Climate Change and Gender Inequality in Taiwan's Green Industry: Why is Female Competency Development Mattered?*

Hae Na KIM[1], Yun-Hsiang HSU[2]

[1] First Author Research Fellow, Institute for Law and Government, National Central University, Taiwan.
E-mail: haenak97@gmail.com

[2] Corresponding Author Associate Professor, Institute for Law and Government, National Central University, Taiwan.
E-mail: yhhsu@cc.ncu.edu.tw

Abstract

Purpose – In spite of the growing importance of Taiwanese green industry, most of employees who work in this industry in Taiwan are dominated by males. Only a few females are working in this industry and their wage is lower. This research is applying role congruity theory which explains why females share only a small portion in Taiwan's green industry. This study addresses a research question, "How has the gender inequality and discrimination been reflected in the occupation structure of Taiwan's green industry? How has this gender occupation structure influenced females in the green industry?"

Research design, data, and methodology – To find out the impact of gender role in the green industry, the dataset of the 2015 Taiwan Social Change Survey is used. Using STATA, t test has been implemented to address our research question with three hypotheses.

Result –All of hypothesis were all supported. It is found there is a statistical difference in stereotypical thinking between female who work in the green industry and the non-green industry of Taiwan. The limited female representation in the green industry of Taiwan influences job matching and job satisfaction significantly.

Conclusion – This study suggests the Taiwanese government should encourage STEM education for females and provide more relevant vocational education and training particularly for females' competency development in the green industry. By providing vocational education and training to meet the skill needs of greener economy resilient to climate change, Taiwan's green industry will grow further and will overcome gender inequality and discrimination.

Keywords: Climate Change, Competency Development, Green Industry, Female Employee, Human Resources, Taiwan

JEL Classification Code: M10, M31.

1. Introduction

Taiwan was once known as a destination for waste disposal. In the early 1990s, the island had a collection rate of 70%; by the mid-1990s, two thirds of landfill sites were almost full (Rossi, 2019). Today, however, Taiwan enjoys sophisticated waste disposal methods, because of the government's emphasis on the value of green economy and concern for implementing rigorous green policy to face climate change issues.

Taiwan's green industry has an important share in Taiwan's economy due to US President Joe Biden's concern for the environment and climate change issues. Biden has re-joined the Paris Agreement within the United Nations Framework Convention on Climate Change, the purpose of which is to address the issue of greenhouse gas emissions, and has communicated his concern for a more environmentally friendly approach (Oxford Analytica, 2020). These circumstances encourage the Taiwanese government to promote greener practices, as the country is heavily dependent on exports to the US. The policy and regulations in the US are critical for the Taiwanese economy, making Taiwan's green industry increasingly important.

In fact, the Taiwanese government has been proactive at implementing green policy, emphasizing green products and recycled items. To confront climate changes, Taiwan has kept its pace to follow the international standards and reduce carbon emissions after the Kyoto Protocol in 1997 (Wang, 2016). For example, Article 10-1 of the WDA, legislated in 1988, asked Taiwanese manufacturers to take financial responsibility for the environment.

In Taiwan's burgeoning green industry, an overwhelming proportion of industry employees are males. There is a need to examine the gender inequality in Taiwan's green industry, the growth of which has influenced labor demand and policies due to the new job skills required in the sector, which affects the labor market directly (Organization for Economic Co-operation and Development [OECD], 2012).

In general, Taiwanese women are not treated equally in the labor market, earning only 85% of men's wages for the same work. Many women also work for small companies with fewer than 30 employees (Yu, 2015), in which decent working conditions and equal treatment for women are neither enforced nor ensured. The evolving green industry in Taiwan is in the same situation as other industries in terms of how female employees are treated, and gender inequality is a noticeable and important issue.

Despite the significance of the green industry, only a few studies (Chien, et al., 2014; Chang, 2018) have discussed gender bias and the issue of developing the female workforce in the broader societal context of Taiwan in relation to the green industry. In particular, previous studies did not address stereotypical thinking between females in the green industry and did not examine job matching and job satisfaction caused by female representation in the green industry. In spite of the importance of the green industry in Taiwan, only the limited number of studies has focused on female representation. Recent studies like Yu et al. (2019) have addressed environmental citizenship and cost-benefit analysis in the context of Taiwan, while few have addressed the aspects of gender and female workforce issues. How to face gender inequality and how to develop female employees specifically in Taiwan's green industry are issues that have received limited academic attention. Furthermore, the failure of addressing gender gap and bias may lead to the permanent loss of competent female workforce in Taiwan's green industry and cause socioeconomic concerns in Taiwan. Therefore, it becomes crucial to explore how gender bias effects female employees in Taiwan's green industry. This study is aimed to explore by applying role congruity theory in the context of Taiwan's green industry.

