

Final draft

The formulation of the CEO endorsement document for the project, “Application of industry-urban symbiosis and green chemistry for low emission and persistent organic pollutants free industrial development in Thailand”

Gender Aspect

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Acronyms

New POPs	New Persistent Organic Pollutants
LFS	Labour Force Survey

Executive Summary

1. Gender and Development (GAD) considerations is one of an integral part of the project strategy in consideration of the Gender policies of the GEF, UIDO and the Government of Thailand. During the preparatory phase of the project, a detailed gender analysis of the key stakeholders involving GHG emission reduction, new POPs and industry-urban symbiosis was carried out by focusing on the three selected provinces. The specific context of each selected province and its target industries and communities was taken into account during the analysis to provide the recommendations on how gender can be mainstreamed in the project and the specific concerns that should be aware. Gender indicators were provided in the project results framework.
2. The project aims to demonstrate the success cases of resource efficiency and green chemistry application in the factory and the resource sharing/waste exchange among industries as well as between industry and community through the concept of industry-urban symbiosis. This study then developed an adaptive stakeholder analysis, the Gender Analysis Matrix (GAM), as well as a theory of change as a framework to capture multiple and comprehensive objectives of the project.
3. The labor force statistics (LFS) of Q3 2017 was used to generate the employment structure in the potential industries of each targeted province. The results showed that there is a higher number of men than that of women in the potential industries.
4. Based on the interview and analysis of data collected, some concerns of genders and social aspects were addressed. The key issues are listed as follows: (i) prevailing awareness on gender among government authorities and NGOs, yet no target on women; (ii) limited empirical evidences and knowledge on new POPs in Thailand creating barriers in developing policies; (iii) Lack of understanding and low awareness of new POPs in the manufacturing sector due to the lack of database & lack of information in Thai in different impacts on men and women; (iv) lack of understanding of the urban- industry symbiosis and its benefits; (v) the on-going developed indicators of Ecotown/ Eco-related indicators have not yet included the gender issues/ gender segregated data.
5. The study also provides gender analysis matrix and detailed recommendations by project components. Risk, timeline and particular concerns for men, women, and other vulnerable groups are assessed and described in this study.

1. Introduction

1.1 Purpose

United Nations Industrial Development Organization (UNIDO) recognizes a significant positive impact on sustained economic growth and sustainable industrial development generated by gender equality and the empowerment of women (UNIDO, 2009). UNIDO adopted a policy on Gender Equality and the Empowerment of Women in 2009. As a consequence, UNIDO commits to engage all men and women equally in all of its organizational practices, policies, programmes and projects.

Gender equality means equal opportunities, including economic, politic, social, cultural, civil and political rights, for women and men. Under the concept of gender equality, women and men are considered by their different behaviour, aspirations and needs, valued and favoured equally (International Labour Office, 2000)¹. It does not mean that women and men have to become the same, but that their rights, responsibilities and opportunities will not depend on whether they are born male or female. A number of international conventions stress the importance of women rights as human rights. Key principles include, for example, the Beijing Declaration² and the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)³.

In order to achieve gender equality, a gender analysis is a vital tool. A gender analysis is a critical examination of relationships between women and men and their access to and control of resources and the constraints in accessing the resources. The gender analysis also encompasses an analysis of the needs, priorities, roles and experiences of women and men to address any gender-based inequalities that may have prevailed; for example, the existing gender gaps in employment, wages, access to resources and opportunities. The gender analysis normally provides recommendations and proposed intervention to promote gender mainstreaming in programmes and activities. Gender mainstreaming addresses the gender inequalities of project, policy or process, and leads to more gender-responsive actions (UNIDO, 2015, p. 4).

This study covers gender-sensitivity analysis and provides general suggestions on how to incorporate gender perspectives in forming a project, “Application of industry-urban symbiosis and green chemistry for low emission and persistent organic pollutants free industrial development in Thailand”. The analysis will identify the different roles between men and women in the potential industry in the targeted areas so as to meet their needs. This work collects sex-disaggregated data, examines the data using gender analysis, and identifies gaps through a comprehensive framework. An adaptive stakeholder analysis and theory of changes are also used in this study. The achievement of gender equality requires gender-responsive concerns, strong governance and robust accountability systems, as well as the full, equal participation of women at all levels of decision-making.

¹ International Labour Office. (2000). *ABC of women workers’ rights and gender equality* (2nd Edition ed.). Geneva: International Labour Office

² UNITED NATIONS (1995) Fourth World Conference on Women: Beijing Declaration. Available online: <http://www.un.org/womenwatch/daw/beijing/platform/declar.htm>

³ United Nations General Assembly (1979) the Convention on the Elimination of All Forms of Discrimination Against Women Available online: <http://www.un.org/womenwatch/daw/cedaw/text/econvention.htm>

1.2 Scope of work

From the perspective of project design, this study will undertake gender's behaviours, attitudes and impact studies. The results will be incorporated as key aspects in the project design and implementation to strengthen operational capabilities on gender and enhance environmental awareness that related to New POPs, GHG reduction, and urban-industry symbiosis. The targeted areas are Chonburi, Rayong and Samuthprakarn province. The potential sectors thus are determined by the technical teams. The potential sectors are sectors with potential for GHG reduction, new POPS reduction as well as a better urban-industry symbiosis. The gender analysis and recommendations will be developed in line with the identified sectors, as listed follows:

Table 1 List of potential industries in three selected provinces*

Area	Energy consumption and engine capacity	New POPs	Urban- industry symbiosis
Samut Prakarn	1310-1399 Textiles 1510-1520 Leather and related products 2010-2030 Chemicals and chemical products 2210-2220 Rubber and plastic product	1310-1399 Textiles 2210-2220 Rubber and plastic product 2910-2930 Motor vehicles, trailers and semi-trailers	Potentials among communities and industries/ firms 3820-3822 Treatment and disposal 3830 Materials recovery
Chonburi	1910-1920 Manufacture of coke and refined petroleum products 2592 Treatment and coating of metals; machining 2930 Manufacture of parts and accessories for motor vehicles	2220 Manufacture of plastics products 2592 Treatment and coating of metals; machining 2930 Manufacture of parts and accessories for motor vehicles	Potentials among communities and industries/ firms 2220 Manufacture of plastics products 3820-3822 Treatment and disposal 3830 Materials recovery
Rayong	1920 Petroleum refinery, lube base oil 2011 Basic chemical (inorganic) 2013 upstream petrochemical and plastic 3510 Power generation 3520 Gas separation process	No targeted industries **	High potentials among industries/ firms. 3811-3822 Waste collection and Treatment and disposal

Note: *The industrial code in this table is the four-digit classification under the International Standard Industrial Classification of All Economic Activities (ISIC) revision 4.

** Based on the technical team's study, the industries in Rayong province are less likely to use the three new POPs.

Source: Author, from the technical teams (Samut Prakarn and Chonburi province by FTI; Rayong province by Kasertsart University)

1.3 Terminology

UNESCO's Gender Mainstreaming Implementation Framework

"Gender refers to the roles and responsibilities of men and women that are created in our families, our societies and our cultures. The concept of gender also includes the expectations held about the characteristics, aptitudes and likely behaviours of both women and men (femininity and masculinity). Gender roles and expectations are learned. They can change over time and they vary within and between cultures. Systems of social differentiation such as political status, class, ethnicity, physical and mental disability, age and more, modify gender roles. The concept of gender is vital because, applied to social analysis, it reveals how women's subordination (or men's domination) is socially constructed. As such, the subordination can be changed or ended. It is not biologically predetermined nor is it fixed forever".

1.4 Methodology

Key objective is to conduct a detailed gender-sensitive stakeholder analysis. It will involve all key stakeholders to frame proposed strategic actions and to discuss about their concerns.

Gender-sensitive stakeholder analysis involves the assessment of:

- The distribution of tasks, activities with the division of labour of the target industry;
- The relative positions of women and men in terms of representation and influence to examine rights of access to resources and voice; and
- Possible benefits and risks associated with the allocation of tasks to women and men.

For the purpose of project development design, the following concerns will be addressed:

- Identifying the key female and male stakeholders and their interests in the project;
- Assessing the importance of, and level of impact on men and women upon stakeholder; and
- Identifying how best to engage female and male stakeholders in the project.

This study undertakes a mixed method, involving the use of both qualitative and quantitative data. Its use is to address the complexity of a social analysis, which cannot be addressed by a qualitative or quantitative alone.

As shown in Figure 1, the desk review is carried out to identify issues regarding three topics: (1) reduce CO₂ and gender equality; (2) reduce new POPs and gender equality; (3) increase industrial symbiosis and gender equality. The review also helps detect relevant stakeholders.

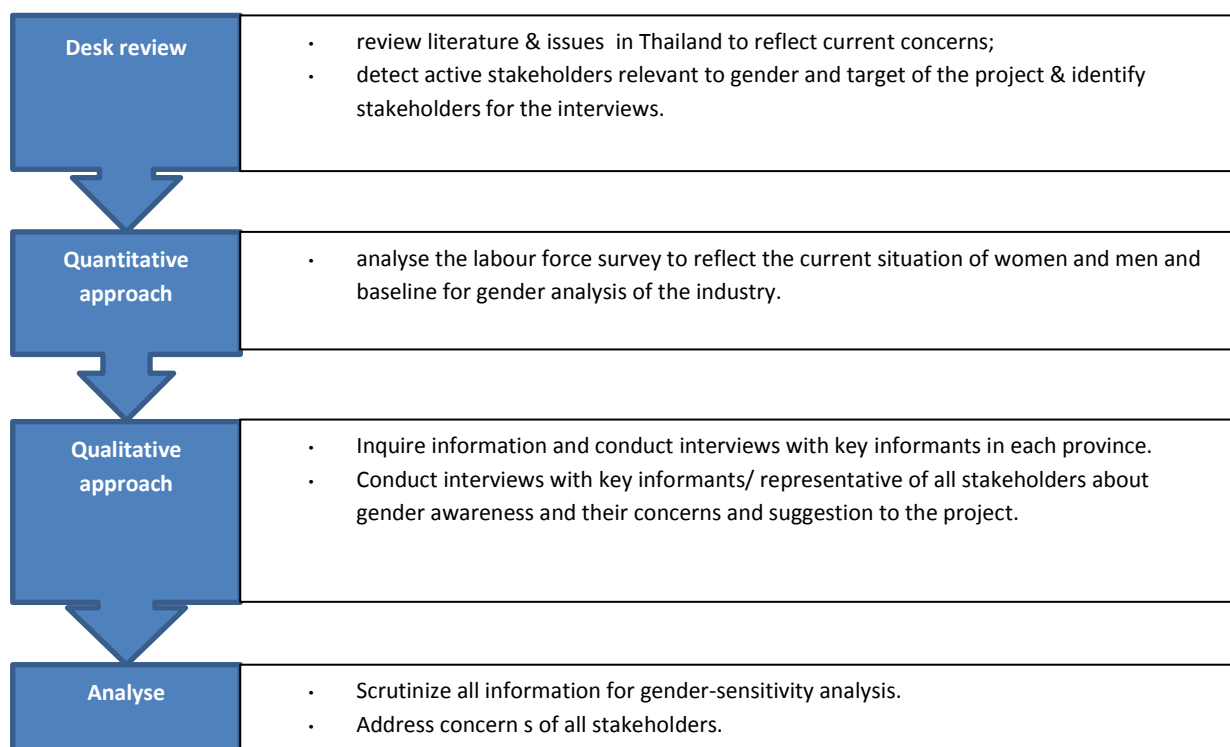
The 2017 Thai Labour Force Survey (LFS) is used to analyse the industry as a baseline. The employment and household profiles in three provinces (Chonburi, Rayong and Samuthprakarn province) are examined. The LFS is conducted by National Statistical Office since 1963. This study utilizes the the LFS conducted in July–September 2017 (Quarter 3, 2017). The quarter 3 is used to reduce the seasonal effect in the Thai labour market. The LFS adopts a Stratified Two - Stage Sampling techniques. Provinces were constituted into 77 strata. The primary and secondary sampling units were enumeration areas (EAs) for municipal areas and non-municipal areas and private households/ persons in the collective households, respectively.

