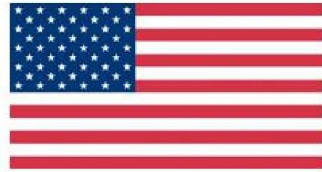


5th International Workshop - Advances in Cleaner Production

São Paulo - Brazil - 20th to 22nd, May - 2015



PATHWAYS
— to Prosperity in the Americas —



Cleaner Production in the Americas: Education Challenges and Outlook

Weslynnne Ashton, IIT



Pathways to
Cleaner Production
in the Americas

ILLINOIS INSTITUTE
OF TECHNOLOGY



NYIT

NEW YORK INSTITUTE OF TECHNOLOGY



World Environment Center



Universidad
Rafael Landívar
Tradición Jesuita en Guatemala



Academic Work

Background

- **US Department of State** initiated the ***Pathways to Prosperity in the Americas***, a policy-level dialogue where countries share lessons about how to spread the benefits of economic growth to all citizens.
- They identified two priority areas related to cleaner production in 2011:
 - the **education of professionals** capable of implementing CP in the private sector, and
 - the importance of **targeting Micro, Small and Medium Enterprises (MSMEs)** for CP implementation
- ***Pathways to Cleaner Production in the Americas*** was envisioned as a multidisciplinary educational approach (incorporating business, engineering and environment) to collectively respond to the need for awareness of sustainability, technical competencies and innovative skills in industry across the Americas, with focus on **CAFTA-DR**.



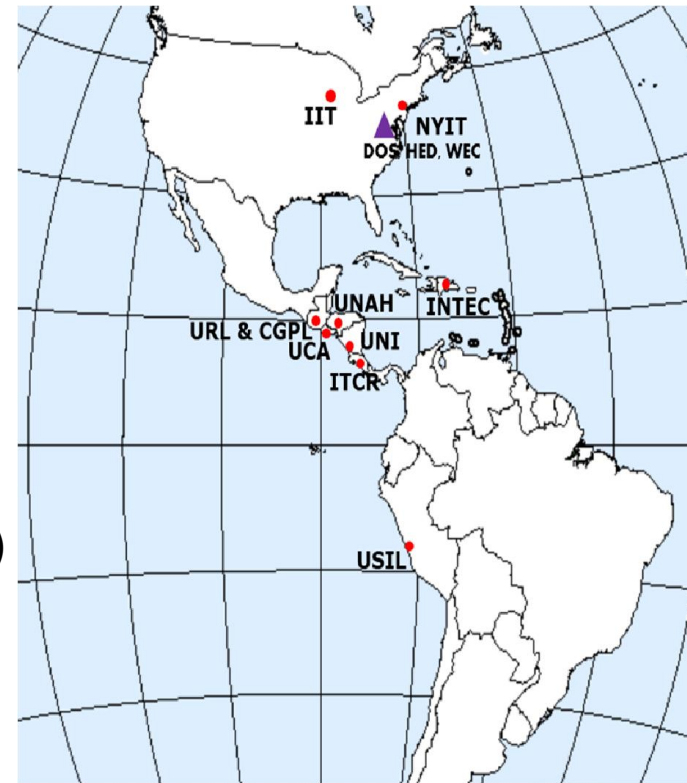
Pathways to Cleaner Production in the Americas

Three-year project funded by US Dept of State (DoS)