This study aims to analyze how the development of green policy changes the gender structure in Taiwan's green industry. Using the 2015 Taiwan Social Change Survey, this paper intends to address our research question, "How has the gender inequality and discrimination been reflected in the occupation structure of Taiwan's green industry? How has this gender occupation structure influenced females in the green industry?"

2. Literature Review

2.1. Role Congruity Theory and Taiwan's Green Industry

Societal gender roles are critical in informing how we judge other individuals (Mukarram et al., 2018). Based on role congruity theory, stereotypes regarding gender provide people with certain images for specific career attributes and roles. According to this theory, a person fits a role well when the role's attributes are suitable for the given gender stereotype (Koch et al., 2015). These stereotypes can result in inequality and irrelevant appraisal of an individual's competency and qualifications due to improper generalization. Gender is a predominant source of stereotypical thinking. (Banaji & Hardin, 1996).

Role congruity theory explains why followers have some prejudice against females, especially when those females are in leadership positions (Eagly & Karau, 2002). Gender stereotypes and prejudice against females result in different standards for females, which represent a disregard for their competency and ability (Eddlestone et al. 2016). Females also face prejudicial evaluation of their competency in specific male-dominated industries and jobs. This perspective results in females being perceived as not legitimate in certain positions and industries, preventing them from receiving adequate respect in the workplace. When females are appraised in stereotypical roles generally assumed for males, many assessors will judge them according to their own attitudes about females rather than their actual performance (Hoyt & Burnette, 2013).

The role congruity theory helps to explain how work outcomes or behaviors and work results are understood with gender bias (Eagly & Karau, 2002). Because of the characteristics of gender roles, women's behaviors for certain careers are devalued. (Hüttges & Fay, 2015). The role congruity theory suggests a group should be positively appraised when its characteristics align with the typical social roles of groups (Eagly & Diekman, 2005). For example, medial doctors are traditionally males. Therefore, prejudice about female medical doctors may occur due to the characteristics related to female gender stereotypes.

Taiwan's green industry has been dominated by males, and gender equality endures in the era of green innovation. Due to this prejudice and inequality, certain skills are accessed more easily by male workers (OECD, 2012). As males have already obtained the necessary skills required in fields such as engineering, they can enter new job markets more easily and be promoted into better jobs with higher salaries than females. Appropriate skill training is important for the growing green job market. The Taiwanese green industry suffers from a skill and qualification mismatch, leading to more gender discrimination.

Role congruity theory explains that gender can contribute to this gender gap and bias. Role congruity theory explains that gender can contribute to this gender gap and bias (Wiedman, 2018). This role congruity theory explains why males have dominated Taiwan's green industry and why gender inequality endures in the era of green innovation. Due to various prejudice and inequality, males in the green industry are evaluated more positively than their female equivalents. Reflecting this theory to workplaces in the green industry of Taiwan, females are regarded as not qualified for certain jobs. General stereotypes can result in biased perceptions of an individual's skills, with incorrect evaluation reflecting a generalization rather than an individual's true qualities in Taiwan.

2.2. What is the Green Industry and Why is the Green Industry mattered in Taiwan?

The US Bureau of Labor Statistics (2021) has defined green jobs as those that offer goods and services that help the environment, protect natural resources, or otherwise establish environmentally friendly production processes (Bureau of Labor Statistics, 2010).

According to the United Nations Industrial Development Organization (United Nations Industrial Development Organization [UNIDO], 2011), green industry involves production and development that would not negatively impact the health of natural systems and would not be harmful to human health. This development could lead to creating new green careers and fields or working to make existing industries greener.

Despite these accepted definitions, green economic concepts can be challenging to summarize. In this paper, green industry is that which has the potential to curb carbon emissions, support a greener economy, and benefit our environment. These various industries can include agriculture, plastic products manufacturing, water supply, and wastewater treatment.

Influenced by internal and external changes, the Taiwanese green industry is in the process of preparing for a faster transition to green growth. The value of this industry is associated with newer technologies, which require the development of business and treatment facilities to handle recycled resources and products. The movement toward greener production practices mean more changes in skill requirements.

Many of Taiwan's companies are Original Equipment Manufacturing companies (OEMs) that focus on exporting their final products. These companies receive orders from other global manufacturing companies. They should meet international demands regarding concerns about environmental protection, meaning that Taiwanese companies must be willing to introduce more environmentally friendly processes. Therefore, green manufacturing in Taiwan is important for the needs and standards of international customers, in addition to exports (Wu et al., 2021).

