

Unravelling the Stereotypes of Women in Industrial Engineering

Glyda Aricon B. Marquez, Sheila May P. Gappi and Elaiza E. Bautista
Industrial Engineering Department

Technological Institute of the Philippines
363 P. Casal, Quiapo Metro Manila, Philippines
glydamarquez@gmail.com, sheilamaygappi11@gmail.com, bautistaisay@gmail.com

Jaypy T. Tenerife and Maria Teresa B. Mendoza
Industrial Engineering Department
Technological Institute of the Philippines
363 P. Casal, Quiapo Metro Manila, Philippines
jaypy.tenerife@tip.edu.ph, mariateresa.mendoza@tip.edu.ph

Abstract

The study is coming from the premise that the prevalence of standards associated with the male gender role hinders most of the young women to consider building a career in the field of engineering. In line with this epistemology, the study posits that most young women in the Philippines are more drawn to a specific type of engineering program rather than considering a variety of engineering discipline as a career option. Using qualitative research method, specifically thematic analysis, the study aimed to highlight the prevailing stereotypes of undergraduate students taking up industrial engineering from two of the premier professional technological institutions in the national capital region of the Philippines. With an end in view of understanding what shapes the outlook and mentality of students to consider industrial engineering as a degree program, themes gathered from two focused group discussions were used to give meaning to the experience of students in selecting an engineering major in tertiary education. Results of the study revealed that students do have a speckled perspective on industrial engineering. The study suggests that generalizations about industrial engineering as a discipline shapes the decision of an incoming undergraduate student to properly identify a suitable engineering program to pursue. The study contributes to the growing number of literature in the fields of engineering education and training, women in non-traditional areas, gender and development, and in general, women in engineering.

Keywords

Engineering Education, Gender and Development, Industrial Engineering, Women in Engineering, Stereotypes
Chapter 1

THE PROBLEM AND ITS BACKGROUND

1.1 Introduction

It is known that engineering programs are male-dominated profession rather than women. Most students are interested in taking engineering over other courses. Women, on the other side are taking business-related and social science programs like Accountancy, Business Management, Marketing, Education, etc. Schools nowadays particularly college universities are also seeking women to take engineering programs. On the study of Brawner et.al (2012), Industrial Engineering program is warmth, flexible, and has more feminism among other engineering programs. Engineering consists of mathematics and sciences and girls have found to be as strong as boys when it comes to those courses. In this study, women are analyzed why are they choosing industrial engineering over other engineering programs. Stereotypes about industrial engineering are being supported with other perspectives and studies. The purpose of this

paper is to have knowledge why women undergraduates are choosing industrial engineering over other courses and to provide results that will emphasize the goal of this research.

1.2 Research Background

This study is coming from a premise that undergraduate women are drawn to industrial engineering over other engineering majors. The research reports findings of prevailing stereotypes about industrial engineering that lead to such premise. The writings of Brawner et.al (2012), Harris (2004), and Zengin-Arslan (2002), are among the many researches that have contributed greatly to this study. The literature review proposes that having stereotypes about industrial engineering such as IE is “easier” and “softer” than other engineering majors can have a major impact in the perception of women thus making them more attracted to the program. Results of the study revealed that students do have a speckled perspective on industrial engineering. The study suggests that generalizations about industrial engineering as a discipline shapes the decision of an incoming undergraduate student to properly identify a suitable engineering program to pursue. The study contributes to the growing number of literature in the fields of engineering education and training, women in non-traditional areas, gender and development, and women in engineering in general.

1.2 Statement of the Problem

The occurrence of prevailing stereotypes and other factors that contributes on as to why undergraduate women are drawn to industrial engineering over other engineering majors in the Philippines.

1.4 Objectives of the Study

General Objective

- The study aims to identify the factors that contributes as to why the undergraduate women are drawn to industrial engineering over other engineering majors in the Philippines.

Specific Objective

- The study aims to identify the various stereotypes about industrial engineering that affects the students to be drawn to the program.