A new listing of private households was made for every sample enumeration areas to serve as the sampling frame. All collective households located within the sample areas were included in the sample and the persons in the collective household were systematically selected for the interviewing. The weighted data is applied to the data set to represent the Thai labour force. The analysis in this study includes the division of labour, women in decision-making level, and wage differentials.

Lastly, interviews are conducted with key informants in the potential industry on gender and social aspects. The interviews aim at assessing the gender “awareness” and “sensitivity” of project beneficiaries and stakeholders. The interview also includes a concern on vulnerable group of people, if any. Furthermore, the objectives of the interviews are to collect views of all stakeholders (government agencies, NGOs, communities, academia, and environmental/ women’s associations) about gender and social aspects of this industry, as well as their concerns and suggestions for the project designing and the project implementation.

The qualitative approach applies a structural list of questions (As shown in Appendix I) to assess the influence and importance of women and men as well as potential impacts of the project upon each stakeholder. In case of the stakeholders are government agencies, NGOs, academia, researchers, communities, and environmental and workers’ representatives, they will also be asked to express their concerns and suggest for the project design.

Figure 1 Methodology and data collection of this study



Source: Author

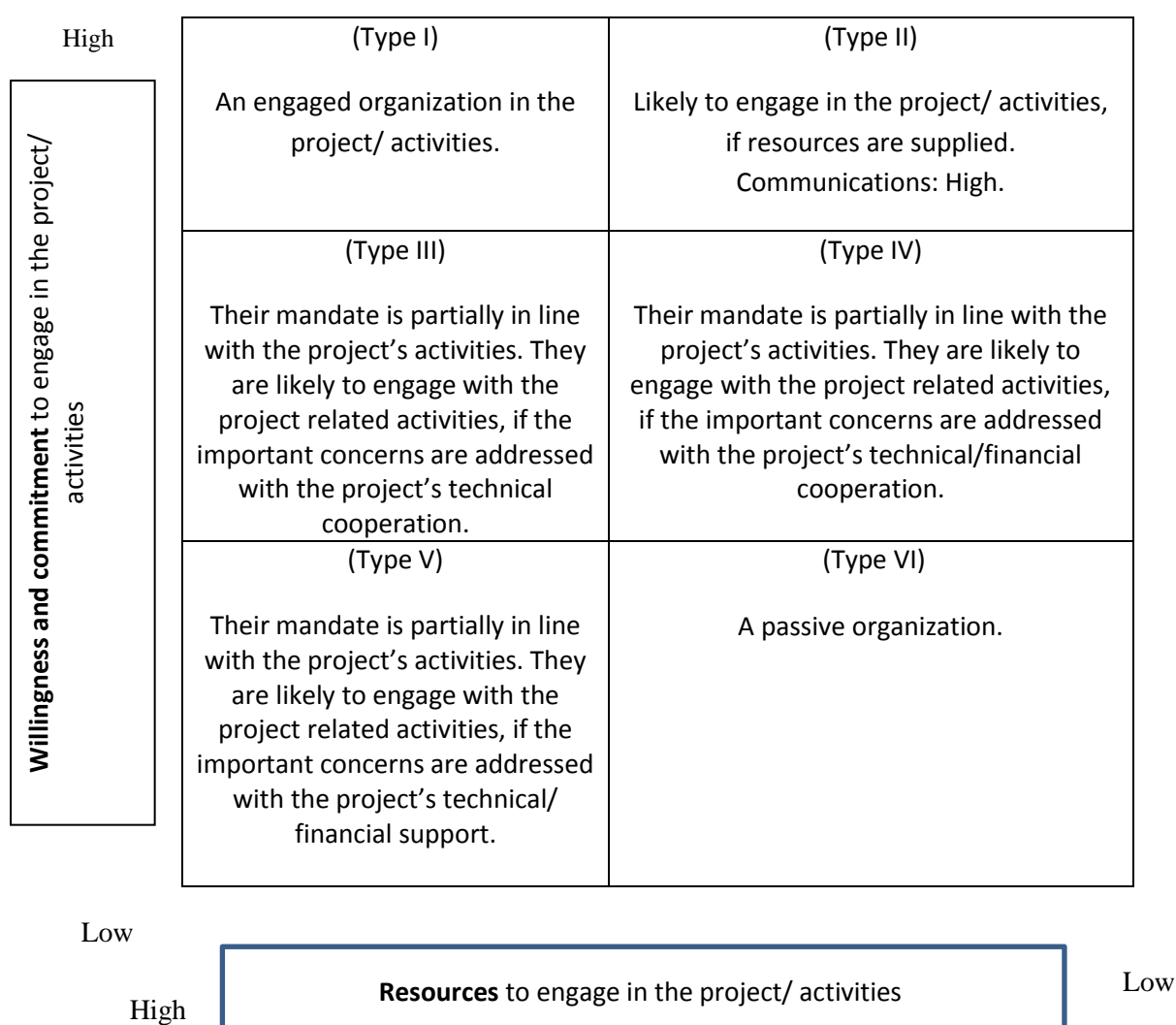
1.5 Conceptual Framework

In order to investigate relevant stakeholders and later identify and analyse their concerns, this study has adapted and developed the stakeholder analysis [e.g. Golders and Gawler (2005), Zimmermann and Maennling (2007) and Schmeer (2013)].

The stakeholder analysis was adapted to identify stakeholders, followed by the theory of changes, and the gender matrix analysis. This stakeholder analysis helps the study have a clear picture of relevant stakeholders and their interests. Figure 2 shows the analytical framework that is particularly developed for this study. The vertical axis indicates the current level of mandate/ commitment for related activities. It also implies the priority setting of the organization in relevant to project's issues. The horizontal axis represents available resources for the related activities. The resources include financial, physical and human resources. The analysis classifies organizations into six types listed below.

- Type I: An organization with high commitment and with sufficient resources to complement with the project's budget/ activities.
- Type II: An organization with high recognition and commitment, but with a lack of resources to implement the related activities. An organization of this type is likely to participate in low resource activities (in terms of time or activity type). It is likely to engage in the project if resources are provided.
- Type III, IV, V: An organization that is likely to engage in the related activities, if the project objectives and importance are increasingly recognized by members of the organization. This type of organization is commonly large in size, with either financial or human resources. However, its mandate may not be related to the project's objectives. There is a possibility that the organization may extend its scope to related activities if the recognition/ awareness of project's objectives increases among its members or its committee, through better communications on the project's objectives.
- Type VI: An organization that is characterized by low resources and low commitment to the related activities. This type of organization is likely to be a passive organization.

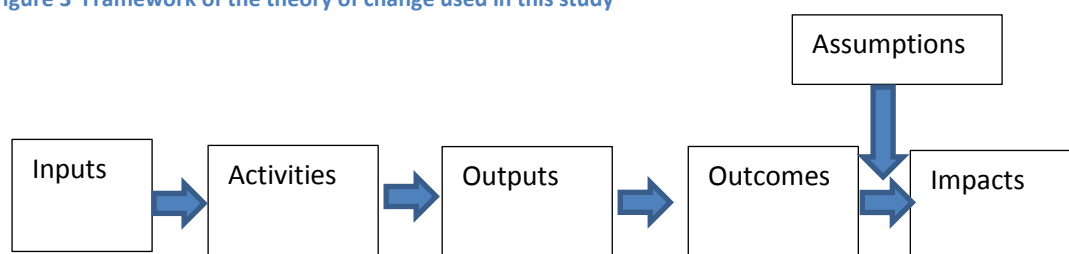
Figure 2 Framework to analyse stakeholder



Source: Adapted from the stakeholder analysis by the author.

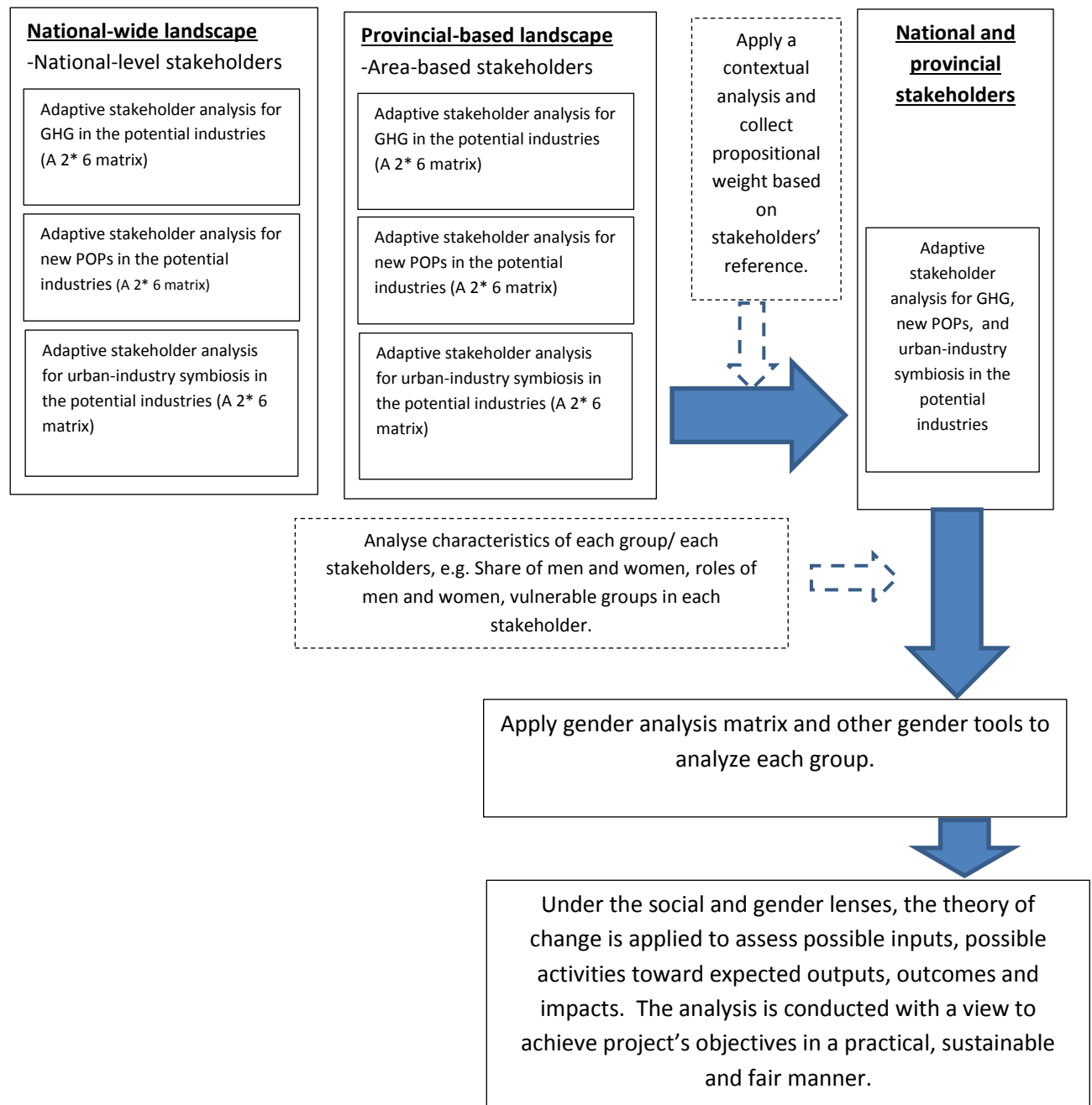
After the stakeholders are identified under the adaptive stakeholder analysis, the Gender Analysis Matrix (GAM) is then applied. Then, the study uses a theory of change approach to identify the underlying intervention logics for the projects leading to a successful impact.