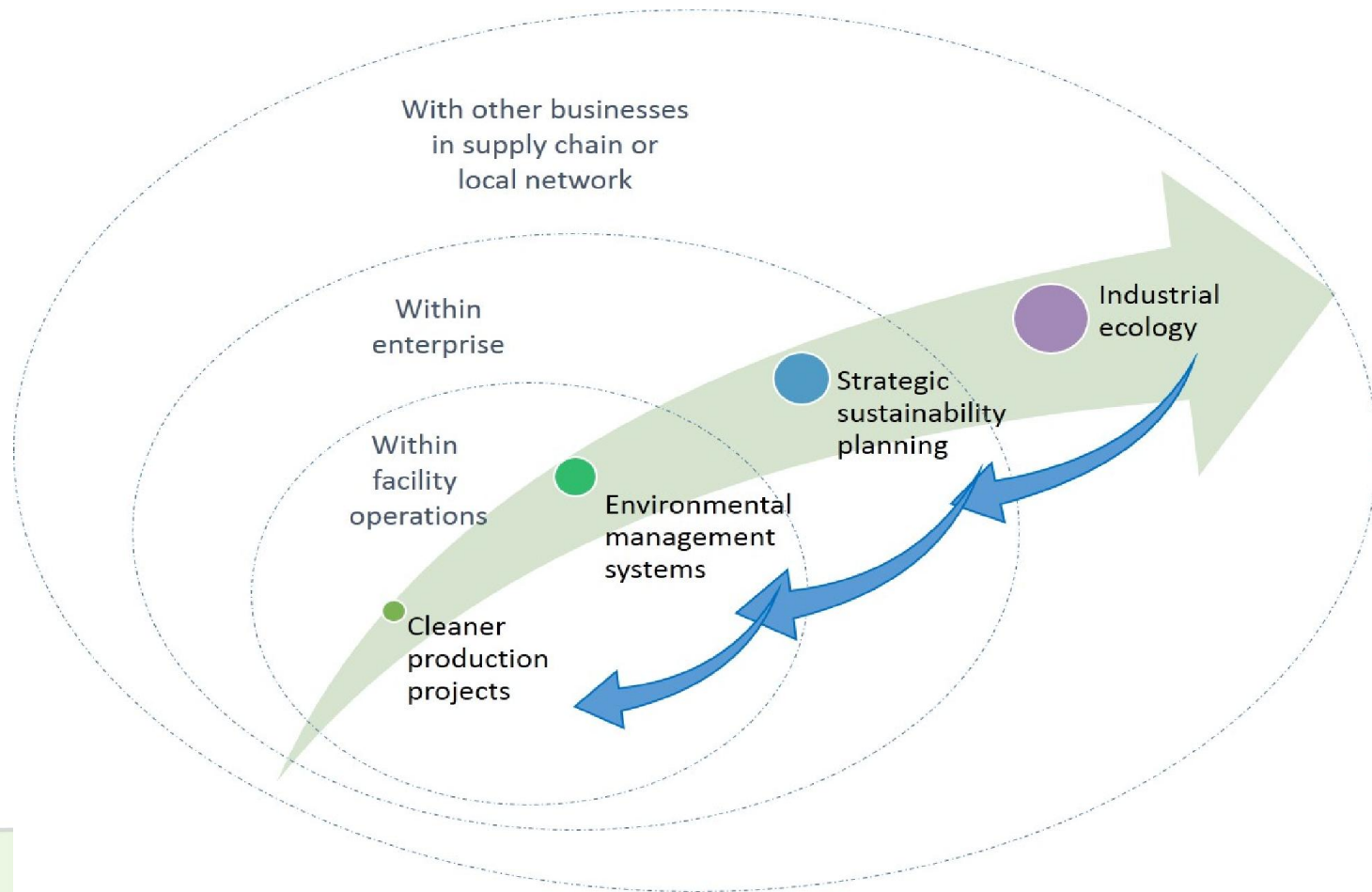
Academic partners - Higher Education for Development (HED) & 9 universities

- US: Illinois Institute of Technology (IIT) and New York Institute of Technology (NYIT)
- Costa Rica: Instituto Tecnológico de CR (ITCR)
- Dominican Republic: Instituto Tecnológico de Santo Domingo (INTEC)
- El Salvador: Universidad Centroamericana (UCA)
- Guatemala: Universidad Rafael Landivar (URL)
- Honduras: Universidad Nacional Autónoma de Honduras (UNAH)
- Nicaragua: Universidad Nacional De Ingeniería (UNI)
- Peru: Universidad San Ignacio de Loyola (USIL)

Business - World Environment Center (WEC) &
National Cleaner Production Centers (NCPCs)



Sustainable Industrial Development Approach



Partnership Goals

- Strengthening academic training related to sustainable industrial development through faculty capacity building for delivering new content, curricular design and modification, and training environmental professionals in partner countries.
- Increasing adoption of cleaner production and sustainability practices in Micro, Small and Medium Enterprises (MSMEs) through increased interaction with academia, especially through experiential learning projects where students work directly with MSMEs.
- Create a virtual forum to promote systemic collaboration and information sharing on sustainable industrial development education and application among the partner institutions and others in the region.