More new jobs will be created, with an emphasis on green housing, renewable energy, and sanitation infrastructure in Taiwan*. Governmental policies and business investments aimed at reducing waste and protecting

the ecosystem will be implemented; however, female employees may be prevented or discouraged from joining green companies, due to gender discrimination and gender-segregated employment (Stevens, 2012).

Currently, the Taiwanese government is willing to follow international standards by promoting green industry. To work toward a zero-waste society, governmental supports and policies have been implemented for business opportunities in Taiwan. This has been beneficial for financial profits and social influence, in addition to environmental improvements (Chen, et al., 2009).

As many forms of waste and pollution (including toxicity and unstable chemical safety) can be caused by electronic companies in Taiwan, these companies' concern and care for greener production and innovation can also influence the global electronics industry. The world's largest foundry manufacturer, the Hsinchu-based Taiwan Semiconductor Manufacturing Company (TSMC), has reused and recycled precious materials from their wastes as a green practice in alignment with their Environmental, Social, and Corporate Governance (ESG) management. TSMC emphasizes on-site recycling after production and reusing its resources to prevent usable materials from becoming waste (TSMC, 2019). These practices could also improve resource efficiency and generate more green jobs in Taiwan while enhancing TSMC's image and strengthening its ESG profile.

Even though new jobs will be created, with an emphasis on green housing, renewable energy, and sanitation infrastructure, female employees may be prevented or discouraged from joining green companies, due to gender discrimination and gender-segregated employment in Taiwan.

We can observe there is a need to work to create low-carbon economies in Taiwan. More effective green training necessitates environmentally friendly training facilities, resources, and equipment. In the transition toward green industries, skill development is critical (International Labor Organization [ILO], 2016). It is expected that more jobs will be created in renewable and environmental energy, mass transportation, wastewater management, environmental conservation, and energy. The steel, paper, and aluminum industries also have the potential to contribute to changing previous economic strategies into green economies (Majumdar, 2016). By promoting renewable resources and curbing damage to our environment, green industries will enhance economic and social performance (UNIDO, 2011). However, even though more new jobs will be created, emphasizing green housing, renewable energy, and sanitation infrastructure, female employees may be discouraged from joining green companies due to gender discrimination and gender-segregated employment.

2.3. Gender Stereotypical Thinking in Taiwan's Green Industry

Taiwan's culture is heavily influenced by Confucian ethics, in which somewhat different roles for men and women are presented (Ramusack & Sievers, 1999). For instance, women are more responsible for taking care of the household and family members and are expected to be feminine and compliant. In contrast, males are expected to be active and masculine. Taiwan's green industry has fewer females, with many jobs being largely male dominated. Science, Technology, Engineering, and Mathematics (STEM) skills have been preferred for men, and the gender bias and segregation regarding STEM majors begin in high school. Consequently, the proportion of females pursuing STEM careers is relatively low. Therefore, it is necessary to rework Taiwan's education and training systems to retain and improve the country's competitive position in the global greener economy (Baumgarten and Kunz, 2016).

Females are less likely to choose STEM majors due to stereotyped perceptions of the field (Schuster & Martiny, 2017). Stereotypical appraisal about gender may predetermine females' abilities in the male-dominated green industry. If females accept the stereotypical classifications of jobs and majors in STEM as suitable for males, they are likely to apply these stereotypes to the evaluation of their own abilities regarding STEM majors.

Stereotypical classifications of jobs and majors impact females and prevent them from fulfilling their potential. Furthermore, stereotypes can decrease females' competency and influence their future career choices. Women's career decisions and continued participation are influenced by social expectations regarding gender, which curbs women's participation in the Taiwanese green industry.

Jobs in the Taiwan green industry, which require various technological and engineering skills, seem more attractive to males than females. The Taiwanese green industry is seen as "manly," predominantly suitable for males, resulting in a significantly imbalanced gender ratio in the industry (Schuster & Martiny, 2017). This imbalance is further influenced by the general discrimination women face in most facets of work in Taiwan, including applying for a promotion or pay increase.

Since its beginnings, Taiwan's green industry has been a male-dominated field, starting with the initial unofficial recruitment process, with many male employees being hired due to word-of-mouth. The pervasive gender inequality in the Taiwanese green industry makes it imperative to provide women with relevant special skill training and recruit them for new green jobs (Stevens, 2012).

According to Bobbitt-Zeher (2011), gender inequality significantly influences gender discrimination in the workplace. Organizational factors and gender stereotyping clearly lead to more discrimination. As the green industry already employs predominantly males in Taiwan, males are seen as more fitting. When employers in Taiwan's green industry select new employees, they are more likely to hire males than females. This action demonstrates the insidious nature of gender inequality in the industry.