Figure 3 Framework of the theory of change used in this study



Source Adapted from: (UNIDO, 2012) Figure 2.1: Generic intervention logic or results chain pp.12

Figure 4 Framework used in this study



Source: Tailor-made framework for this study, by author.

The structural questions are listed in Appendix 1. The list of key informants and the time of interviews are demonstrated in Appendix 2.

1.6 Review Literature

The literature focuses on the literature in Thai context. The concerns are addressed in 3 dimensions: (1) GHG emissions and gender; (2) POPs and gender; and (2) urban- industry symbiosis and gender dimension.

1.6.1 GHG emissions and gender in Thailand

The impact of GHG under gender perspective is mostly mentioned in a very board context. For example, the impact of the GHG of the food security, the GHG on health, and the GHG and work changes [(FAO, 2011), (Cohen, 2014)]. According to Cohen (2014), men are more involved with work and vehicle uses that contribute to GHG emissions than are women. In addition, he addressed that the assumption of shared responsibility for this source of emissions needs to be taken, as public policies frequently impose increased labour burdens on households impacting on responsibility by gender.

Despite the fact that Thailand has many plans for the GHG reduction, there is no concrete plan/ indicators by sex segregation. A statement delivered by H.E. General Prayut Chan-o-cha, Prime Minister of the Kingdom of Thailand At the General Debate of the 70th Session of the United Nations General Assembly New York, 29 September 2015 addressed that

“Climate change will pose a major challenge to the achievement of various SDGs. It is, therefore, our shared responsibility to ensure that the outcome of the COP 21 will be both ambitious and viable.”
“On Thailand’s part, we reaffirm our commitment under the INDCs to reducing our greenhouse gas emissions between 20 and 25% by the year 2030.”

In line with the PM’s statement, National Committee on Climate Change (NCCC)⁴ approved Thailand’s Master Plan on Climate Change (2015–2050)⁵. The objectives of the Master Plan are to guide actions to mitigate and tackle problems arising from climate change, promote the conduct of appropriate and effective action plans in all sectors and levels, and encourage Thailand to move towards “Low Carbon Society”. Its activity plan includes three key components which are (i) adaptation for coping with effects of climate change; (ii) mitigation of greenhouse gas (GHG) emissions and promote low carbon society; and (iii) capacity building of GHG management. Under the master plan, the component that related to skills development is identified under the third strategy⁶. A measure in this strategy aims

⁴ Thailand’s National Climate Change Committee (NCCC) was established in 2007 under Office of Prime Minister to achieve climate change targets. In 2009, the committee members were added from a number of ministries. The NCCC comprises) (i) Prime minister or assigned Deputy prime minister (2) Minister of Ministry of Natural Resources and Environment as a secretary (3) Deputies from ministries (Ministry of Finance, Ministry of Foreign Affairs, Ministry of Agriculture and Cooperatives, Ministry of Communication, Ministry of Digital Economy and Society, Ministry of Energy, Ministry of Science and Technology, Ministry of Public Health, Ministry of Industry, and NESDB; (4) assigned qualified members. Department of Environmental Quality Promotion, Ministry of Natural Resources and Environment (2016) Thailand’s National Climate Change Committee.. Accessed on 15 August 2017. <http://www.eppo.go.th/index.php/th/plan-policy/climatechange/thailand/climatechange>

⁵ Office of Natural Resources and Environmental Policy and Planning (2015) Thailand’s Climate Change Master Plan. Ministry of Natural Resources and Envir onment. http://climate.onep.go.th/wp-content/uploads/2015/10/ccmp_2558_2593.pdf

⁶ This strategy includes (i) developing information, technology, and research; (ii) developing a supporting mechanism (iii) increase public awareness on the climate change; and (iv) Enhance international collaboration.

at enhancing skills for labour for low-carbon society and environmental friendly economy, but no indicators by gender.

1.6.2 Concerns on POPs and gender in Thailand

In Thailand, POPs are included as chemical hazardous issues. Obviously, the literature was majorly provided by the government with the key purpose to publicise the information on POPs on health and environment⁷. However, the documents in Thai on 3 new POPs (HBCD, PBDE and PFOS) are very limited.

Recently, a study performed by IPEN and Arnika (an environmental organization in the Czech Republic) found that toxic chemicals, OctaBDE, DecaBDE, and Hexabromocyclododecane (HBCD) in the plastic casings of electronic products contaminate toys. If the plastic casings of electronic products are not removed, the toxic flame-retardant chemicals are carried into new products when the plastic is recycled. The survey of products from 26 countries, including Thailand, found that 90% of the samples contained OctaBDE or DecaBDE. Nearly half of them (43%) contained HBCD⁸. The sampling product of Thailand is Rubik's cubes. The samples were collected from 9 sources and found that 2 out of 9 sources were selling contaminated Rubik's cubes⁹. This literature focuses on the household and consumer goods that expose people to vulnerable health.

The new POPs may contaminate in waste. Few literatures addressed concern on waste management in the manufacturing sector. For example, Sripoung (2010)¹⁰ briefly presented the industrial waste management, emphasizing the situation of toxic and chemical waste and mechanism of the private waste management. The study by Pookkasorn & Sharp (2016) emphasized the lack of clear knowledge about good E-waste management including effects from E-waste to their health and the environment. They highlighted the importance of public awareness raising about proper E-waste management, especially among informal sectors.

While Sripoung and Pookkasorn & Sharp did not address gender issues, Muenhor, Moon, Lee, & Goosey (2017) investigated the different exposure levels to polybrominated diphenyl ethers (PBDEs) of male adult, female adult, male children and female children. They characterized concentrations of PBDEs in floor and road dust from a manual e-waste dismantling facility and adjacent communities in Thailand. Their study provided a preliminary database for PBDE contamination in a manual e-waste

⁷ In Thailand, many reports exhibit the pollution level in an agricultural sector, in which some POPs substances are included in the report. Similarly, literatures on POPs among academia are mostly a part of agricultural chemicals and pesticide (For example, Wattasith Siri Wong, 2014⁷; Sarun Keithmalesatti, 2008⁷). Wattasith (2014) collected samples in agricultural area in Pathumthani province during 2004 and 2007 to evaluate Organochlorine pesticide residues.

⁸ Press Release: Recycling Contaminates Plastic Children's Toys with Toxic Chemicals from Electronic Waste. Accessed online. <http://www.ipen.org/news/press-release-recycling-contaminates-plastic-children%E2%80%99s-toys-toxic-chemicals-electronic-waste>

⁹ EARTH (2017) Open to the study: Contamination of hazardous chemical of electronic waste recycling in "Rubik's cube" (เปิดงานศึกษา: การปนเปื้อนของสารเคมีอันตรายจากขยะอิเล็กทรอนิกส์ใน "ลูกบาศก์") By Akaraphol Teabtaisong in Thai <http://earththailand.org/th/document/120>

¹⁰ Naline Sripoung (2010) Thai Journal of Toxicology 25(2). The 3rd National Conference in Toxicology, 25-26 November 2010 (in Thai) <http://www.thaitox.org/media/upload/file/Journal/2010-2/abstract.pdf>

dismantling facility, houses and a Buddhist temple in Thailand. Under their different scenarios of occupational and non-occupational exposure to BDE-99 and BDE-209, the facility workers as well as adults and children in the adjacent dwellings were exposed to BDE-99 and BDE-209 differently.

Furthermore, Muenhor, Moon, Lee, & Goosey's study addressed an urgent need to examine PBDE contamination of workers involved in the processing of e-waste. Their study also highlighted the following issues, which are (i) indoor dust ingestion as occupational and environmental exposure pathways, (ii) the factors influencing PBDE contamination of workplace and domestic environments, and (iii) the potential health impact of occupational and environmental exposure to PBDEs.

1.6.3 Concerns on urban-industry symbiosis and gender in Thailand

In Thailand, there are a number of the cases on the industry-industry symbiosis. Nevertheless, the concept of the urban-industry symbiosis is not widely acknowledged. The urban-industry symbiosis is mostly mentioned in the waste management.

Some of industry-industry symbioses in Thailand are actively operating in the Map Ta Phut industrial estate (Miguel Ângelo de Freitas Lopes, 2013)¹¹. For example, the liquid sulphur from oil refinery to fertilize industry, and Naphtha and condensate derived as by products which are used in the production process of aromatics (GTZ/IEAT, 2001; Homchean, 2004 in CECF, 2007, cited in Miguel Ângelo de Freitas Lopes, 2013).

One of the important concerns relating to the urban-industry symbiosis is addressed in the National Waste Management Master Plan (2016–2021)¹². It aims to encourage 3R to waste management and collection systems, apply integrated technologies into waste recovery and disposal, amend and develops regulations, and facilitate public participation.

Most literatures accessed the feasibility of establishing a waste-to-energy establishment. However, the produced energy is for public distribution, not for industry in particular. The other type of literatures is a technical feasibility study in using the industrial waste as an input to produce a new product. For example, a study to investigate if the dust from rock crushing plant can be used to replace cement in interlocking block production (Tanpaiboonku, 2017), and a study to use the waste from a mining industry to make blocks or related products (Tothirakul, Suksamiti, & Sutjakij, 2008).

¹¹ The Map Ta Phut Industrial Estate, located in Rayong, was established in 1985 and designed for petrochemical industries and its downstream processes.

¹² The Master plan was approved by the Cabinet on 3 May 2016 to support Integrated Waste Management. The Master Plan.

2 Results of the analysis

The analysis applies a mixed method to analyse information from both secondary and primary sources. The result of the analysis is demonstrated as follows:

1. Stakeholder identification - to identify relevant stakeholders so that gender analysis can be conducted. It must be noted that many stakeholders perform operations across targeted provinces.
2. Gender analysis – within this section, the analysis by gender segregation data as well as Gender Analysis Matrix (GAM) will be described under the theory of changes, and the gender lenses.

