluorinated chemicals	ND
Phthalates (Ortho-phthalates)	ND
Polycyclic aromatic hydrocarbons (PAHs)	ND
Volatile organic compounds (VOCs)	ND



Deep Dive Substitution

CASE STUDY

FACTORY 02



FACTORY PROFILE

LOCATION: Gazipur / Bangladesh

PRODUCTION PROCESS: Denim Fabric Production

NUMBER OF WORKERS: 762

PRODUCTION VOLUME: 7000 tons/month

WASTE WATER TREATMENT PLANT: On-Site ETP

IMPLEMENTED IMPROVEMENT MEASURES:

EXAMPLES

BEFORE



PPE usage has been enforced through persons designated as responsible as well as workers' training

AFTER



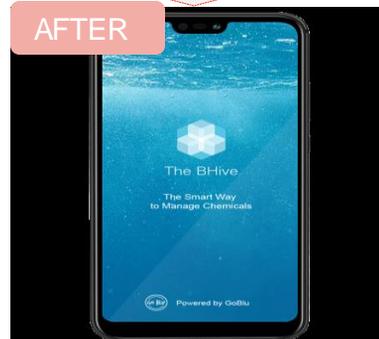
The factory has started chemical spillage drills to be conducted twice a year

AFTER



The factory started using BHive to improve its chemical inventory

AFTER





EMPAct
DETOX
Detox Training Program

"The training was very helpful and gave us a clear direction on how to conduct chemical management in our daily operation. We have already joined other programs on chemical management but the 'Detox Training Program' is the first one offering operational support rather than just communicating new requirements."

EMPAct
DETOX
Deep Dive Substitution

"The chemical substitution program was very interesting to me, I found the recommended substitution method to be very practical and useful. The whole training was way above my expectations. I would like to thank the instructor very much."



Advanced Chemical Management Training



"The trainer explained all the subjects in a sincere and understandable way and kept all the participants focused without getting off the subject."

„The program helped to improve my skills on chemical management“

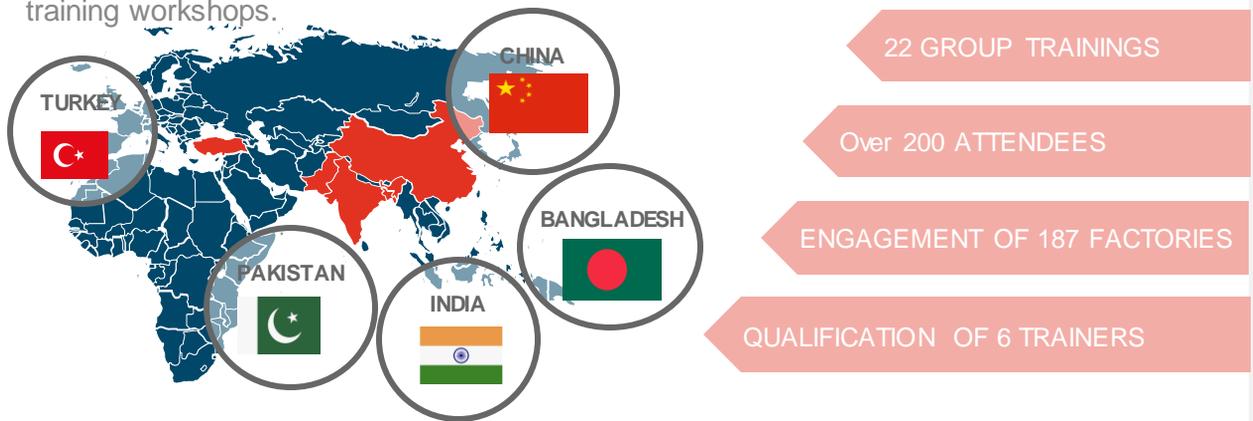


EMPAct
DETOX
Detox Training Program

3 programs implemented in 5 textile production countries:

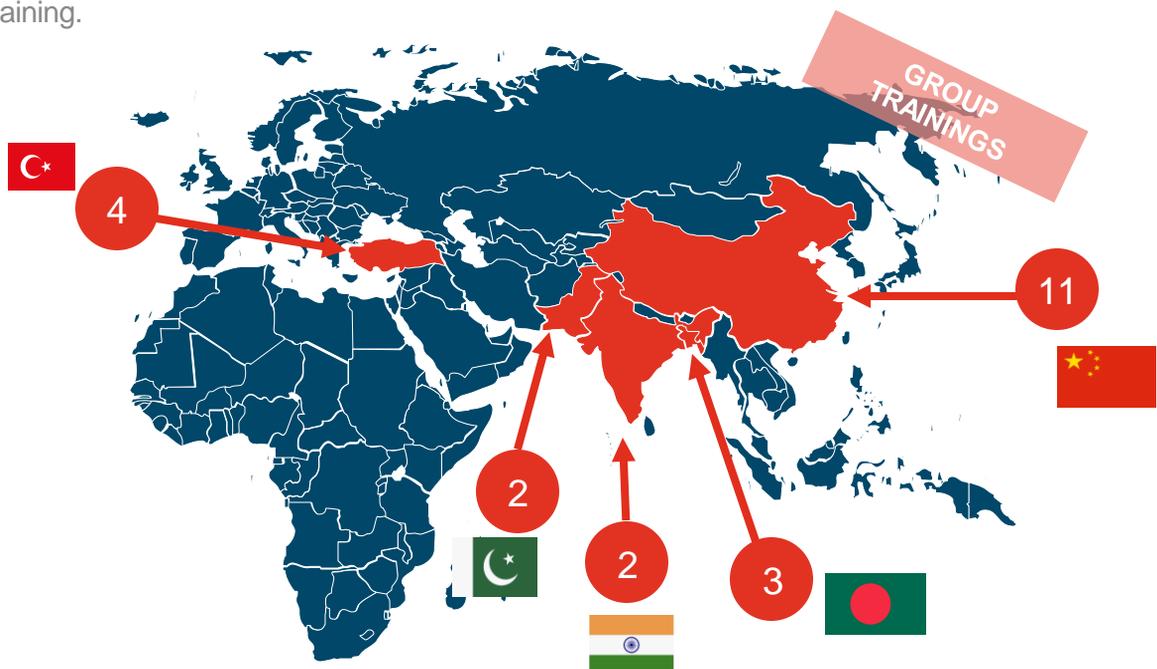
GROUP TRAININGS

In total, 21 group trainings were organized for representatives of wet-processing factories to improve knowledge on chemical management. Representatives from local industry associations and institutions took part in them, with the aim of creating multipliers to spread the knowledge in those countries. 209 attendees from 135 factories participated in the training workshops.



ON-SITE TRAININGS

From 2016 to 2021, 203 factories out of 22 group trainings have been visited for an on-site training.



LESSONS LEARNT

Examples of some key observations and lessons learnt:

All implemented programs from 2016 to 2021 show that the trainings have significantly increased the WPU's chemical management performance. The "Deep Dive" program proves that overall performance rate of the participating factories is now 78%.



It has been observed that even the factories that did not take part in the follow-up programs showed very good performance in chemical management over the years, as they continued to implement the initial learning outcomes of their training.



Hazardous chemicals are still in use in WPU's. Phase-out and substitution is still difficult due to missing knowledge and price pressure. On the other hand, 100 % of the factories that participated in chemical management programs started to work on their chemical substitution and improved their chemical inventory list.



There are still plenty of low hanging fruits. Many improvements can be implemented without any costs (e.g. Material Safety Data Sheets, warning signs) or require relatively low investments of < 5.000 USD (e.g. Personal Protective Equipment).



Wet-processing factories still need support to improve their chemical management. Especially China, Bangladesh and Pakistan are countries with significant improvement potential.

Training is a key element to improve chemical management. Factory management must be committed and motivated to ensure improvement.

After the trainings, factories are on a good way to **zero discharge of hazardous chemicals**. Continuous support is nevertheless needed for achieving long term improvements.

PROJECT IMPLEMENTATION PARTNERS

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