1.5 Scope and Delimitation of the Study

In general, the main concern of the study is to determine the various stereotypes about industrial engineering that affects the students to choose the program. The research sample is composed of six (6) selected Bachelor of Science in Industrial Engineering students, three (3) from each of the two premier professional technological institutions in the National Capital Region of the Philippines in the school year of 2018-2019. This study limits its coverage members or officers of a Women in Engineering Organization that is launched in 2015 in line with Gender and Development initiatives. The primary data gathering method used was focus group discussion interview along with thematic analysis. Each of the respondents was asked the same questions based on an interview guide and used a voice recorder to gather data from the interview. This study focuses on the current Women in Engineering Organization Industrial Engineering student members of the present school year, 2018-2019.

1.6 Significance of the Study

This research will potentially help the senior high school students specifically women to consider a specific engineering program as a course. They will understand and identify the factors that contribute on why women are attracted to a Industrial Engineering program. This will also serve as a learning module and a guide to devise better methods that can be used in the learning process to have better quality of teaching. The parents then who are greatly concerned in the education of their children will be able to understand them on why they choose Industrial Engineering as a degree in college. In addition, this study will help the Commission on Higher Education in the Philippines to improve the current situation in the uneven number of male and female students in engineering programs. Through this study, they will be able to establish the implement new programs that can support women in engineering. The result of this study will serve as a guide for future studies pertaining to the stereotypes of women in engineering or for other parallel researches.

Chapter 2

REVIEW OF RELATED LITERATURE AND STUDIES

All About Industrial Engineering

Industrial engineering program is a discipline that teaches students the requirements in the ever-changing demands in the industry due to the non-stop competition of the new products that are released in the market every day at the highest possible quality with low cost (Elsayed, 1999). Industrial engineers are often seen as the operator of changes. Because with the continuous planning and designing, industrial engineers are into continuous improvement not just with their product but also with their service. Industrial engineers possess abilities in logic, management, organization, and leadership. They also enjoy seeking ways to improve processes and systems. Engineering is a male dominated profession. Despite the differences in the representations of women in engineering in different countries, its characterization and conception as a 'masculine profession' remains the same. Women are a minority in this field at both the academic and the professional level more so than in other specialized professions. Moreover, it is still generally considered as a profession only for men. Zengin-Arslan (2002) explained that Industrial Engineering is viewed as close to the department of management, which is also a department with a high percentage of female students. In this respect, this field is believed to be more 'social' than other engineering departments. It can be suggested that women, who want to be engineers but not "technologists" consider industrial engineering as an alternative. It is a common argument that women are not good at technical issues, while they are good at 'social' issues. They are conceived as technically incompetent and they are not trusted in technical subjects and matters. In cultural imagery 'femininity is incompatible with technological competence.' Thus, even though they work with technology in their professions, they feel removed from or incompetent in technology. As stated by Dasgupta, Scircle, & Hunsinger, (2015), In a field like engineering, where the level of ladies is exceptionally little (generally 18% in school) and significantly smaller at advanced level dimensions of training, the attrition down issue is especially intractable because newcomers who are ladies will almost always be a solo (one of a kind) or a token (one of a few) upon entry into engineering majors, they are at risk for isolation and eventual attrition from the major, which reinforces the original problem of small numbers.

Reasons for Choosing Industrial Engineering

Gender Equity disregards the diverse beneficial encounters of people and makes the present 'male' model of the perfect scholastic regularizing. It expects that ladies can pursue this model as effortlessly as men, and, on the off chance that they do, will be viewed as successful and as central as their male colleagues. Harris et al., (2004) mentioned that young women' career orientation is frequently not as solid as young men's, but rather young women attempt to please others in their lives, including guardians and instructors, through great execution in arithmetic and science in secondary school. On account of male students, fathers give direction and mastery, as well as thoughts regarding vocation choices. The moms who rouse female students appear to give moral help yet have no significant information in the field, its requests, and its potential outcomes. The picture of building as a manly calling has recreated the recognition that designing is unsatisfactory for ladies. While different techniques have been utilized to attempt to expand the quantity of ladies entering building training and business, their prosperity has been restricted (Powell, Bagilhole, & Dainty, 2007).

As defined by Jagacinski, LeBold, & Linden, (1987), a few speculations concerning the purposes behind the distinctions in professional success of people engineers were explored in a national study of designers in the United States. The sexual orientation contrasts in professional success couldn't be clarified by contrasts in training level or in self-impression of capacity. The way that ladies were bound to have taken a profession break than were men decreased their pay rates and supervisory dimensions. The conducted study of Bradley (2000) shows that the outcomes demonstrate that sex separation has declined pretty much nothing. Ladies are bound to move on from instruction, expressions, humanities, sociologies, and law, and men are bound to move on from regular sciences, arithmetic, and designing.