2.1 Stakeholders Identification by mandates/ interest of the stakeholders

Stakeholders are identified through the project objectives and the potential partners under the stakeholders' framework.

2.1.1 GHG emissions

2.1.1.1 Public sector

- **The Thailand Greenhouse Gas Management Organization**

National Committee on Climate Change (NCCC)¹³ approved Thailand's Master Plan on Climate Change (2015–2050)¹⁴. The objectives of the Master Plan are to guide actions to mitigate and tackle problems arising from climate change, promote the conduct of appropriate and effective action plans in all sectors and levels, and encourage Thailand to move towards “Low Carbon Society”. Therefore, the relevant organizations to the National Committee on Climate Change, and the Master Plan on Climate Change should also be included in the stakeholder list.

- **The Thailand Greenhouse Gas Management Organization**

The Thailand Greenhouse Gas Management Organization (TGO) has established since 2007. It is responsible for analysing, and collecting views and opinions on approval and appraisal of authorized projects to further project advancements and the market of greenhouse gas quantity trading as approved; to be an information centre for circumstances on greenhouse gas operations; to establish a database about the authorized projects and the approved trading of greenhouse gas quantity; nevertheless, in accordance with the policy determined by the National Board and the Board; to

¹³ Thailand's National Climate Change Committee (NCCC) was established in 2007 under Office of Prime Minister to achieve climate change targets. In 2009, the committee members were added from a number of ministries. The NCCC comprises (i) Prime minister or assigned Deputy prime minister (2) Minister of Ministry of Natural Resources and Environment as a secretary (3) Deputies from ministries (Ministry of Finance, Ministry of Foreign Affairs, Ministry of Agriculture and Cooperatives, Ministry of Communication, Ministry of Digital Economy and Society, Ministry of Energy, Ministry of Science and Technology, Ministry of Public Health, Ministry of Industry, and NESDB; (4) assigned qualified members. Department of Environmental Quality Promotion, Ministry of **Natural** Resources and Environment (2016) Thailand's National Climate Change Committee.. Accessed on 15 August 2017. <http://www.eppo.go.th/index.php/th/plan-policy/climatechange/thailand/climatechange>

¹⁴ Office of Natural Resources and Environmental Policy and Planning (2015) Thailand's Climate Change Master Plan. Ministry of Natural Resources and Environment. http://climate.onep.go.th/wp-content/uploads/2015/10/ccmp_2558_2593.pdf

further and enhance the efficiency and provide instructions to public agency and private body in the operations on greenhouse gas accordingly; to disseminate and conduct public relations campaign on the greenhouse gas management; and to promote and support relevant climate change operations (TGO, 2018)

One of the TGO's mandates are to develop capacity building plan and curriculum on climate change, disseminate knowledge on climate change mitigation and adaptation, organize trainings and workshops, and enhance networking among Thais. The TGO also aims to expand training and networking for ASEAN countries. Therefore, its activities include develop curriculum on climate change for Thailand and ASEAN, provide training programmes for interested parties, develop e-learning system and training materials, build climate change network in ASEAN, and promote knowledge dissemination on climate change in Thai and in English (Interviewed with TGO).

- **Department of Environmental Quality Promotion, and National Institute of Dioxin (Under supervision of Department of Environmental Quality Promotion)**

National Institute of Dioxin aims to research and develop current technologies in order to reduce and control a range of hazardous chemicals including dioxins, Furans, along with other new Persistent Organic Pollutants (new POPs) stated in the Stockholm Convention. Based on the interview, the Institute conducted studies in some types of new POPs, for example, Perfluorooctanesulfonic acid (PFOS).

2.1.1.2 Private sector

The firms in the potential industries, especially firms in petroleum refinery, lube base oil, basic chemical (inorganic), upstream petrochemical and plastic, power generation, gas separation process, chemicals and chemical products, manufacture of coke and refined petroleum products, manufacture of coke and refined petroleum products, treatment and coating of metals; machining, and treatment and coating of metals; machining. The potential industries are largely based on the industrial foundation of the targeted areas. The associations and the industrial associations are also considered to be important in awareness rising as well as disseminating the demonstration activities. In addition, firms/ factories in manufacture of plastics products, treatment and disposal, as well as materials recovery are considered to be critical in new POPs management.

Department of Alternative Energy Development and Efficiency; Occupational Safety and Health Division, Department of Labour Protection and Welfare; Department of Environmental Quality Promotion.

2.1.1.3 Communities/ CSOs/ NGOs

The communities, CSOs and NGOs around the firms are important to help monitor GHG emissions.

2.1.1.4 Others

The Federation of Thai Industries; Kasertsart University, and other environmental institutes.

2.1.2 New POPs

2.1.2.1 Public sector

- **Pollution Control Department**

The Pollution Control Division (PCD), Ministry of Natural Resources and Environment, is a national focal point for Stockholm convention. The PCD contributes to the majority of prevailing literature on POPs, which can be divided into two key issues: (1) the Stockholm Convention on New POPs, the corresponding national implementation plan, and its update¹⁵; and (2) informative documents about impact of New POPs and New POPs on health and environment¹⁶.

It handles the following key tasks: formulate national policy and plans for the promotion and conservation of environmental quality with respect to pollution control; make recommendations for the establishment of environmental quality standards and emission effluent standards, develop environmental quality management plans and measures to control, prevent and mitigate pollution, monitor environmental quality and prepare an annual report on the state of pollution, develop management system of solid waste, hazardous substance, water quality, air quality, noise level and vibration; coordinate and implement measures to rehabilitate and remedy damages caused by pollution in the contaminated area and environmental appraisals; provide assistance and advice on environmental management; cooperate with other countries and international organizations on environmental management; investigate public complaints on pollution¹⁷.

- **Department of Industrial Works, Ministry of Industry**

The Department of Industrial Works, the Ministry of Industry, is supervising the industry including hazardous waste, production, environmental and safety aspects. It also supports and provides knowledge related to machinery, production, environment, safety, hazardous waste, energy and CSR for industrial development.

- **Working group for the Stockholm Convention on Persistent Organic Pollutants in Thailand**

Besides those two key stakeholders, the working group for the Stockholm Convention on Persistent Organic Pollutants in Thailand are composed of Office of the National Economic and Social Development Board, Department of Health, Department of Agriculture, Department of Environmental Quality Promotion (DEQP), under the Ministry of Natural Resources and Environment, Department of International Organizations, Department of Treaties and Legal Affairs, Department of International Trade Promotion, Department of Local Administration, Food and Drug Administration, Bureau of the Budget, Office of International Cooperation on Natural Resources and Environment, and Bangkok metropolitan Administration.

¹⁵ Most literatures are contributed by Pollution Control Division. For example, Manorat Ruthitem (2015) Pollution Control Division, accessed online: http://www.thaipan.org/sites/default/files/conference2558/2.10_manorat.pdf; Pollution Control Division (2007) Plan for the Implementation of its Obligation under the STOCKHOLM CONVENTION on the Persistent Organic Pollutants (New POPs) in Thailand Accessed online http://infofile.pcd.go.th/haz/en_plan_new_POPs.pdf?CFID=3142021&CFTOKEN=42740220

¹⁶ For example, Environment promotion, National Institute of Dioxin (2014) Dioxin Laboratory. 2nd Editionn http://library.baac.or.th/exhibition/greenlibrary/file_e-book/file/e-book_15.pdf. It provides information on Stockholm Convention, and Dioxin.

¹⁷ Authorities and Duties of Pollution Control Department http://www.pcd.go.th/about/en_ab_mission.html

- **Department Labour Protection and Welfare (DLPW), Ministry of Labour**

The DLPW establishes and develops labour standards, as well as promote and supervise for certifying establishment applying Thai Labour Standard in consistent with the international labour standard. It also promotes and develops occupational safety, health and environment as well as disseminates information on labour standard, labour protection, occupational safety, labour relations, state enterprise labour relations and relative labour welfare.

2.1.2.2 Private sector

The firms in the potentials industries, especially firms in manufacture of plastics products, treatment and coating of metals; machining, manufacture of parts and accessories for motor vehicles, textiles, rubber and plastic product, and motor vehicles, trailers and semi-trailers. The potential industries are based on the industrial base of the targeted industries. The associations and the industrial associations are also considered to be important in awareness raising as well as disseminating the demonstration activities.

2.1.1.3 Communities/CSOs/NGOs

The communities around the firms are important to help monitor POPs at a certain level.

2.1.3 Industry-urban symbiosis and cross cutting issues

2.1.3.1 Public sector

The relevant stakeholders are Department of Industrial works, Provincial Administration Organization, and Municipality/Subdistrict Administration Organizations.

2.1.3.2 Private sector

Firms/ factories in manufacture of plastics products, treatment and disposal, as well as materials recovery are considered to be critical in new POPs management. It includes Industrial waste treatment/disposal facility, waste recycle/treatment/ disposal facilities (including waste pickers and waste collectors).

2.1.3.3 Communities/CSOs/NGOs

The communities around the firms are important to help create the urban-industry symbiosis. The essential groups include Eco network; Green network and other networks; Universities and technical colleges in the targeted areas; Natural Resources and Environmental Protection Volunteer.

In addition, EARTH (Ecological Alert and Recovery-Thailand) is also works as a NGO that jointly worked with IPEN for several projects, including mapping toxics in Phuket as a contribution to global debate

about POPs in wastes (2011)¹⁸. The key tasks are to identify problems, make initial recommendations and link to public awareness-raising, as well as facilitate the identification and disposal of obsolete list of pesticides and other chemicals.

2.1.3.5 Others

The NGOs/ CBOs listed in this section represent only those relevant to New POPs and workplace gender equality. The gender-related NGOs listed in this study are those working with women in the manufacturing sector

- **Gender organizations and GHG/ POPs**

There are around ten active NGOs organizations working on gender issues in Thailand. However, their focuses vary, and mostly locate on domestic violence, poor families and women's rights. Only some work with women employed in the manufacturing sector¹⁹. One eminent organization working on women's rights in the manufacturing sector is Friends of Women Foundation. FOW works to protect and promote women's rights. FOW advocates on behalf of Thai women against gender-based violence, worker's rights, reproductive rights, and in support of gender equality and development. It provides consultation for the rights' protection under child protection, domestic violence, human trafficking, and computer crime acts. FOW manifests four women's rights protection centers in Chiangmai

¹⁸ ISIP Report: Mapping toxics in surrounding of Phuket as a contribution to global debate about New POPs in wastes. Available online:

<http://ipen.org/sites/default/files/documents/EARTH%20final%20ISIP%20Contaminated%20Sites%20report.pdf>

¹⁹ Some other gender organizations that do not in line with this study are listed, but not limited to, as follows: International Women's Partnership for Peace and Justice (IWP), founded in 2002, leads workshops, retreats and training courses for sustainability and transformation at the personal, community and society levels. IWP offers the following many courses, grounded in three core principles: feminism, social activism and spiritual practice (For more information: <http://womenforpeaceandjustice.org/about-iwp/our-principles-2/>).

EMPOWER Foundation or Centre for Sex Workers' Protection (Thai: มูลนิธิส่งเสริมโอกาสผู้หญิง), is a non-profit organization in Thailand that supports sex workers in multiple setting, including by offering free classes in language, health, law and pre-college education, as well as individual counseling.