Han (2021) stresses the importance of instilling egalitarian gender beliefs from an early age, as encouraging more egalitarian attitudes toward gender can decrease gender segregation in high school and career decision-making. To face the changes occurring with the developing green economy, it is important to maintain highly qualified human resources regardless of gender. In Taiwan's green industry, females may not be treated equally because of stereotypical thinking (Hoffman et al., 1998).

In general, in Taiwan, females are highly educated and have actively participated in business. However, the proportion of females in the green industry is still low and is different from other industries in Taiwan. Because of stereotypical thinking, females in the green industry face more challenges than non-green industries in Taiwan. Because non-green industries have already had many females and may not face serious stereotypical thinking. But Taiwan's green industry is quite new and has a few women which results in stereotypical thinking at workplaces. Based on this information, we propose the following hypothesis:

H1: There is a statistically significant difference in stereotypical thinking between females who work in green industries and non-green industries in Taiwan.

2.4. Gender and Job Matching in Taiwan's Green Industry

Job matching is critical because it is related directly to employee wage determination (Sicilian, 1995). It is related to the employment process, and people who have more labor market information experience better job matching. Therefore, females who lack a professional network and do not have full access to labor market information may face more difficulties when seeking employment. Thus, insufficient information can lead to problematic job matching (Belfield & Harris, 2002).

The green economy offers many new opportunities to encourage equality between men and women by providing more jobs (ILO, 2015). However, women possessing a weaker network than men could exacerbate job mismatch. It is expected that women's access to green job opportunities would be limited because of irrelevant experience and training. According to Pedulla (2016), the mismatch is caused by gender. Women are more likely than men to be employed in jobs with lower salaries and social security and restricted social mobility due to job mismatch. This would lead to limited female representation in the green industry of Taiwan, and females in the green industry would suffer significantly from job mismatching.

Although gender equality must be central to promoting green, low-carbon, and sustainable economies, females are generally segregated into job categories that are not stable and sometimes not secure (ILO, 2012). Furthermore, many green jobs are concentrated in sectors of the economy with limited female representation (ILO, 2015). The transition to a green economy should be based on commitments to gender equality. Limiting females in the green industry impacts job matching significantly. The number of females is small, and they would confront more prejudice and negative images in the green industry because the green industry has not been regarded as relevant fields for females for a long time in Taiwan. This prejudice could lead to more limited female representation in the green industry because job matching would be affected by gender. Females may not be benefited from job matching because of their gender and limitation in the green industry. As they are minorities in the green industry, job matching is not positive for females in the end. Based on these ideas, we present the following hypothesis.

H2: The limited female representation in the green industry influences job matching significantly.

2.5. Gender and Job satisfaction in Taiwan's green industry

Gender may influence employment, promotion, salary, or reward and is therefore critical for job satisfaction. Previous studies (e.g., Zhang & Li, 2013; Bhave et al., 2012) have shown gender to be significantly related to job satisfaction. For example, Başol (2016) indicates that supervisors and reward are critical factors in employees' job satisfaction in the green industry, and defines job satisfaction as "the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values (Locke, 1976, p. 1342)." Satisfaction affects performance and productivity and the extent to which the employee contemplates quitting. Taiwanese female employees have lower salaries and rewards in their workplaces and face less favorable working

conditions than their male equivalents, perhaps partly because males heavily dominate the industry. Many work-related factors influence job satisfaction, including the work environment (Robbins & Judge, 2012). Yukawa (2014) indicates that males express higher overall job satisfaction than females. Lower representation of females may reflect an improper work environment and less support for them in the green industry of Taiwan, impacting their job satisfaction. Because the number of females is small and females are not powerful in the green industry, females may not fully enjoy their job and their job satisfaction can be low. It may indicate that their job satisfaction can be influenced by their limited representation. As it seems limited female representation can impact job satisfaction in the green industry of Taiwan, we propose that job satisfaction in the green industry can be influenced by gender, as suggested in the following hypothesis.

H3: The limited female representation in the green industry of Taiwan influences job satisfaction significantly.

3. Methodology

This research is based on the Taiwan Social Change Survey which was collected in the 2015 year survey of the research project entitled "Taiwan Social Change Survey". This project was implemented at the Institute of Sociology, Academia Sinica (data gathered before the first year of the third round were conducted by the Institute of Ethnology, Academia Sinica), and was supported by the Ministry of Science and Technology (formerly the National Science Council) in Taiwan. The Taiwan Social Change Survey (TSCS) addresses various changes and provides insights based on extensive survey data about Taiwanese society.