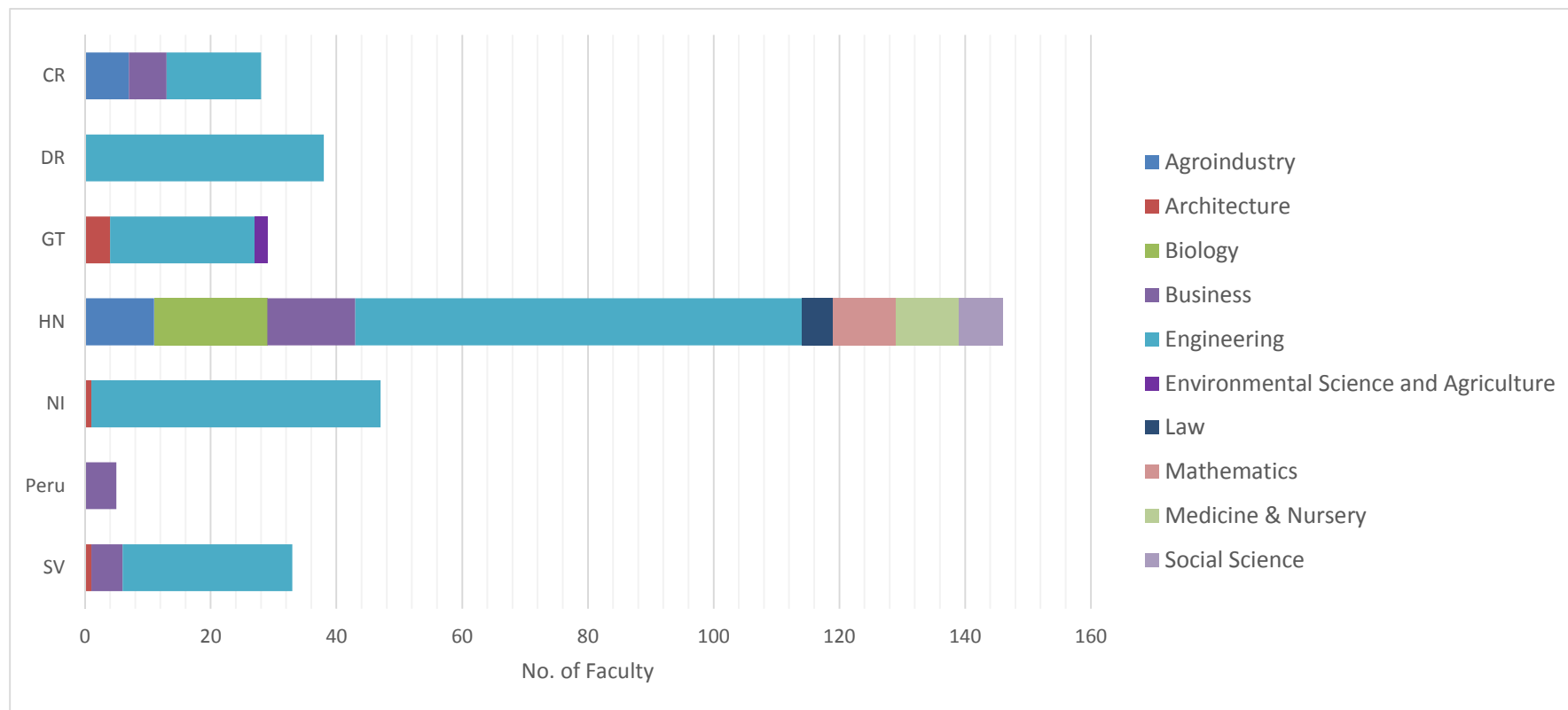


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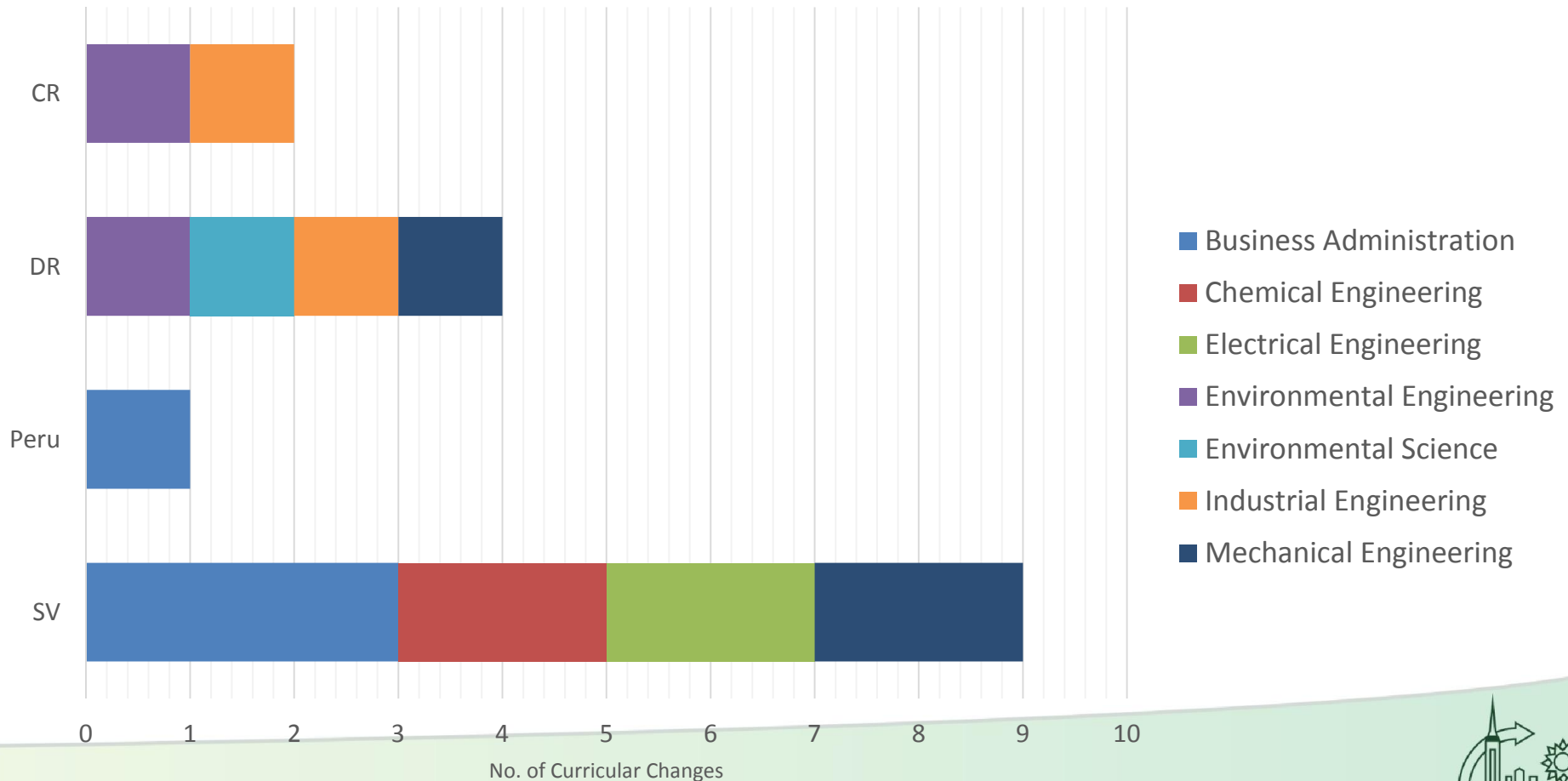
Faculty Trained



326 faculty members trained in Cleaner Production, Environmental Management and Industrial Ecology topics (introductory and advanced)