The Pratthanadee Foundation (formerly the Goodwill Group Foundation) is a Thai registered non-governmental organization based in Bangkok, Thailand with a second branch in Ubon Ratchathani province in the Northeast of Thailand. Pratthanadee was founded on December 8, 2000. It provides trainings to develop career and to help set the right attitude and provide tools for success. It provides 30 hours of career and personal development training (covering topics such as self-assessment, goal-setting, women's law and rights, self-defenses) and English lessons (<http://pratthanadee.org/programs/>).

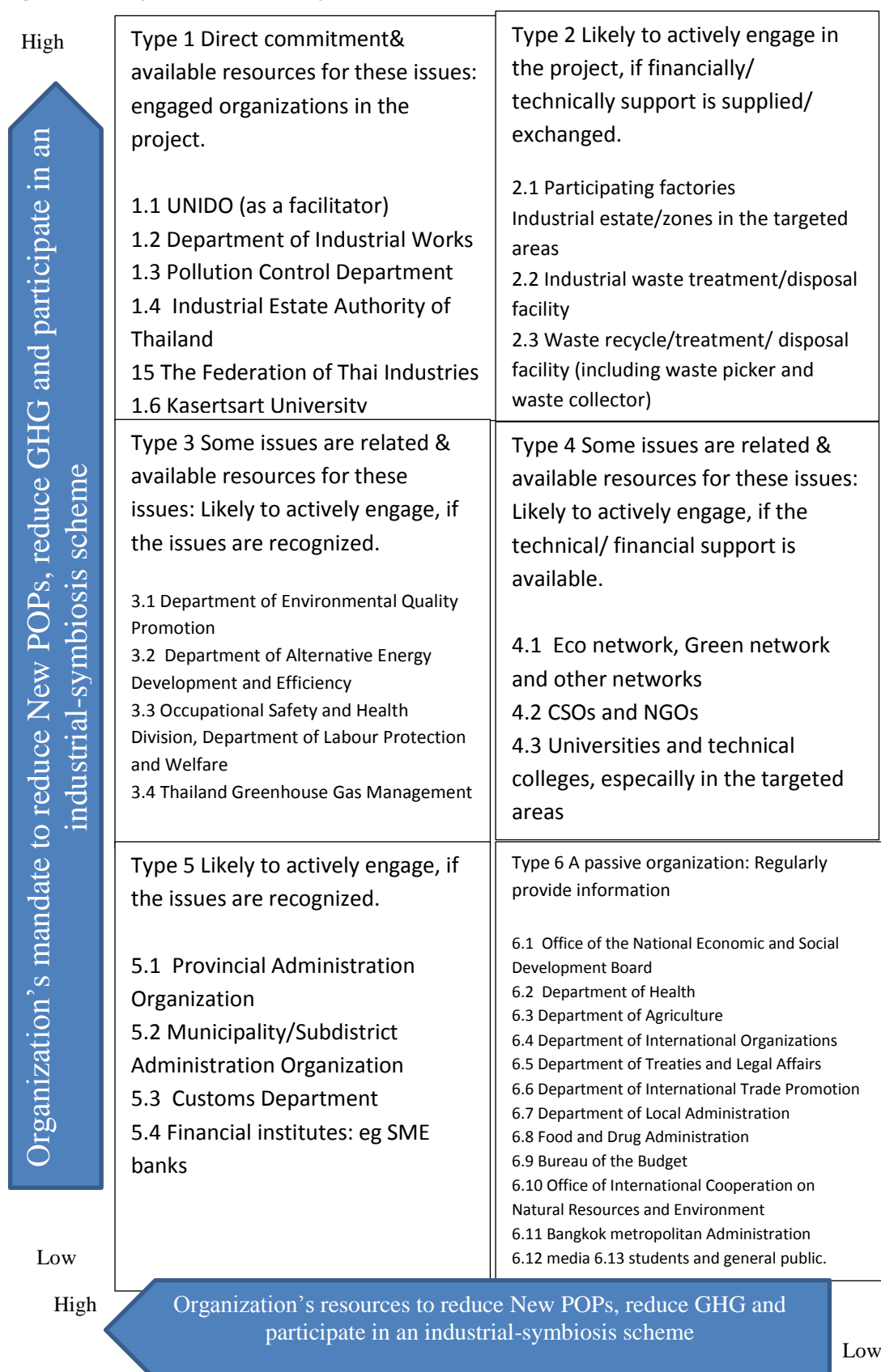
Women Network Reshaping Thailand (เครือข่ายผู้หญิงพลิกโฉมประเทศไทย: WREST) whose website slogan reads 'Reinvent the country's network'.^[13] The WREST advocates for the promotion of gender equality and the engagement of Thai women to participate in the government's decision making processes. It has now developed to Women for Democracy Coordinator: Dr Suthada Mekrungreangkul ; President: Dr Sutheera Vijitranon (GDRI)

The Association for the Promotion of the Status of Women (APSW) under the Royal Patronage of HRH Princess Soamsawali (สมเด็จพระรัตนมาลาฯ), established in 1974, is a non-profit, aiming to provide assistance to women and children who are victims of forced prostitution, rape, HIV/AIDS, unemployment, abandonment, physical and mental abuse. APSW provides many services, relating to women; for example, temporary shelters, physical and mental rehabilitation services for women and children. For the women and children stays in the shelter, those victims can enjoy opportunities for vocational skills trainings in their interests through the Women's Education and Training Center (<http://www.apsw-thailand.org/About%20APSW2.htm>). APSW has founded Gender Development and Research Institute (GDRI) in 1990, with the initial fund from UNWomen. As part of APSW, GDRI emphasizes on action research in policies affecting women and women's participation in decision making process which will lead to gender equality (<http://www.gdrif.org/history>).

In addition, The Foundation for Women (FWW) (มูลนิธิผู้หญิง) was founded in 1984 as Women's Information Center giving advice to Thai women traveling overseas. In 1986 the FFW opened a women's shelter for victims of domestic violence. The FFW focuses on providing services such for Thai women such as shelters and education of human rights aiming at protecting and promoting the rights of individual women and girls. A key concern of FWW is on the domestic violence, women's rights in justice, and women's labour rights in informal sector. The scope of the foundation does not fall to the focus of the study.

(North), Songkla (South), Mukdahan (Northeast), and Bangkok, to coordinate legal aid with lawyers and consultations with social welfare officials. FOW also provides education and training for women.

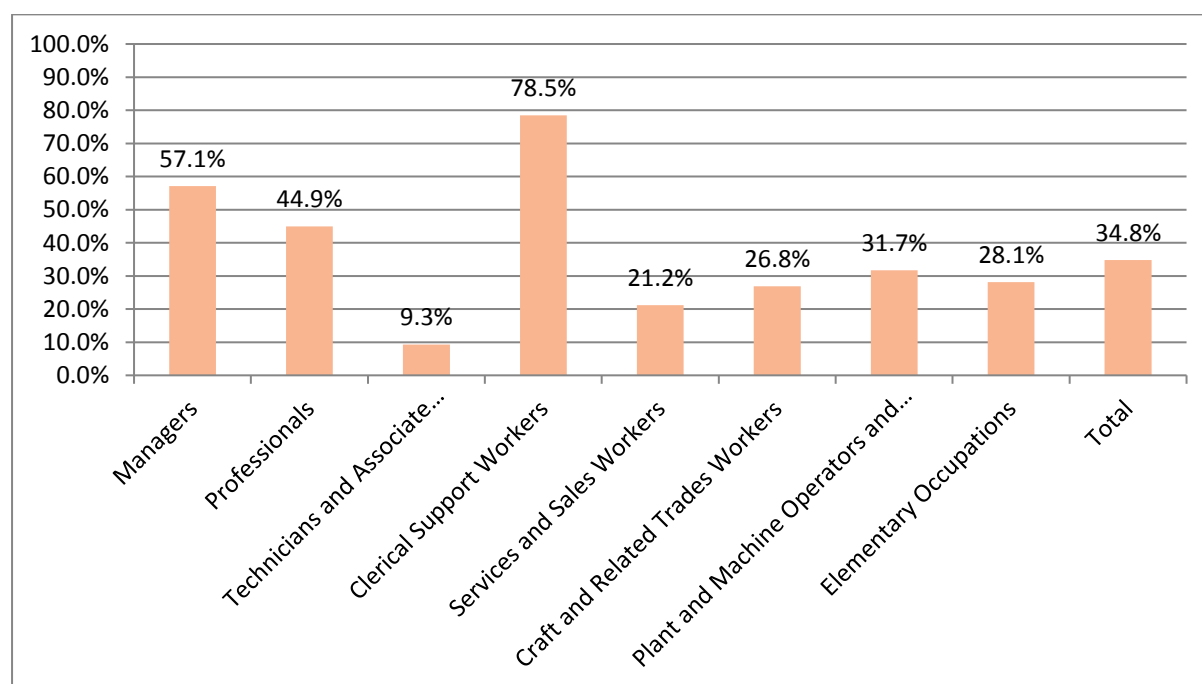
Figure 5 The adapted stakeholder analysis



2.2 Baseline information: Employment in the targeted provinces and potentials industries

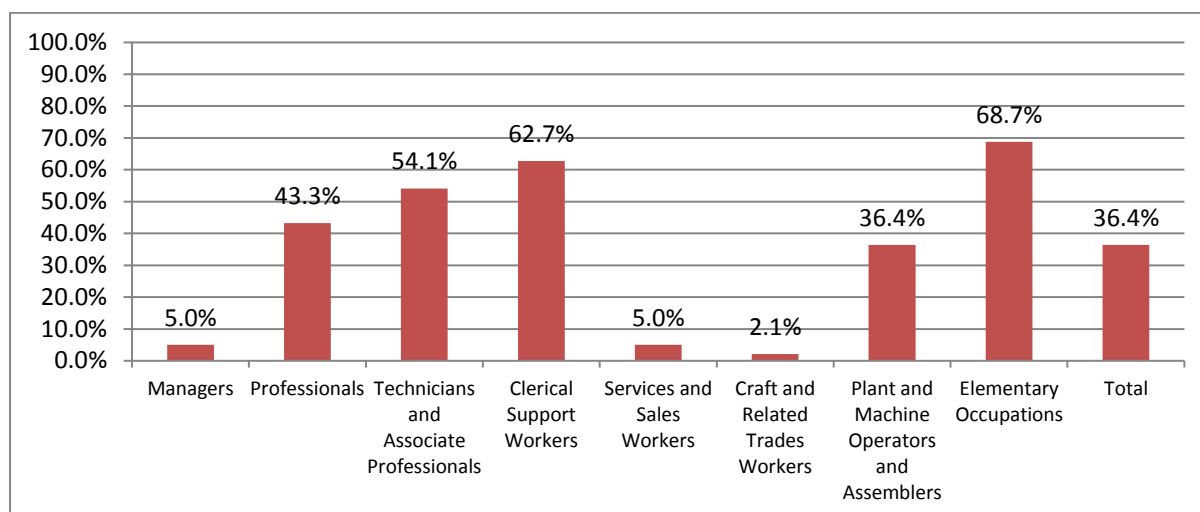
- The labour force statistics (LFS) of Q3 2017 was used to generate the employment structure in the potential industries of each province as shown in Figure 6 to 8. The International Standard Industrial Classification of All Economic Activities (ISIC) revision 4, the international reference classification of productive activities, was used to assess the detailed employment of the targeted industry at the most detail availability.
- In this study, the potential industries are identified by province. The potential industries by provinces are listed in the Table 1.
- The allocation of female employment in all three provinces confirms the fact that the potential industries are likely to have a higher number of men than that of women. Women working in the potential industries in three provinces only ranged from 12.8 – 36.4 per cent. A higher share of female workers is commonly found in clerical support workers, while the female share in other occupations demonstrates a variation base on industry.
- Among the potential industries, majority of decision-level workers in Chonburi and Rayong province are males. The female share demonstrates only around 5 per cent of managers. On the other hand, the female manager in Samuthprakarn province is relatively high, at 57.1 per cent. Despite a relatively high share of females in the higher positions in Samuthprakarn, the female share to the total employment remains a challenge.
- As the female share of the total employment in Rayong is very low, project activities in Rayong province should boost female roles at all levels. On the other hand, project activities in Chonburi should promote female managers to take part in the project as well as promoting awareness among female in elementary occupations. In Samuthprakarn, women working in “technical and associate professionals” should be particularly encouraged to join the project’s activities.