Stereotypes of Women in Industrial Engineering

Foor & Walden stated that popular stereotypes circulating among engineers suggest that Industrial Engineering is "easier" than other engineering majors, and that Industrial Engineering majors are "imaginary engineers". The common themes about the attractiveness of Industrial Engineering expressed by the women are: warmth, flexibility, passion, efficient, sociability, generalists, feminine, career opportunity, and easier. According to Brawner et al., Industrial Engineering serves as a boundary between the harder and more technical engineering disciplines like chemical or electrical, and the academic world that lies outside if the college of engineering, particularly business. For

women and men, IE offers the ability to be engineering while not being “weird”. For women, this means that they can be feminine and have families. Industrial engineering program is said to be 'easier' than other engineering majors and it is closer to management and business that is why women are more drawn to this program than men. According to Scott (1986), educated eyewitnesses have set various speculations about why there has been such a checked development in the quantity of ladies claimed organizations. Included among these is the conviction that, of the relatively extensive number of ladies currently involving the lower rungs of the professional bureaucracy, many have thought that it was difficult to move to a dimension where they can "run the show". The level of ladies in the superintendency stayed dormant more than 80 years of the most recent century and has just expanded marginally, to only less than 14% of the government funded school directors in the U.S. today. As it were, the discriminatory limitation still exists. The steady explanations behind absence of progress are sex bias and sexual orientation organizing much of the time alluded to as sexism (Dana, & Bourisaw, 2006).

2.2 Definition of Terms

Gender Equity - Provision of fairness and justice in the distribution of benefits and responsibilities between women and men.

Industrial Engineering - Engineering that deals with the design, improvement, and installation of integrated systems (as of people, materials, and energy) in industry.

Norms - A principle of right action binding upon the members of a group and serving to guide, control, or regulate proper and acceptable behavior

Qualitative Research - Is especially effective in obtaining culturally specific information about the values, opinions, behaviors, and social contexts of particular populations.

STEM - is an educational program developed to prepare primary and secondary students for college and graduate study in the fields of science, technology, engineering, and mathematics (STEM)

Stereotypes - is a fixed general image or set of characteristics that a lot of people believe represent a particular type of person or thing.

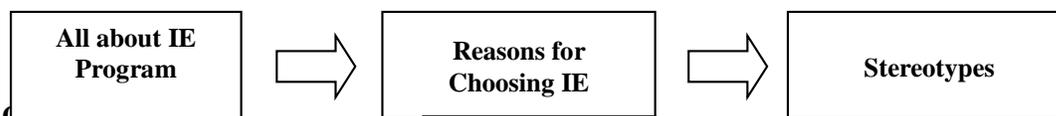
Thematic Analysis - Is an independent qualitative descriptive approach is mainly described as “a method for identifying, analyzing and reporting patterns (themes) within data.

Undergraduate - a student at a college or university who has not yet earned a bachelor's or equivalent degree.

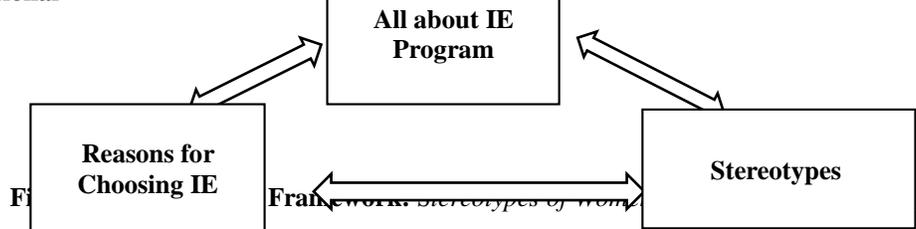
Unravelling - investigate and solve or explain

2.3 Conceptual Framework

A. Linear



B. Correlational



There are two options for the Conceptual Framework of this study, linear and correlational. Each of the framework has three (3) parts that the researchers considered as the factors that contributes on as to why the undergraduate women are drawn to industrial engineering over other engineering majors. These three parts consist of the (1) All About Industrial Engineering Program, (2) Reason of Women for Choosing the Industrial Engineering Program and (3) Stereotypes of Women in Industrial Engineering. In the linear framework it shows a straight-line one-way relationship between the three parts wherein the knowledge of women about the I.E. program directly affect their reasons for choosing the I.E. program and these reasons directly affects the stereotypes regarding the program. On the other hand, the Correlational framework shows a two-way or cycle relationship between the three parts meaning that the stereotypes affect the reasons of women for choosing I.E. in the same way these reasons affect the women to have

these stereotypes. The same relationship happens between the stereotypes and the knowledge of women about IE as well as the reasons for choosing IE.