In the mid-1980s, the National Science Council started to archive baseline information about Taiwanese society and to survey Taiwan's general adult population based on rigorous sampling designs. Since the completion of the first nationwide survey in 1985, this long-term, cross-sectional survey has followed five-year cycles and tracked the time-series of diverse social changes. These surveys have run through up to five cycles of survey operations, which contributes to understanding about significant changes from a longitudinal perspective. All survey data have been archived and are accessible to the public via the dedicated websites. The TSCS continues to cover its major national research agenda and proves the characteristics of Taiwanese social changes in the surveys (Fu & Chang, 2021).

In this dataset, we have included all of the green businesses including Agriculture, Water Supply, Wastewater Treatment, Waste Collection and Treatment and Disposal. Using STATA, t test is conducted to compare the perceptions and attitudes from females who work for the green and the non-green industry in Taiwan.

3.1. Descriptive Statistics

In the total sample, the number of males is 994 and the number of females is 1,037 in our dataset. From the descriptive statistics, we can find that females in green industry are the oldest among all. The average age of females in the green industry is 55.84 and it is older than other male and female groups. The lengths of their education are the shortest among all groups. Females in the green industry have only 9.98 years of formal education which are quite low compared to other groups. It can be interpreted that many new employees in the green industry may come from other male-dominated industries and the ratio of female employees is small. The education background and wage of females in the green industry of Taiwan are not high at the moment and this will lead fewer representation of females in the green industry (See Table 1).

Table 1: Descriptive Statistics for Total Subjects

Item	Percentage (%)	Total Number	Age (Mean)	Years of formal education (Mean)	Monthly wage in NT dollars (Mean)
Total Males	48.94	994	46.75	14.49	50,475 (US1,807.72$)
Total Females	51.06	1,037	47.84	19.41	34,223 (US 1,225.67$)
Males in Green Industry	62.84	252	46.50	12.62	43,991 (US1,575.50$)
Females in Green Industry	37.16	149	55.84	9.98	24,132 (US 864.27 $)

4. Results

To test our hypotheses, we compared females in green industry and females in non-green industry firstly. The main question of our first hypothesis comes from "Would you say that women are getting equal treatments as men in labor markets in Taiwan now?". From our t test, it is found that a gender stereotypical thinking exists in Taiwan's green industry (t=2.60 p<.001). Females in the green industry indicate they feel higher stereotypical thinking at their workplaces (3.59) than other females in the non-green industry (2.77). We can see our "H1: There is a statistical difference in stereotypical thinking between female who work in green industry and non-green industry" is confirmed. It may mean that female's wage and reward of the green industry may not be sufficient for females because of inequal treatment for these females caused by stereotypical thinking (Please see Table 2 for more information).

Table 2: t test for Stereotypical Thinking between Females who Work in the Green Industry and the Non-Green Industry

	Number	Mean	Standard Error	Standard Deviation	t	p
Females in the Non-Green Industry	843	2.77	.40	1.20	2.69	p<.001***
Females in the Green Industry	134	3.59	.71	8.29		

Note: Two-tailed., N=2031, * p<.05, **p<.01, ***p<.001

To examine our second hypothesis, "H2: The limited female representation in green industry influences job matching significantly", we compared females in the green industry and females in the non-green industry about job matching using t test. The main question of this hypothesis is "How much of your past work experience or job skills can you apply to your present job?". We have some missing values including 'can't choose' or 'unknown' and have unambivalent answers. Therefore, our second hypothesis has a fewer sample than our first hypothesis testing.

Based on the result of our t test, it is found there is a statistical significance (t= 1.89, p<.01) and our H2 is confirmed. Females in the green industry feel more job mismatching, compared to other females in the non-green industry. It may mean that their low representation caused by gender influences job matching of employees in the green industry of Taiwan. Females in the green industry show fewer job matching perception (1.69) than other females in the non-green industry (1.57). It may mean that female in the green industry may have more difficulties in job matching because they are not powerful and have restriction to more job matching resources at their workplaces (Please see Table 3 for more information).

Table 3: t test for Limited Female Representation in the Green Industry and Job Matching

	Number	Mean	Standard Error	Standard Deviation	t	p
Females in the Non-Green Industry	501	1.57	.02	.50	1.89	p<.01**
Females in the Green Industry	68	1.69	.06	.47		

Note: Two-tailed., N=2031, * p<.05, **p<.01, ***p<.001

Lastly, we examined our last hypothesis, "H3: The limited female representation in green industry influences job satisfaction significantly" to check whether the concentration of male affects job satisfaction among female in green industry. From the survey, "How satisfied are you in your job?"is taken. As we have missing values like 'can't choose' or 'unknown' responses and possess unambivalent answers, our third hypothesis has a fewer sample size than our first hypothesis testing. Based on the result of our t test, it is found that our "H3: The limited female representation in green industry influences job satisfaction significantly" is statistically significant (t=2.17, p <.05). Females in the green industry have less job satisfaction (2.51) than females in the non-green industry (2.77). It may mean that females in the green industry may have less job satisfaction as the attitudes and treatment toward these females are not positive at their workplaces (Please see Table 4 for more information).