Curricular Changes



16 curricular changes implemented incorporating CP and experiential learning

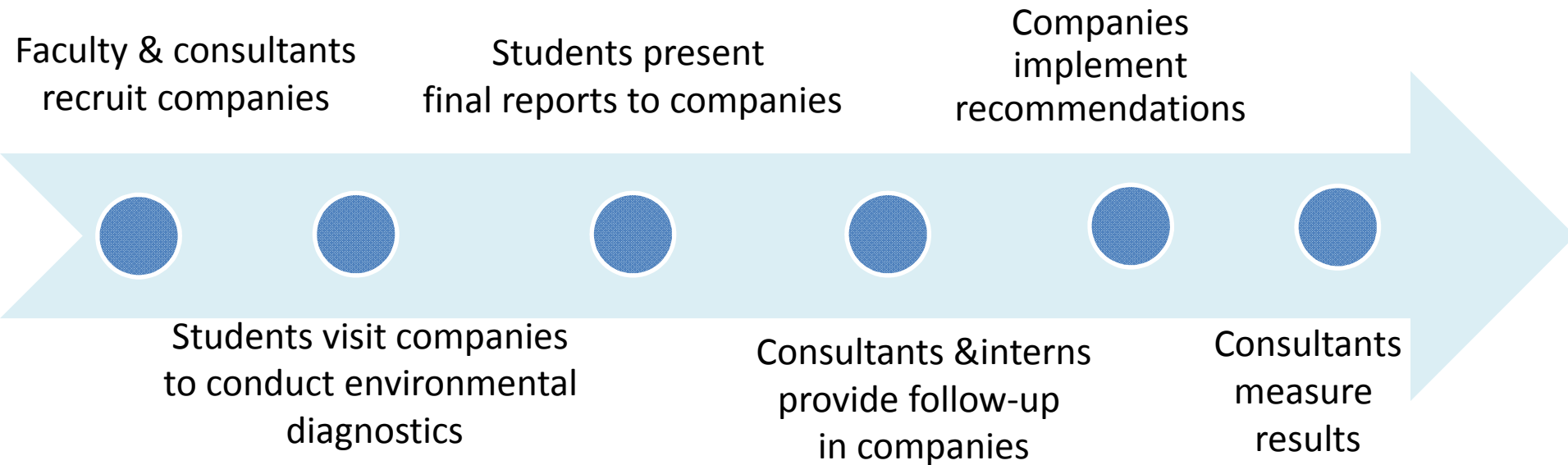


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Industry-University Practicum & Collaboration



Minimum on-site time 20 hours



Example of students' project from Rep Dominicana

| Objetivos del proyecto

1

- Conocer la empresa y las actividades a las que se dedica.

2

- Identificar posibles oportunidades de producción más limpia

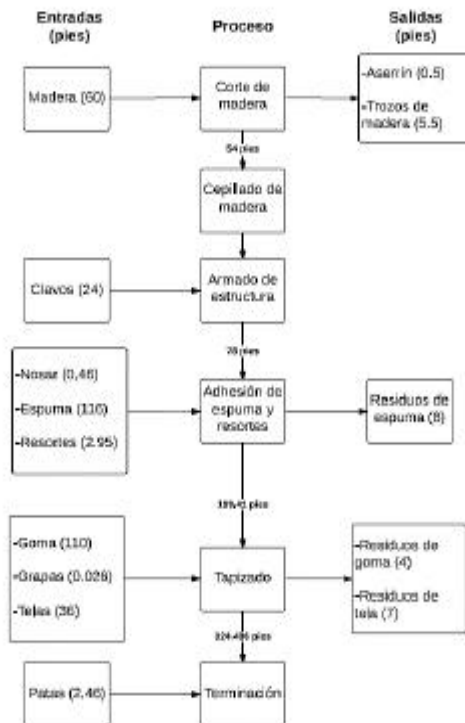
3

- Elaborar propuestas alcanzables y factibles para la empresa que ayuden a resolver los principales problemas detectados.



Example of students' project from Rep Dominicana

| Diagrama de flujo de proceso



| Balanceo de materiales

Balanceo de Materiales						
Entrada		Proceso	Utilizados		Residuos	
MP	Unidad (pies)		MP	Unidad (pies)	MP	Unidad (pies)
Madera de pino	60	Corte de madera	Aserrín y trozos de madera	54	Aserrín y trozos de madera	6
Clavos	24	Armado de la estructura	Clavos	24		
Nosar	0.46	Acolchado de asiento	Nosar	0.46		
Espumas	116		Espumas	108	Espumas	8
Resortes	2.95		Resortes	2.95		
Goma	110	Tapizado	Gomas	106	Gomas	4
Grapas	0.026		Grapas	0.026		
Telas	36		Telas	29	Telas	7
Patatas	2.46	Terminación	Patatas	2.46		
Total de entradas	351.896		Total de salidas	326.896	Total de residuos	25



Example of students' project from Rep Dominicana

| Propuesta #1 "Recolección y venta de aserrín"

Descripción de la oportunidad

- Actualmente, en ninguna de las áreas de trabajo se cuenta con contenedores donde puedan depositar y clasificar los residuos de los muebles trabajados, Esta situación provoca que dicho aserrín y trozos de madera se vayan acumulando dentro de la zona de producción, conllevando a dificultar la movilidad de los operarios dentro de la misma, además de esto puede afectar tanto al medio ambiente como a los mismos operarios

Descripción de la propuesta

- La propuesta consistiría en colocar dos contenedores estratégicamente en el área de trabajo para recolectar todo el aserrín que se genera debido a los cortes de madera, todo esto con la finalidad de poder vender dichos residuos (aserrín). Se tendría un acuerdo con Maderera del Cibao que es una industria que se dedica a la venta de maderas y sus derivados.