Chapter 3

RESEARCH METHODOLOGY

3.1 Research Design

This research study used the Qualitative Approach under the Descriptive Research Design Method. Qualitative research is defined as a market research method that focuses on obtaining data through open-ended and conversational communication. This method is not only about “what” people think but also “why” they think so. There are different types of qualitative research methods like an in-depth interview, focus groups, ethnographic research, content analysis, case study research that are usually used. The writings of Brawner et.al (2012), Harris (2004), and Zengin-Arslan (2002), are among the many researches that have contributed greatly to this study. Among the types of qualitative research methods mentioned, the writings above used focus groups and thematic analysis in gathering data which the researchers also applied for this particular study.

A focus group is also one of the commonly used qualitative research methods, used in data collection. A focus group usually includes a limited number of respondents from within your target market. The main aim of the focus group is to find answers to the why what and how questions. On the other hand, thematic analysis is one of a cluster of methods that focus on identifying patterned meaning across a dataset. The purpose of TA is to identify patterns of meaning across a dataset that provide an answer to the research question being addressed. Patterns are identified through a rigorous process of data familiarization, data coding, and theme development and revision.

3.2 Research Locale



Figure 3.2 *Research Locale*

Figure 3.2 shows the research locale of the study wherein it was conducted in two of the areas within the National Capital Region in the Philippines namely Manila and Quezon City.

3.3 Sources of Data

- **Primary** – Focus Group Discussion Interview, gathered data from thematic analysis of the FGD
- **Secondary** – Journals, Internet, books, articles, and other research papers related to the subject of the study

3.4 Respondents of the Study

The respondents of the study were six (6) selected Bachelor of Science in Industrial Engineering students, three (3) from each of the two premier professional technological institutions in the National Capital Region of the Philippines in the school year of 2018-2019. The said selected students were either members or officers of a Women in Engineering Organization launched in 2015 in line with Gender and Development initiatives. It is committed to recognize our contribution as women and give women the opportunity to explore and build an interest in engineering.

3.5 Procedure

This section presents the overall plan, procedures and time frame for collecting data. The presentation must be clear and comprehensive.

Focus Group Discussion Process

Phase 1: Creating the Interview Guide Questions

Phase 2: Set Length of the Focus Group Discussion

Phase 3: Selecting the Participants

Phase 4: Preparing for the Focus Group Discussion

Phase 5: Conduct FGD

Thematic Analysis (Post-FGD) Process

Phase 1: *Familiarization with the data*- This phase involves reading and re-reading the data, to become immersed and intimately familiar with its content.

Phase 2: *Searching for themes*- This phase involves examining the codes and collated data to identify significant broader patterns of meaning (potential themes). It then involves collating data relevant to each candidate theme, so that you can work with the data and review the viability of each candidate theme.

Phase 3: *Reviewing themes*- This phase involves checking the candidate themes against the dataset, to determine that they tell a convincing story of the data, and one that answers the research question. In this phase, themes are typically refined, which sometimes involves them being split, combined, or discarded.

Phase 4: *Defining and naming themes* - This phase involves developing a detailed analysis of each theme, working out the scope and focus of each theme, determining the 'story' of each.

Phase 5: *Writing up* - This final phase involves weaving together the analytic narrative and data extracts, and contextualizing the analysis in relation to existing literature.

3.6 Research Instrument

The proponents of the study used an interview guide for the Focus Group Discussion (FGD) as the primary tool of this study. Documents including past activity reports of a Women in Engineering organization that the participants belonged to are also used for further analysis. The researchers also used a voice recorder to record the conversation that happened in the focus group discussion and Microsoft Word to transcribe the interview.