Table 4: t test for Limited Female Representation in the Green Industry and Job Satisfaction

	Number	Mean	Standard Error	Standard Deviation	t	p
Females in the Non-Green Industry	501	2.77	.04	.90	2.17	p <05*
Females in the Green Industry	68	2.51	.12	.97		

Note: Two-tailed., N=2031, * p<.05, **p<.01, ***p<.001

It is found that three hypotheses we proposed, based on role theory, were largely confirmed. We can say there is a statistical difference in stereotypical thinking between female who work in the green industry and the non-green industry of Taiwan. In addition, it is clear that the limited female representation in the green industry influences job matching and job satisfaction significantly.

5. Conclusion and Implication

5.1. Academic and Practical Implications

A successful transition toward a low-carbon economy is essential to confront global climate change and to promote Taiwanese export and economy. This will also impact Taiwan's industry and green economy significantly by providing vocational education and training to meet the skill needs of greener economy resilient to climate change. It has been suggested that the Taiwanese government should provide more relevant vocational education and training particularly for female employees' competency development in the green industry. Proper vocational education and training for females will increase their wages and will reduce gender inequality in Taiwan's green industry.

The results of our research are aligned with Clark (1997) and Bellou's (2010) studies, both of which stressed the influential role of gender on job satisfaction. Like Clark (1997) and Bellou's (2010) studies, our study shows females may be more confined within their gender role and their job satisfaction and job matching are influenced by gender.

To face this situation, there is a need to pay an attention to the importance of more education and training especially for STEM majors in Taiwan (Chang, 2018). Lower numbers of females in STEM majors would create more imbalance for female employment in the green industry continuously. If females are well-educated and possess specific skills targeted for the green industry, they will have positive job matching and have higher wages as well. This will change the perception and attitudes toward females in the green industry and the portion of females will increase and reduce gender discrimination. In the end, their job satisfaction will be high.

The Taiwanese government would provide more financial assistance for female students majoring in the green industry including STEM areas (Chang, 2018). From the high school level, we should provide more intensive career guidance for females and more females will enter the areas of the green industry in the future.

Chien et al. (2014) indicates the significance and the need to publicize the job training programs offered by the Taiwanese government. Currently, it is not effective to provide the government's education and training programs for females in the green industry, which requires newer skills and knowledge. The Taiwanese government should introduce more tailored education and training programs to increase females' competency for newer skills required for working in the green industry.

This study suggests the following recommendations. Firstly, it is recommended for policymakers to promote STEM majors among females and to provide relevant policies to encourage STEM majors for females. There is still a strong prejudice about STEM majors which regards males are better for STEM fields. By reducing the prejudice, more females would choose to study STEM and would continue their career in STEM related areas including the green industry. The governmental policies should focus on offering opportunities for Taiwanese females to be exposed to STEM when they were younger. STEM would provide a steppingstone to be linked to Taiwan's green industry and females would develop their competency based on their STEM training. Furthermore, the government may consider setting up more rigorous guidelines for hiring more women in green companies. Also, the government may provide incentives for green companies which provide women priority working opportunities.

Academically, there is a need to update green curriculum continuously and to train females with updated expertise and knowledge which can be directly applied in Taiwan's green industry. This can boost females' competency development and help them to be more competitive in the job market to enter the green industry.

Practically, green companies in Taiwan should have an open mind to hire females and should provide internship opportunities for female students who are interested in the green industry and to help them to be friendlier with diverse works and activities of the green industry. Human Resources (HR) department of green companies in Taiwan may introduce a quota system to hire females and promote more female friendly corporate culture. HR department should cooperate with universities to provide extensive practical training for female interns and female interns become more interested in the green industry and continue working for those green companies after their graduation. With these opportunities, females would possess new skills and knowledge which are required in those green companies and would develop their competency which is necessary when they work for the green industry.

Our findings have practical implications, particularly for supervisors who work for the green companies. Based on our results, it is recommended that supervisors should be cautious of the gender' influence on work values at their green workplaces. Supervisors should be prepared for fair assessments regardless of gender and possess the mindset of gender equality. Supervisors may need to attend regular trainings to prevent gender stereotyping and to promote fair corporate culture when they resume their work.

More participation and cooperation from Taiwan's green companies need to be involved with young female students. Young females will work and contribute to the industry in the future. The Taiwanese green companies would provide more internship opportunities for young females at their workplaces and will help them to pursue their careers (Wu et al., 2021).