Aserrín



Contenedor



Example of students' project from Rep Dominicana


| Propuesta #1 "Recolección y venta de aserrín"

Viabilidad ambiental

Evitar que los residuos de aserrín sean depositados en vertederos al aire libre.

Menor contaminación dentro del área de trabajo.

| Retorno de la inversión

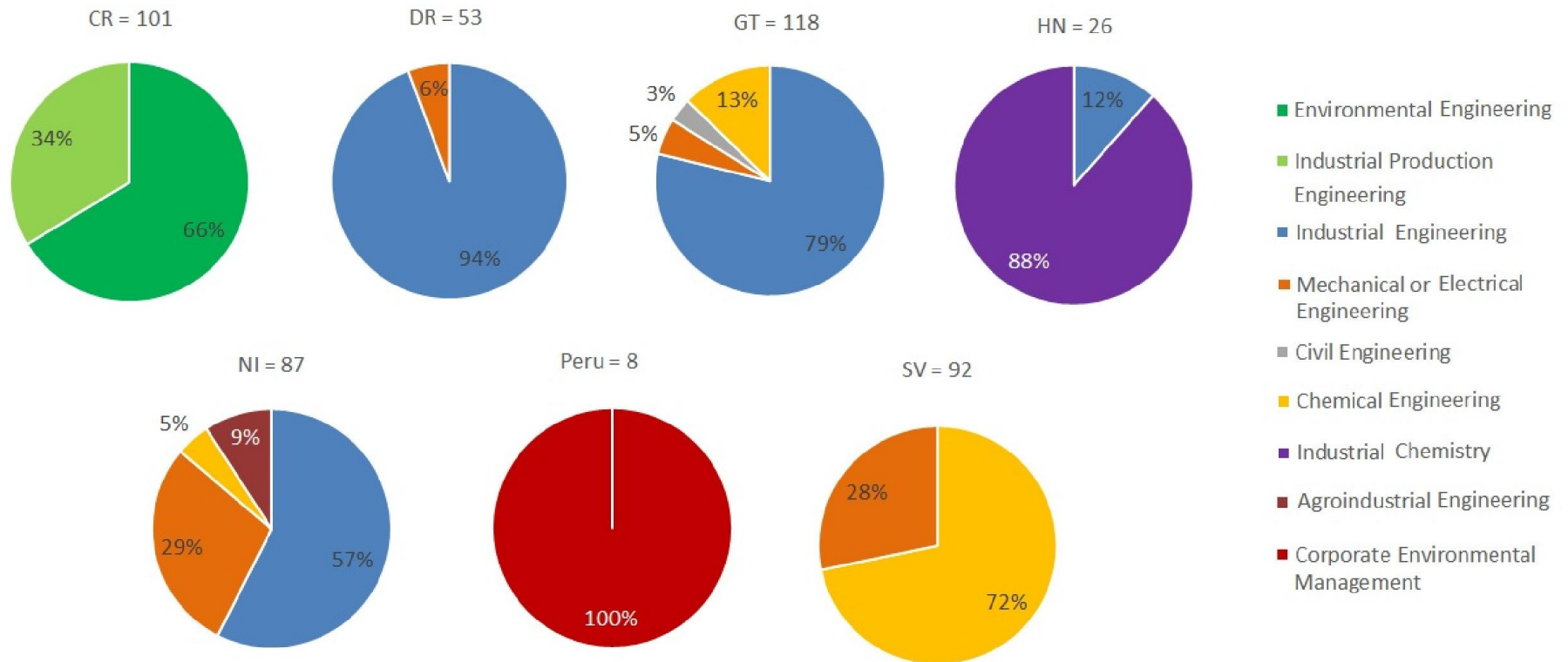


Meses	Costos	Ganancias	Beneficios
1	\$ 1,110.00	\$ 286.53	\$ (823.47)
2	\$ -	\$ 286.53	\$ (536.94)
3	\$ -	\$ 286.53	\$ (250.41)
4	\$ -	\$ 286.53	\$ 36.12
5	\$ -	\$ 286.53	\$ 322.65
6	\$ -	\$ 286.53	\$ 609.18
7	\$ -	\$ 286.53	\$ 895.71
8	\$ -	\$ 286.53	\$ 1,182.24
9	\$ -	\$ 286.53	\$ 1,468.77
10	\$ -	\$ 286.53	\$ 1,755.30
11	\$ -	\$ 286.53	\$ 2,041.83
12	\$ -	\$ 286.53	\$ 2,328.36