3.7 Data Gathering Instrument

Interview Guide

The interview-guide is consisted of five (5) questions based on the research objectives. These questions are specifically constructed for the I.E. student respondents that are crafted after brainstorming of the researchers.

(FGD) Interview questions:

1. How did you learn about this Women in Engineering Organization?
2. As an Industrial Engineering student, what made you join the organization?
3. What programs/activities of the organization have you attended in the past?
4. What do you expect on being part of the organization or what do you expect upon being part of the organization?
5. How do you plan to contribute to the mission and vision of the organization?
- 6.

Chapter 4

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

4.1 Analysis Based on the Comparison of the Existing Literature and Studies vs the Gathered Data from the Focus Group Discussion

The analysis done in this section is divided on the three parts of the conceptual framework for this study which are the stereotypes, reasons for choosing Industrial Engineering Program and all about Industrial Engineering. Each part has a different analysis and the researchers come up with a separate conclusion for each. The said conclusions from this analysis were later on interpreted and combined in order to satisfy the objectives for this study.

4.1.1 Stereotypes

After the researchers conducted the analysis of stereotypes in Industrial Engineering in terms of the related literature and studies as well as the analysis done in the data from the focus group discussion, they found out certain similarities between the two. 1.1 and 1.2 are the same in terms of having the perspective that "If you are a woman who wants to

take engineering, you must take Industrial Engineering as a degree because it is a lot easier.” The literature and studies suggests that IE stands for “Instant Engineer” why based on the analysis from the respondents, they quoted IE as “Instant Engineer”, these two are related and similar as these two IE meanings imply that IE is easier than other engineering programs. Another similarity is that based on the respondents’ view “IE students are indeed friendlier than that of other engineering programs”, while the existing literature that one stereotype in being an Industrial Engineer is its sociability which indicates that these two are pretty much the same. Both analysis also pertains to the mindset that “Industrial Engineering program is the most flexible out of all the engineering programs that can land females the career that they want in every industry.” This so called flexibility of Industrial Engineers allow them to meet opportunities in the careers along the way. For the researchers, the main highlight among these stereotypes is that Industrial Engineering represents the softer or more feminine side of engineering, not that it is only for women but “The Industrial Engineering is the engineering program with most number of female students.”

4.1.2 Reasons for choosing IE

In the comparisons done between the Reasons for choosing Industrial Engineering based on the Related Literature and studies as well as those that are based on the data gathered from the focus group discussion, two certain similarities were evident between the two analysis. They are the same in terms of the idea that women take up industrial engineering as it is, “a degree in industrial engineering can lead to jobs in various sector”, and that “There is a high possibility that an industrial engineering graduate can have any jobs that they want.” The reason of the respondents that ““IE is the most flexible out of all the engineering programs which gives many career opportunities in every industry that there is after graduation,” matches with that of the existing studies. The two analysis also agreed with the reason that, “Industrial engineering program can be an alternative specifically for women who want to take more on technology but in the softer side because industrial engineering is more on a social side”, that is why it also adds up to the reason why women took up IE.

4.1.3 All about Industrial Engineering Program

The comparison of the related literature and studies versus the gathered data from the focus group discussion in terms of the overall knowledge in Industrial Engineering is just the same as the other comparisons earlier wherein the researchers found similarities. Both analysis agree with the knowledge of women that, “Industrial engineering (IE) is the most wide-ranging engineering discipline in terms of career options meaning it is the most flexible out of all the engineering programs.” An Industrial Engineer may be employed in almost any type of industry, business or institution from retail establishment to manufacturing plants to government offices to hospitals because their skills can be used in almost any type of organization, and also Industrial Engineers are more widely distributed among industries than other engineers. This idea relates to one of the reasons why women take up Industrial Engineering as discussed earlier.

4.2 Interpretation of the Themes Collected Based on Analysis

After the researchers were done with the analysis based on the comparison of the existing literature and studies vs the gathered data from the Focus Group Discussion, they conducted an interpretation of the minor themes that later on were classified into major themes. Themes gathered from two focused group discussions were used to give meaning to the experience of students in selecting an engineering major in tertiary education. The researchers formed fifty-one (51) minor themes that leads to the creation of twelve (12) major themes. Each minor and major theme was explained based on the question given in the discussion as well as its relation to the objectives of the study.