Figure 6 Percentage of female and male employment in the potential sectors in Samut Prakarn



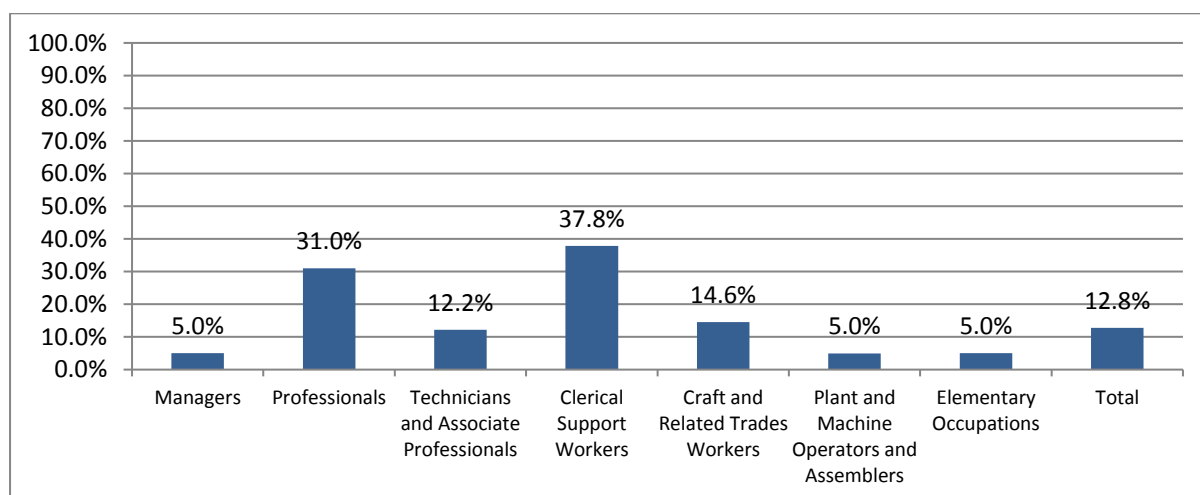
Source: LFS (Q3), 2017, estimated by the author

Figure 7 Percentage of female and male employment in the potential sectors in Chonburi



Source: LFS (Q3), 2017, estimated by the author

Figure 8 Percentage of female and male employment in the potential sectors in Rayong



Source: LFS (Q3), 2017, estimated by the author

2.3 Government

All government official underlined the importance of capacity building about new POPs. The capacity building includes officials of all relevant departments, including those from provincial offices. She also stressed the needs of a compulsory monitoring scheme for all manufacturing sectors. In addition, it is observable that projects/ events about new POPs are mostly conducted under an ad hoc basis.

The industry-urban symbiosis is relatively new to all government officials, except the Department of the Industry Work, which responsible to the eco town development. A series of consultations to mutually improve understandings among stakeholders, visualize the possible scenarios for industry-urban symbiosis through international case studies and a feasibility study in each target area are crucial key of success for the project.

2.4 Other stakeholders

There is a lack of accessible records of new POPs measurement, especially regular records in many of industrial areas, leading to a dearth of empirical evidence. Thus, it is difficult for advocates to address a strong concern about new POPs in Thailand. There is a need to build a systematic database about new POPs, which is accessible to public. EARTH, the NGO, further highlighted the importance of an easily accessible and free database on new POPs for a monitoring purpose, and suggested to organize a pilot project to monitor workers' health, and recommended to promote understandings about new POPs through both formal and informal education.

Friends for Women, an NGO working for women in both formal and informal sector, underscored on the view of workers. It is problematic for male and female workers to prove if their health problem is a result of poor waste management of the factory, as POPs/ new POPs are slowing accumulated in human bodies. As a result, there is no intention to employers to disseminate this information in the factory, unless it is mandatory by laws.

3. Concerns of genders and social aspects

*** Prevailing awareness on gender among government authorities and NGOs, yet no target on women**

Gender awareness is raised among government authorities²⁰. Under the Cabinet resolution, every ministry has an assigned Chief Gender Equality Officer, and gender focal point. However, there is unclear indicator/ plan to achieve gender equality, resulting in a poor monitoring system on gender aspects. Also, there is no available data segregated by the number of men and women. While the NGOs underlined that there are on-going gender activities, activities on gender are more likely to active in a light industry, as it employs a greater share of women.

²⁰ Cabinet's resolution dated 31 July 2001 announced that every Ministry and Department has to appoint one Vice Permanent Secretariat and above, or one Vice Director General and above to be a Chief Gender Equality Officer-CGEO.

*** Limited empirical evidences and knowledge on new POPs in Thailand leading to limited evidence and create barriers in developing policies**

Thai government has committed to promote sound management of chemicals and waste. There is, however, little empirical evidences of new POPs, because of a non-mandatory regulation to monitor new POPs. There is a need to develop database and inventory report with the regular updated basis. The limited knowledge also includes the knowledge and impacts on health of men and women.

*** Lack of understanding and low awareness of new POPs in the manufacturing sector due to the lack of database & lack of information in Thai in different impacts on men and women**

The occupational health issue does not address new POPs in the workplace. Among the business operators and workers, concerns about dust, noise and odour pollution become priorities. The impact of chemical waste at work becomes the second priority and is monitored at the minimum required by law.

As mentioned before, most concerned substance among POP lists in Thailand is dioxin. Even Thailand has put efforts to disseminate understanding about Dioxin and established the National Institute of Dioxin for many years, most industrial associations and ecological networks do not know about Dioxin, POPs, as well as new POPs. Some have heard about POPs/ new POPs, but they could explain only partial impacts on men and women. Therefore, the understanding about new POPs and its impact on health of women and men must be promoted.

Only few NGOs are actively raising concerns on New POPs; for example, the EARTH. In order to promote the understanding of new POPs, EARTH suggested monitoring health/ or environment of workers and/or residents around the factory for policy advocacy.

In addition, it could be observed that communities and ecological volunteers are more likely to have a limited English ability. Good and quality translated documents regarding GHG, new POPs, and urban-industry symbiosis as well as their impacts on men and women are crucial for capacity building and knowledge dissemination. It can be observed that active ecological volunteers are mostly aged 50 and over. Thereby, the dissemination activities should be promoted among a younger generation to ensure a sustainable knowledge management. The knowledge about GHG, new POPs, and urban-industry symbiosis should also be included in schools, to ensure the awareness about new POPs for general public in a sustainability manner.

The project should also give priority to men and women working the recycle facilities as they are more likely to low-educated and lack of knowledge about waste management, as well as possible impacts on their health.

- **Lack of understanding of the urban- industry symbiosis. The private sector and the CSO/NGO/ Eco town/ communities should be encouraged to visualize possibility of the urban- industry symbiosis**

There is a lack of understanding about the urban- industry symbiosis. The interviewees mostly respond only the factory –to-community activities, in terms of employment creation. Despite the fact that there are various channels of the urban- industry symbiosis. A better understanding should be encouraged among stakeholders through consultations. The consultation should include experts to study possible business models/ urban- industry symbiosis that fit the specific needs and economic/social environment in the area.

- **The on-going developed indicators of Ecotown/ Eco-related indicators have not yet included the gender issues/ gender segregated data.**

The on-going developed indicators on Ecotown/ Eco-related indicators well capture multiple dimensions. For example, the on-going developed indicators of Eco town are grouped of 5 dimensions: physical, economic, environment, social, and management. However, the gender issues have not yet addressed in these sets of the indicators. For example, one indicator regarding promotion of local economy currently measures the employment of local at a certain percentage. A share of female employment can be added into this indicator. The project is encouraged to review all indicators and develop a set of gender indicators as parts of monitoring and evaluation.

- **Gender Analysis Matrix (GAM)**

The GAM is conducted to analyse impacts of an intervention. The GAM features two main concepts: four levels of society and four kinds of impact (March et al., 1999: 69) ²¹. The four levels of analysis include women, men, household and community. Those four categories are analysed the impact on four aspects, which are labour, time, resources, and socio-cultural (Table 2).

Table 2 Gender Analysis Matrix

	Labor	Time	Resources	Culture
Women (Direct beneficiary)	+ Acquire new/ advance skills in BAT/BEP (particularly with those directly impacted.)	+ In the long term, reduce the possibility of sickness, particularly the women that expose to new POPs.	+ Reduce GHG emissions, and new POPs in the environment ? Access to income generation and social activities (In case of the employment is increasing.) + Training, and maintenance take more time.	+ Awareness on GHG emissions, new POPs, industry-urban symbiosis increase and change the environmental and gender concerns. + Change working attitude toward environmental friendly. + Create a friendly industry-community environment, promoting a sustainable development.
Men (Direct beneficiary)	+ Acquire new/ advance skills in BAT/BEP (particular with those directly impacted.)	+ In the long term, reduce the possibility of sickness, particularly the men that expose to new POPs.	+ Reduce GHG emissions, and new POPs in the environment + Better health (reduce the negative impact caused by GHG emission, and new POPs.) + Training, and maintenance take more time.	+ Awareness on GHG emissions, new POPs, industry-urban symbiosis increase and change the environmental concerns with a gender concern. + Change working attitude toward environmental friendly. + Create a friendly industry-community environment, promoting a sustainable development.
Household	+ Skills improved	+ In the long term, reduce the possibility of sickness of household members.	+ Better health (reduce the negative impact caused by GHG emissions and new POPs.) ? Possibility to increase income	+ Raise the concern on GHG emissions and new POPs with a gender concern. + Promote attitude toward environmental friendly.

²¹ Candida March, Ines Smyth, and Maitrayee Mukhopadhyay (1999) A guide to Gender-Analysis Frameworks. Oxfam publication

	<i>Labor</i>	<i>Time</i>	<i>Resources</i>	<i>Culture</i>
<i>Community</i>	<i>+ Increase in employment</i>	<i>+ In the long term, reduce the possibility of sickness of community members.</i>	<i>+ Better health (reduce the negative impact caused by GHG emissions and new POPs.)</i> <i>? Possibility to increase for the community activities</i>	<i>+ Reduce the negative impact due to possible symptoms caused by GHG emissions and new POPs.</i> <i>+ Create a friendly industry-community environment, promoting a sustainable development with a gender concern.</i>

Note: + positive impact; - negative impact, ? either positive or negative?