Flujo de efectivo propuesta #1



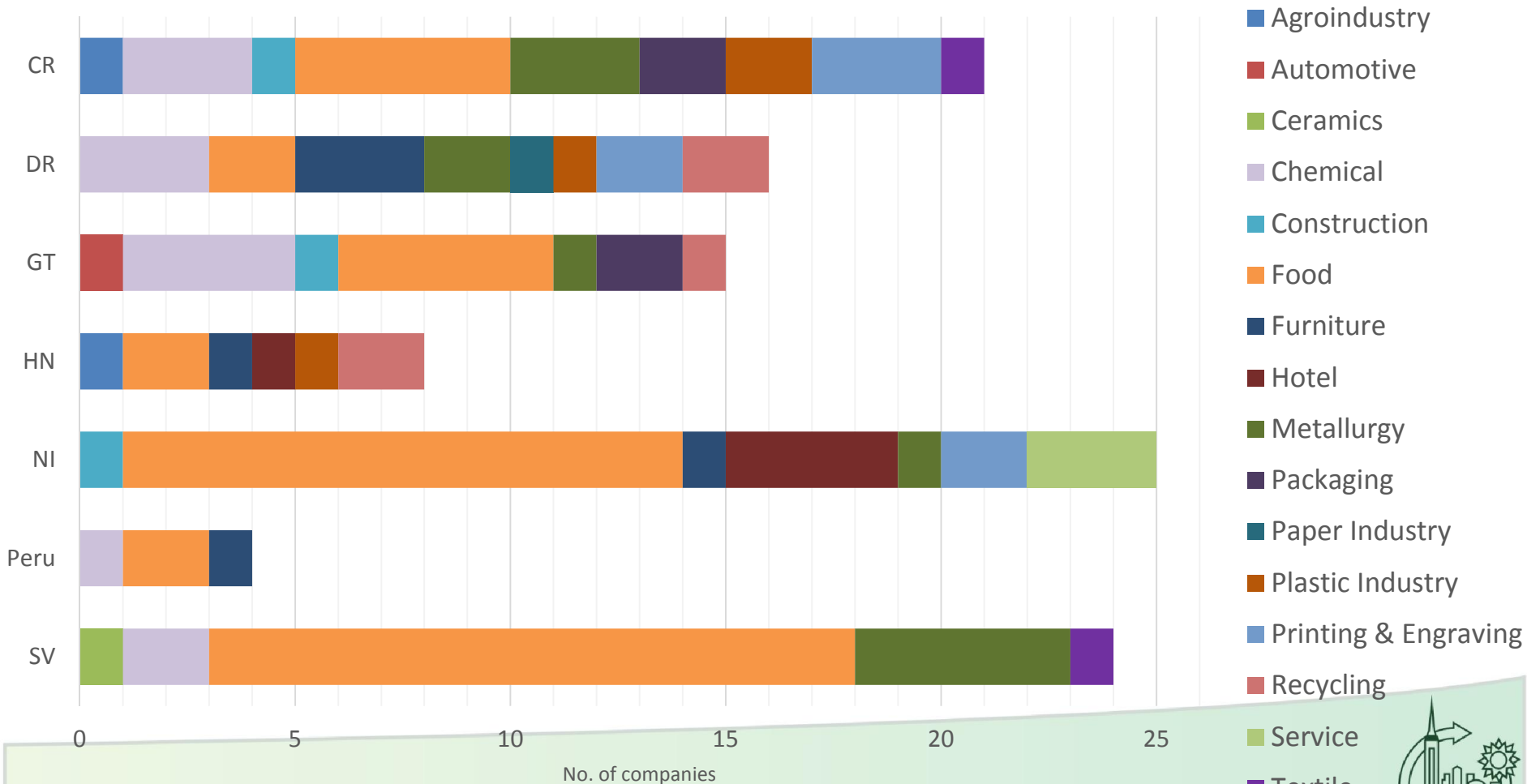
Students Trained



485 students trained through practicum course and/or internships



Participating Companies



113 companies received students in project courses and internships



Benefits realized in companies

Economic benefits		Environmental benefits	
Investment (USD)	Savings realized in 2014 (USD/yr)	Raw materials savings (ton/yr)	Solid waste reduction (ton/yr)
\$81,978	\$113,128	0.73	3.51