Constantly, Taiwan's green industry will need a higher number of talented employees equipped with new technologies, skills, and knowledge. Green companies should develop an effective HR system to recruit females and to enhance gender equality in the workplace. They should create and maintain corporate cultures that are friendly to females and recruit females.

Through relevant education and training, females can work for the green industry. The focus on skills building is especially beneficial to females for their wage increases as well (Benson, Gospel & Zhu, 2013, p. 240). Additionally, the content of the school curriculum should reflect the need of the green industry. Creating and adding greener contents to the current education programs for females will be able to meet the skill needs and demands under the current era of rapid eco-innovation. This aligns with the United Nation's sustainable development goals (UN SDG), particularly for Target 4.3, which ensures that all men and women have equal access to vocational education and training (United Nations Educational, Scientific and Cultural Organization [UNESCO]-UNESCO International Project on Technical and Vocational Education [UNEVOC], 2017). By gaining more applicable skills for the green industry with vocational education and training, females will increase their competency and will have more employment opportunities for the green industry in Taiwan with their enhanced competency.

5.2. Limitation and Direction for Future Research

This study contributes to the growing literature on female employees in the green industry of Taiwan but have some limitations. Firstly, this study focuses on Taiwan's' green industry and it will be difficult to generalize in different industries including traditional manufacturing, or construction. Also, it cannot be generalized to employees in other industries like banking and commerce. Secondly, this study depends on previous dataset published in 2015 as cross-sectional research. Future studies might consider more robust longitudinal designs to identify gender stereotyping for a longer-term basis. The longitudinal study to find changes how gender inequality has been changed over time would provide meaningful insights about the competency development of female employees in Taiwan. Thirdly, conducting an interview with female employees in Taiwan's green industry may provide more insights into gender inequality and discrimination. Lastly, future studies would expand the literature to the context of Taiwan's corporate culture, and this will provide better contribution to gender inequality and discrimination in Taiwan's green industry.

References

Banaji, M., & Hardin, C. (1996). Automatic stereotyping. *Psychological Science*, *7*(3), 136–141.

Başol, O. (2016). Classic or modern? Enhancement of job satisfaction scale for green job workers. *Management*, *11*(2), 103-122.

Bhave, D., Kramer, A., & Glomb, T. (2012). Pay satisfaction and work family conflict across time. *Journal of Organizational Behavior*, *34*(5), 698-713.

Belfield, C., & Harris, R. (2002). How well do theories of job matching explain variations in job satisfaction across education levels? Evidence for UK graduates. *Applied Economics*, *34*(5), 535–48.

Benson, J., Gospel H., & Zhu, Y. (2013). *Workforce development and skill formation in Asia*. London: Routledge.

Chang, C., & England, P. (2011). Gender inequality in earnings in industrialized East Asia. *Social Science Research*, *40*(1), 1–14.

Chang, C. (2006). The employment discontinuity of married women in Taiwan. *Current Sociology*, *54*(2), 209–228.

Chen, Y., Wu, T., & Chen, Y. (2009). The recycling business for sustainability in Taiwan. *European Business Review*, *21*(5), 403-417.

Chien, W., Wu, S., Yu, C., & Chen Y. (2014). *The commissioned study on surveying Taiwanese women's rights and policy recommendations*. Taipei: Executive Yuan.

Eagly, A., & Diekman, A. (2005). What is the problem? Prejudice as an attitude-in-context. In J. Dovidio, P. Glick, & L. Rudman (Eds.), *On the nature of prejudice: Fifty years after allport* (pp. 19-35). Malden, MA: Blackwell.

Eddleston, K., Ladge, J., Mitteness, C., & Balachandra, L. (2016). Do you see what I see? Signaling effects of gender and firm characteristics on financing entrepreneurial ventures. *Entrepreneurship Theory and Practice*, *40*(3), 489–514.

Fu, Y., & Chang. Y. (2021). *A brief introduction to the Taiwan social change survey*. Retrieved from https://www2.ios.sinica.edu.tw/sc/en/home2.php

Green, F., Ashton, D., James, D., & Sung, J. (1999). The role of the state in skill formation: evidence from the Republic of Korea, Singapore, and Taiwan. *Oxford Review of Economic Policy*, *15*(1), 82–96.

Gunderson, E., Ramirez, G., Beilock, S., & Levine, S. (2012). The relation between spatial skill and early number knowledge: The role of the linear number line. *Developmental Psychology, 48*(5), 1229-1241.

Haslam, S. A., & Ryan, M. K. (2008). The road to the glass cliff: Differences in the perceived suitability of men and women for leadership positions in succeeding and failing organizations. *Leadership Quarterly, 19*(5), 530–546.

Hoffman, R., Pasley, K., & Pasley, K. (1998). Thinking about the sexes: The relation between cognitions and gender stereotypes. *American Journal of Family Therapy*, *26*(3), 189–202.