Source: Author

4. Recommendations to mainstream gender in the project

As a result of the study, a set of recommendations that identify opportunities and entry points to mainstream gender into the project is developed. The project consists of five components, as shown in Table 3.

Table 3 Preliminary recommendations on gender mainstreaming by components of the project

Project component	Expected output	Recommendations	Time line	Risk/ concerns
Component 1: Policy development	Output 1.1 Necessary legislative and policy measures on industry-urban symbiosis principles, management of new POPs and market-based instruments enhanced.	- Gender issues, especially gender related health issues, are considered in the development of national issues in at least 50 per cent of working group meetings/ discussions. - A set of gender-related indicators is developed. The data of the gender-related indicators are collected and tracked to support the development of national standards, potential regulatory instruments, and mechanisms.	Year 1, 2, 3, 4, 5	A set of gender-related indicators has to be systematically developed with consultations and discussions with relevant stakeholders to ensure the functional application in working group meetings/ discussions.
Component 2: National capacity building and	Output 1.2 Inventory of new POPs and intervention plan	- A set of gender-related indicators is developed. The data of the gender-related	Year 1, 2,	The information about gender-related issues to

awareness raising on industry-urban symbiosis and POPs	developed for the three selected provinces	<p>indicators are collected and tracked to raise awareness among stakeholders.</p> <ul style="list-style-type: none"> - Gender issues, especially information/ indicators about health issues and impact on men and women, are included in training materials and all awareness raising activities; - Training sessions on GHG, new POPs, and industry-urban symbiosis include a set of gender indicators and being updated annually. - Develop a module on new POPs to be included in the examination for the hazardous substances, authorized by the Hazardous Substances Control Bureau, Department of Industrial Works, 	3, 4, 5	<p>be addressed in the technical information must comply with the work culture of the industry.</p> <p>The information about gender-related issues to be addressed to various groups must reflect their specific concerns/ needs.</p>
	Output 1.3 Opportunities for industry-urban symbiosis elaborated through material and waste stream analysis	<p>- Gender issues and gender awareness are included in discussions of all stakeholder meetings, organized to develop opportunities for industry-urban symbiosis.</p> <p>-- Business models developed to reflect specific needs of each area with gender issues, and vulnerable groups of people, e.g older men and women in the area.</p>	Year 1, 2, 3, 4, 5	The information about gender-related issues to be addressed in the technical information. It must comply with the work culture, and communities' nature of each area, taking gender issues and sustainability into account.
	Output 1.4 Increased capacity and awareness on risks	One set of awareness raising materials, one set of intensive training, one set of training	Year 1,2,3 ,4,5	Identify key persons and encourage their

	of new POPs and the benefits of (i) resource efficient and cleaner production industry-urban, (ii) green chemistry, (iii) industry-urban symbiosis;	for trainers are developed. These materials should include a short video clip and being uploaded for public dissemination. The impact of new POPs, and benefits of resource efficient and cleaner production industry-urban, green chemistry, industry-urban symbiosis are highlighted. The different impact on men and women must be included in the materials. Material types and training platforms (classroom-based / on-line platform/ lab-training, and etc.) must be developed in various forms, ensuring an effective learning set. The detailed description about gender issues are described in Table 4 to provide awareness raising, capacity training, and training for trainers. The suggested gender shares, risks and identification of vulnerable people are also included in Table 4, ensuring gender mainstreaming and all inclusive growth.		continuous participation, ensuring the gender participation in the project.
		A set of training programs and adapt academic curricula on the challenges faced in implementing RECP, low carbon technologies, green chemistry, BAT/BEP of new POPs and industry-urban symbiosis in Thailand is developed with a gender & social component included. The set of training programs and adapt academic curricula must compose of pretest &	Year 4,5	The training programs, covering different levels of training, must be designed with the consideration of targets' group characteristics, area context,

		posttest with questions regarding gender.		and social & gender issues.
Component 3: Pilot demonstration of cleaner production, new POPs management and industry-urban symbiosis	Output 1.5 Industry-urban symbiosis implemented through the demonstration of low carbon and green chemistry systems in selected enterprises, industrial zones and neighboring urban settlements	<p>Gender issues, especially gender related health issues, are addressed in the process of identification, implementation and demonstration BAT/BEP.</p> <p>- A set of materials about pilot demonstrations must be developed, addressing gender issues. The gender issues may include impacts of GHG emissions, and POPs on men and women, and benefits of green chemistry, and urban-industry symbiosis on men and women.</p> <p>- The waste collectors and the unregistered waste facilities are identified as vulnerable groups, as they are relatively low educated and low awareness about hazardous waste and risks. Waste collector and waste segregators are majorly women, while waste carriers are mostly men. Children are sometimes found in the waste facilities with their parents, especially in the unregistered waste facilities. Therefore, the different risk must be identified for each group of men, women, and children. A set of materials must be developed in particular for this group.</p>	Year 1, 2,3, 4,5	The gender-related issues to be addressed in the process must comply with the work culture of each establishment.

	<i>Output 1.5 Industry-urban symbiosis implemented through the demonstration of low carbon and green chemistry systems in selected enterprises, industrial zones and neighboring urban settlements</i>	Produce one booklet/ leaflet of best practices in Thai for dissemination among relevant firms, government officials, and educational institutions. At least 1,000 printed copies should be produced. The disseminating approach should also include an online platform. The booklet/ leaflet must, at least, contain information, different impacts on men and women.	Year 4, 5	Quality of translation and quality content for dissemination materials that fit the target group's interest.
		- Disseminate case studies about GHG emissions/POPs reduction/industrial symbiosis, through universities, vocational schools, and higher education by providing opportunities for factory visits at least 3 times. The visits can be seen as a chance for developing/ pilot testing materials to various targeted groups. The visits may link to existing Eco schools network to build capacity of the teachers and the youth, especially the young women.	year 4, 5	A strong network among schools& vocational schools & universities& ecological networks should be established for a sustainable knowledge management.
		The publication about the results of the pilot activities for a nation-wide replication strategy as well as for other developing countries must contain gender-related issues, and different impacts on men, women, and children.	year 4, 5	The publication has to be easy to read and target to various groups of people with different educational background.
Component 4: Development of National Eco-Industrial	<i>Output 1.6 Continuous improvement and</i>	-A set of gender-related indicators is developed and	year 1,2,3 , 4, 5	The database must be regularly

Town Framework and its supporting system	<i>sustaining the industry-urban symbiosis</i>	<p>included in the national Eco-Industrial Town Framework.</p> <p>The sex disaggregated data must be made available, if possible. The gender-related indicators must be included in the monitoring and evaluation process. The database must be maintained and updated regularly, to support the potentials to increasingly mainstream women in the development process.</p>		updated and accessible by various groups of people.
Component 5: Monitoring and Evaluation	<i>Output 2.1 Periodic monitoring and evaluation of project implementation completed</i>	- A set of gender indicators will be utilized at the output level when project document is uploaded in SAP PPM system. Gender responsive indicators, targets and baselines will be incorporated into the results framework.	Year 1	<p>Gender issues have to be included throughout the activities.</p> <p>Monitoring of gender indicators to be made an integral part of project management.</p>
		- A set of sex disaggregated data and qualitative information will be collected and analyzed to monitor the gender situation for the M&E.	Year 1, 2, 3, 4, 5	
		- Gender balanced recruitment of project personnel and gender balanced representation in project committees will be taken consideration during the project implementation and the project managers and assistants.	Year 1, 2, 3, 4, 5	
		- The gender issue will be one of the criteria of the mid-term review and the terminal evaluation in UNIDO.	Year 3, 5	

Source: Author

The suggested activities for outcome 1.4 are described in Table 4. The table segregates groups of people by type of awareness raising and capacity training courses. The suggested gender shares, risks and identification of vulnerable people are also included, ensuring gender mainstreaming and all inclusive growth.

Table 4 Recommendations on gender mainstreaming by components of the project in the second component

	Stakeholder and f	Awareness raising	User training	Intensive training & Expert training	Training for trainer
Brief objective		Understand the importance of new New POPs, RECP, green industry, and industry urban symbiosis. It could be 1-3 hour training through online or conventional training.	Understand about three issues& their potential impacts. It could be 1 -3 day training through online or conventional training, at least 2 times. Eg how to handle the new POPs.	Understand how their organization related to these three issues& their potential impacts& and technical issues. It could be 3 days – 10 months training through online or conventional training, at least 2 times.	It could be 3-10 days training with the combination of online and conventional training, at least 2 times. The participants must pass the expert training.
Timeline		Year 1, 2, 3 4, 5.	Year 1, 2, 3 and 4	Year 1, 2,3 and 4.	Year 3 and 4.
Risk		-The information about gender-related issues to be addressed to various groups must reflect their specific concerns/ needs.	-The information about gender-related issues to be addressed to various groups must reflect their specific concerns/ needs. -Time arrangement of the targeted groups.	-The information about gender-related issues to be addressed to various groups must reflect their specific concerns/ needs. - The content of the training must be varied upon the targeted group. -Time arrangement of the targeted groups.	-The information about gender-related issues to be addressed to various groups must reflect their specific concerns/ needs. -Identify key teachers/ lecturers who are familiar with this area and are likely to disseminate/ research these issues. -Time arrangement of the targeted groups. - They must pass the expert training exam.
Proposed gender responsive Indicators for the project		- A set of gender-related indicators is developed in the materials. The data of the gender-related indicators/information are included to raise awareness among all stakeholders. - The awareness raising materials should be produced in multiple types, including a short video clip. The video clip must be uploaded for public dissemination and	- One set of materials is developed. The materials should be produced in multiple types. The impact of New POPs-new New POPs, GHG emission, and industry-urban symbiosis on men and women must be highlighted. - At least the specified number of the targeted people participating in the training/workshop with the suggested female share. - At least 50 per cent of the participants	- One set of technical guidelines is developed. The materials should be produced in multiple types The impact of New POPs-new New POPs, GHG emission, and industry-urban symbiosis on men and women must be highlighted - At least 80 per cent of the participants must fully understand the content of the training, and the impact on men and women. They must be equipped by	- One set of technical & training guidelines is developed. The materials should be produced in multiple types. The impact of New POPs-new New POPs, GHG emission, and industry-urban symbiosis on men and women must be highlighted. - At least the specified number of the targeted people participating in the training/workshop with the minimum female share.