Approximately half of the companies engaged have implemented some of the recommendations (typically the least cost initiatives)

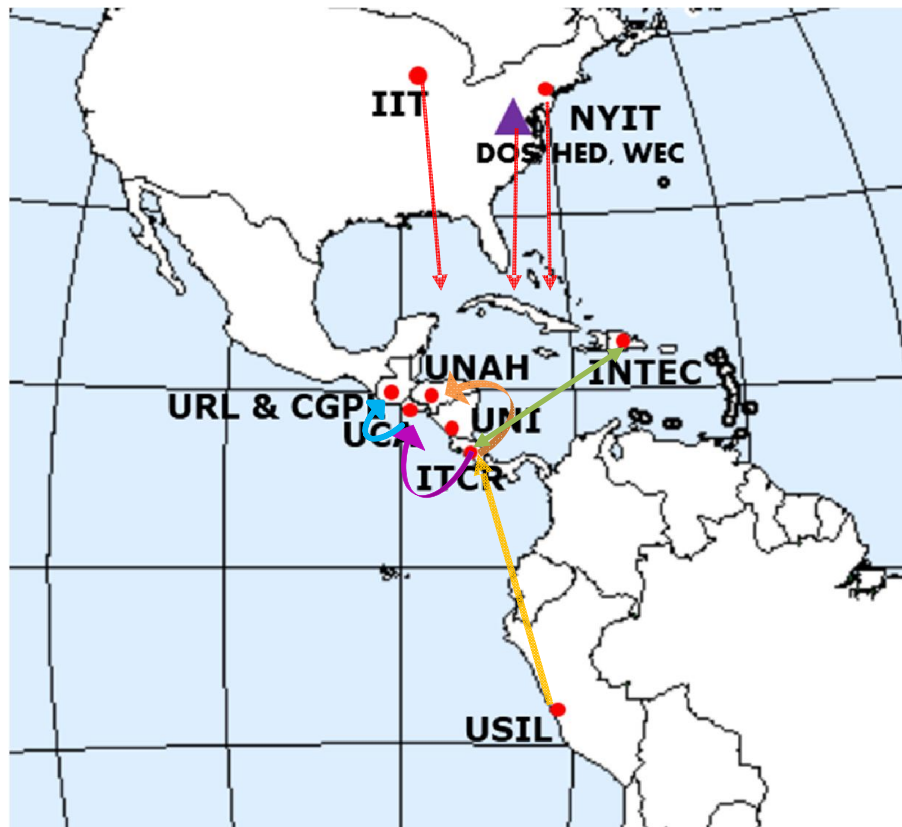


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Academic Exchange Activities



- Several US partners visits to all other partners in LAC
- Capacity Training ITCR-UCA
- CP Workshop USIL - ITCR
- Academic Exchanges: Faculty and Students UCA-URL
- Academic Exchange Students INTEC-ITCR
- Faculty training ITCR - UNAH



Education Challenges

- Institutional inertia and politics can inhibit adoption and spread of CP within university
 - Importance of having buy-in from top administrators and multidisciplinary representation on teams
- Diversity in programs has prevented creating a standard CP practicum
 - Embrace diversity by creating a standard manual that each team modifies according to technical focus of their programs



Broader Education Challenges

- Connection to the social dimension of sustainability - people and communities?
- Tension between education vs implementation
 - Student versus company needs
- Limited resources to continue and deepen practicum courses and research



Future Outlook

- **Experiential learning and multidisciplinary teams** give students the opportunity to understand real market needs, and gain technical competencies as well as soft skills that are required of CP professionals
- **Trends:** cross-country exchange, and link to corporate social responsibility and industrial ecology research



Thank you

Email: washton@iit.edu or cleanerproduction.la@gmail.com

Website: <http://cleanerproduction-la.org>

Facebook: <https://www.facebook.com/PathwaysToCleanerProduction>

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