Hoyt, C., & Burnette, J. (2013). Gender bias in leader evaluations: Merging implicit theories and role congruity perspectives. *Personality and Social Psychology Bulletin, 39*(10), 1306-1319.

Hüttges, A., & Fay, D. (2015). The gender-differential impact of work values on prospects in research careers. *Journal of Career Development, 42*(6), 524-539.

International Labor Organization. (2012). *Global employment trends for women*. Retrieved from https://www.ilo.org/global/research/global-reports/global-employment-trends/WCMS_195447/lang--en/index.htm

International Labor Organization. (2015). *Gender equality and green jobs*. Retrieved from https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_360572.pdf

International Labor Organization. (2016). *Green jobs: Progress report 2014-2015*. Retrieved from https://www.ilo.org/global/topics/green-jobs/publications/WCMS_502730/lang--en/index.htm

Koch, A., D'Mello, S., & Sackett, P. (2015). A meta-analysis of gender stereotypes and bias in experimental simulations of employment decision making. *Journal of Applied Psychology, 100*(1), 128–161.

Locke, E (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology* (pp. 1297-1350). Chicago: Rand McNally.

McKinney, K. (1987). Age and gender differences in college students' attitudes toward women: A replication and extension. *Sex Roles: A Journal of Research*, *17*(5-6) ,353-358.

Mukarram, S., Saeed, A., Hammoudeh, S., & Raziq, M. (2018). Women on Indian boards and market performance: A role-congruity theory perspective. *Asian Business & Management*, *17*(1), 4-36.

Noseworthy, C., & Lott, A. (1984). The cognitive organization of gender-stereotypic categories. *Personality and Social Psychology Bulletin*, *10(3)*, 474-481.

Organization for Economic Co-operation and Development. (2012). *OECD employment outlook*. Retrieved from https://www.oecd-ilibrary.org/employment/oecd-employment-outlook-2012_empl_outlook-2012-en

Oxford Analytica (2020). *Prospects for climate change in 2021*. Retrieved from https://dailybrief.oxan.com/Analysis/DB257771/Prospects-for-climate-change-in-2021

Pedulla, D. S. (2016). Penalized or protected? Gender and the consequences of nonstandard and mismatched employment histories. *American Sociological Review, 75*(2), 303–329.

Rossi, M. (2019). *How Taiwan has achieved one of the highest recycling rates in the world*. Retrieved from https://www.smithsonianmag.com/innovation/how-taiwan-has-achieved-one-highest-recycling-rates-world-180971150/

Schuster, C., & Martiny, S. E. (2017). Not feeling good in STEM: Effects of stereotype activation and anticipated affect on women's career aspirations. *Sex Roles: A Journal of Research, 76*(1-2), 40–55.

Stevens, C. (2012). *Gender in the green economy*. Retrieved from https://www.unrisd.org/news/stevens

Taiwan Semiconductor Manufacturing Company (2019). *Corporate Social Responsibility Report*. Retrieved from https://csr.tsmc.com/download/csr/2019-csr-report/english/pdf/e-6-issue-3.pdf

United Nations Educational, Scientific and Cultural Organization-UNESCO International Project on Technical and Vocational Education. (2017). *Greening technical and vocational education and training: A practical guide for institutions*.

United Nations Industrial Development Organization. (2011). *Green industry initiative for sustainable industrial development*. Retrieved from https://www.unido.org/our-focus-cross-cutting-services-green-industry/green-industry-initiative

Valentin, C. (2015). Greening HRD. *Advances in Developing Human Resources*, *17*(4), 426–441.

Wang, S. (2016). Green practices are gendered: Exploring gender inequality caused by sustainable consumption policies in Taiwan. *Energy Research & Social Science*, *18*(August), 88-95.

Wu, C., Hu, M., & Ni, F. (2021). Supporting a circular economy: Insights from Taiwan's plastic waste sector and lessons for developing countries. *Production and Consumption*, *26*(3), 228-238.

Yu, W. (2015). *Women and employment in Taiwan*. Retrieved from http://www.brookings.edu/research/opinions/2015/09/14-women-employment

Yu, T., Lin F., Kao, K., Chao, C., & Yu, T. (2019). An innovative environmental citizen behaviour model: Recycling intention as climate change mitigation strategies. *Journal of Environmental Management*, *247*, 499-508

Yukawa, S. (2014). Factor decomposition of the gender–job satisfaction paradox: Evidence from Japan. *Journal of Applied Business and Economics*, *16*(3), 69-89.

Zhang, X., & Li, B. (2013). Organizational culture and employee satisfaction: An exploratory study. *International Journal of Trade, Economics and Finance*, *4*(1), 48-54.