	Stakeholder and f	Awareness raising	User training	Intensive training & Expert training	Training for trainer
		online learning platforms. - The impact of New POPs-new New POPs, GHG emission, and industry-urban symbiosis on men and women must be highlighted. - In addition, special attention should be paid to the youth and the children for sustainable outcome.	must fully understand the content of the training, and the impact on men and women. They must be equipped by disseminating materials to facilitate the dissemination in their establishments.	disseminating materials to facilitate the dissemination in their establishments.	- At least 80 per cent of the participants must fully understand the content of the training, and the impact on men and women. They must be equipped by disseminating materials to facilitate the dissemination to interested parties, networks, and academia.
1. Business partners and private sectors	Group of people				
	Risk	Time arrangement of the factory workers.	-Time arrangement of the targeted groups. -Possible linkages to the implementation in their operation.	-Time arrangement of the targeted groups. -Possible linkages to the implementation in their operation.	-Time arrangement of the targeted groups. -Possible channels to continue disseminate the knowledge.
1.1 Business partners		- Factory workers with primary focus on labour union, of any.	-Managers/ decision making personals -Purchasing /supply chain/ CSR personals.	- Engineers - Technicians / Hazardous personals/ OSH personals.	- Engineers -Technicians -Hazardous personnel/ OSH personals.
	(1)Chonburi, key industry	At least 100 people, with a female share greater than 30%	At least 200 people, with a female share greater than 50%.	At least 50 people, with a female share greater than 10%	At least 10 people, with a female share greater than 20%
	(2) Rayong	At least 60 people, with a female share greater than 10%.	At least 120 people, with a female share greater than 40%.	At least 30 people, with a female share greater than 10%	At least 5 people, with a female share greater than 10%
	(3) Samuth prakarn	At least 140 people, with a female share greater than 30%.	At least 280 people, with a female share greater than 30%.	At least 70 people, with a female share greater than 20%	At least 20 people, with a female share greater than 20%
1.2 Private sector		-Managers/ committee members of the provincial FTI.	- Managers/ committee members of the provincial FTI and/or industrial associations in the targeted provinces. - Officers of the provincial FTI and/or industrial associations.		
	In three target provinces(Chonburi, Rayong, Samuth prakarn)		- Managers/ committee members: At least 30 people, with a female share greater than 40%. - Officers of the provincial FTI and/or industrial associations. At least 10 people, with a female share greater than 50%.		

	Stakeholder and f	Awareness raising	User training	Intensive training & Expert training	Training for trainer
	In all areas (to cover supply chain linkages)	At least 2500 people, with a female share greater than 30%.	At least 1400 people, with a female share greater than 30%.		
2. 1 Government partners			Indirect responsible officials	Direct responsible officials	Direct responsible officials
	In the head quarter & relevant sections		At least 100 people, with a female share greater than 50%.	At least 80 people, with a female share greater than 50%.	At least 40 people, with a female share greater than 50%.
	In all areas, with the focus of three target provinces		At least 200 people, with a female share greater than 30%.	At least 180 people, with a female share greater than 30%.	At least 90 people, with a female share greater than 30%.
2 Government org with environmental-oriented advocated			Indirect responsible officials	Direct responsible officials	
	In the head quarter		At least 20 people, with a female share greater than 50%.	At least 10 people, with a female share greater than 50%.	
	In all areas, with the focus of three target provinces		At least 50 people, with a female share greater than 30%.	At least 25 people, with a female share greater than 50%.	
2. 3 Government org with environmental-oriented concerns under STOCKHOLME convention		Indirect responsible officials	Direct responsible officials		
	In the head quarter	At least 72 people, with a female share greater than 50% with the focus to disseminate	At least 40 people, with a female share greater than 50% with the focus to disseminate the information.		
3. Local government		- Decision making personals and officials who are responsible for environmental & waste oriented.			
	In three target provinces	At least 6 people, with a female share greater than 30%.	At least 15 people, with a female share greater than 30%.		
4. Industrial		Manager/ decision making level	Employees related to environment&		

	Stakeholder and f	Awareness raising	User training	Intensive training & Expert training	Training for trainer
estates/parks (Public and private)			hazardous/ health/ CSR		
	In three target provinces	At least 2 people, with a female share greater than 30%.	At least 400 people, with a female share greater than 30%.		
5.Eco network, community people		<ul style="list-style-type: none"> - A public-private committee should be formed for consultations meetings of industry-urban symbiosis. - Community people with a strong interest to advocate in the environmental area - A public-private committee should be formed for consultations meetings of industry-urban symbiosis. 			
Risk		<ul style="list-style-type: none"> - In each area, there are different issues, and different parties. To ensure the comprehensive commitment, a clear criteria should be formed to avoid possible conflicts of interest in each area. - A system should be developed to engage both male and female middle-age community leaders in the project. 			
	1.Eco network in three provinces &.Eco committee & Environmental Protection Volunteers	At least 45 people, with a female share greater than 30%.	At least 45 people, with a female share greater than 30%.		
	2.Environmental network (including CSOs & NGOs)	At least 45 people, with a female share greater than 30%. The youth should be focused as one of an input for sustainable development.	At least 45 people, with a female share greater than 30%.		
6. Media		Media includes social media, and other channels of media.			
Risk		Must keep them informed about the impact of the GHG, new POPs, and industry symbiosis. The content of the meeting must be			
	In the head quarter & the local media in the province	The news/ information provided to media has to include the impact on both women and women's health. It should also address importance of industry-urban symbiosis and opportunities for the youth & communities' benefits.			
7. Academia & schools		It can be divided into 2 groups. The university and researchers with are accessible to tools and measurement. This group should be engaged to make to lab tests and advance knowledge on GHG emissions, new POPs, and industry-urban symbiosis.			
Risk		The training provides to universities to include the impact on both women and women's health. It should also address importance of industry-urban symbiosis and opportunities for the youth & communities' benefits			
	University & researchers	At least 10 people, with a female share greater than 30%. It may include staff of	At least 30 people, with a female share greater than 30%. It may include staff of	At least 30 people, with a female share greater than 30%. It may include staff of	At least 10 people, with a female share greater than 30%.

	Stakeholder and f	Awareness raising	User training	Intensive training & Expert training	Training for trainer
		local universities and creating network for sustainability.	local universities and creating network for sustainability. The	local universities and creating network for sustainability.	
	Primary & secondary schools & vocational schools & training schools	At least 10 teachers/academia staff, with a female share greater than 30%. The content of the training must address importance of industry-urban symbiosis and opportunities for the youth & communities' benefits. The teachers/academia staff should be equipped with materials to be disseminated to students and general public.	At least 15 teachers/staff, with a female share greater than 30%. The content of the training must address importance of industry-urban symbiosis and opportunities for the youth & communities' benefits.		
Total		At least 2,500 FTI members and 500 participants	At least 3,000 participants	At least 500 participants	At least 200 participants

Note: * Refer to the adaptive stakeholder matrix.

Source: Author

Appendix 1

Table A1 Structural list of questions for interviews by stakeholders

The interview questions include, but not limited to, the following questions.

Key stakeholder	Key questions	Key objective
1. Industry		
1.1 Industry representatives	<ul style="list-style-type: none"> - Who are management board by gender segregation? Who holds positions of responsibility in organizations? - Who are directly responsible for decisions on important issues of the establishment? - Is there any gender issue emerged in the establishment/ industry? - What is the estimated number of employees (women and men) by work position and gender in the industry? 	<ul style="list-style-type: none"> - To investigate share between male and female in decision making level, professional level, and general level. - To validate the number of employment by gender with the estimates of the labour force survey.
1.Firm level		
2. Industrial associations/ level	<ul style="list-style-type: none"> - Do you know GHG emission, new POPs? -In your opinion, who are direct and indirect responsible organizations regarding GHG, new POPs, and urban-industry symbiosis? -In your opinion, how will this project impact on: <ul style="list-style-type: none"> (1) the industry (2) the industrial employees (3) Others (eg communities) - Do you think women/men will be impacted differently by the project implementation? 	<ul style="list-style-type: none"> - To identify stakeholders and expectation of the project by the owners/ management. - To assess possible different impacts on men and women as well as all stakeholders by the owner/ management.
	<ul style="list-style-type: none"> - Is there any linkage with a school/a training institute/ a university? (e.g. Internship) -How can a school/ a training institute/ a university learn from the project implementation? 	<ul style="list-style-type: none"> - To investigate possible changes due to technological changes caused by the project. - To seek an alternative approach to implement the project on the dissemination activities.
	<ul style="list-style-type: none"> - Is there any on-going/ potential rooms for the industry-industry symbiosis? 	<ul style="list-style-type: none"> - To explore possibility for the industry-industry symbiosis.

Key stakeholder	Key questions	Key objective
	<ul style="list-style-type: none"> - What are current activities currently conducted with communities? - Is there any on-going/ potential rooms for urban-industry symbiosis? - Are there any NGOs/CBOs/ communities raise any concern on your operation (general/ gender-related/ environmental issues)? - Is there any NGOs/CBOs working with you or if they raise any concern on your operation (general/ gender-related/ environmental issues)? 	<ul style="list-style-type: none"> - To double check issues with the CBOs, communities, and NGO's responses - To explore possibility for the urban-industry symbiosis.
2. Government officials Central government/ local government	<ul style="list-style-type: none"> - Do you know GHG, new POPs and urban-industry symbiosis? -In your opinion, who are direct and indirect responsible organizations regarding GHG, new POPs, and urban-industry symbiosis. -In your opinion, how the project will impact on: (1) employers (2) employees (3) Others (e.g. communities) 	<ul style="list-style-type: none"> - To identify stakeholders and expectation of the project by the government officials - To assess possible impacts on gender
	<ul style="list-style-type: none"> - What is the gender combination in your organization? 	<ul style="list-style-type: none"> - To examine the gender background of the organization.
	<ul style="list-style-type: none"> - What are projects/ activities about GHG, new POPs, and urban-industry symbiosis and/or gender? 	<ul style="list-style-type: none"> - To review the organization background.
	<ul style="list-style-type: none"> - Please suggest the method to promote gender equality in the targeted industries under the project design/ implementation. 	<ul style="list-style-type: none"> - To collect comments on the project design/ or implementation.
3. NGOs/ CBOs on environment/ gender/Econonetowrk/ academia	<ul style="list-style-type: none"> -What are current/ ongoing concerns on the value chain/women in the work place/environment? -What are challenges regarding campaigns on environment/ New POPs? (NGOs on environment) -What are challenges regarding campaigns on gender/ women in the workplace? (NGOs on gender) 	<ul style="list-style-type: none"> - Explore current concerns on environment/ gender and interactive issues among them.
	<ul style="list-style-type: none"> -In your opinion, who are direct and indirect responsible organizations regarding GHG, new POPs, and urban-industry symbiosis? -Who has the capacity to hinder efforts at gender equality in the project? 	<ul style="list-style-type: none"> -To identify stakeholders and to collect comments on the project design and/or implementation.

Key stakeholder	Key questions	Key objective
	- Do you think women/men will be impacted differently by this project? What are suggestions to the project design/ implementation?	

Source: Author

Table A2 List of interviews of organizational representatives

Thai environmental health association
The People's Network for Sustainable Development, Network of Eastern Friends
The Industrial Estate Authority of Thailand
Federation of Thai Industries
Department of Industrial Works, Ministry of Industry
Industrial Estate Authority of Thailand
Eco Industry town, Samuthprakarn
Head of Econetwork, Samuthparkan
Head of Econetwork, Chonburi
Samuthprakan municipal office/ Leam chabang municipal office
Head of econetwork in Chonburi, Rayong and Samuthprakarn
Thailand Greenhouse Gas Management Organization
Earth
Environmental/ gender researchers
Friends of Women
National Institute of Dioxin