4.2.1 Major Themes Analyzed

This part is where the minor themes are typically refined, which sometimes involves them being split, combined, or discarded to form major themes. Twelve (12) major themes are found and these are:

- 1. Easy** - Easy in terms of women perceived that IE is easier than other engineering majors because most of them have this thought that IE means “Instant Engineer” or an “Imaginary Engineer” which is probably one of the factors why women are drawn to it.
- 2. Fun** - It is more enjoyable to be in Industrial Engineering because you can have fun and be laid-back because you can create bonds with a lot of women that are there to have fun with you.
- 3. Sociability**- Industrial Engineering relates to sociability because based on the analysis they have the friendliest students and these students the greatest communication skills out of all the engineering programs that made women drawn to the program.

4. **Comfortability-** In relation with sociability, as the respondents saw that most Industrial Engineering are sociable and given the perception in the analysis earlier that the respondents perceive IE has the most number of female students, they are more comfortable with the program because they feel that they are surrounded by a large number of the same gender that are there to support them.
5. **Belongingness-** The respondents perceived that most female that took up engineering are enrolled in Industrial Engineering so women feel the belongingness that they want to receive because there is the warmth and support of the same gender in the program.
6. **Active and participative-** Female Industrial Engineering students are more active and participative in organizational activities and events rather than those female of other engineering programs. A factor that made such female student respondents to be drawn to the program is because they saw that most of the members of the women in engineering organization that they are in are IE students themselves.
7. **Femininity-** Looking at the analysis, Industrial Engineering exudes femininity because it is usually known to be the softest out of all engineering programs as IEs mostly deal with people and not the technical side of engineering.
8. **Flexibility -** Given the gathered data, it is interpreted that the respondents perceived that Industrial Engineering program is the most flexible out of all the engineering programs that can land females the career that they want in every industry. This so called flexibility of Industrial Engineers allow them to meet opportunities in the careers along the way.
9. **Opportunity-** The analysis shows that IE brings in more opportunities for women who are taking up the program. These opportunities are not only limited to the seminars and activities where the new members can gain knowledge and friends but also the career opportunities that are there after they finish the IE program and graduate. Such opportunity can also be an opportunity in terms of making new friends and opportunity to develop yourself more as you go to the program.
10. **Encouragement-** Females are encouraged and influenced by other females, their families or their relatives to take the program. It is the encouragement about experiences and instances that made women attracted to the program.
11. **Women Empowerment-** Engineering is a male-dominated profession but, women in Industrial engineering are more empowered and have a boost in their confidence because there is a large number of strong sense of support and encouragement from people of the same gender than that of other engineering programs.
12. **Women Development -** The respondents perceived that women excel in IE than in other engineering programs that clearly shows progress and development. One of the indications that leads to this perception is that women tend to stay longer in the program until they graduate because they have a lot of female companions to support them". Whereas in other engineering degrees, women tend to shift and fail courses because of lack in support from the same gender.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

6.1 Summary of Findings

The focus of the study is to determine the various stereotypes about industrial engineering that affects the students to choose the program. After going through the analysis, interpretation and results, it is revealed that the students indeed have a speckled perspective on industrial engineering. This research used thematic analysis as a tool in order to interpret and evaluate the data gathered from the focus group discussion. The background of this study was done by examining and analyzing several relevant literatures on the case internationally and locally. Such background covers the impact and initial indicators that there is indeed a problem on school children backpacks and trolleys. The research approach used was qualitative research approach. The research sample is composed of six (6) selected Bachelor of Science in Industrial Engineering students, three (3) from each of the two premier professional technological institutions in the National Capital Region of the Philippines in the school year of 2018-2019. The respondents are all members or officers

of a Women in Engineering Organization that is launched in 2015 in line with Gender and Development initiatives as the study was made in relation to it.

Between the two options of Conceptual Framework given in Chapter 2, the researchers decided to use the Correlational type of Framework as the analysis clearly shows that there is a two-way or cycle relationship between the three parts. The said parts are namely: (1) Stereotypes of Women in Industrial Engineering, (2) Reason of Women for Choosing the Industrial Engineering Program and (3) All About Industrial Engineering Program. The correlational relationship between the three parts means that the stereotypes affect the reasons of women for choosing I.E. in the same way these reasons affect the women to have these stereotypes. The same relationship happens between the stereotypes and the knowledge of women about IE as well as the reasons for choosing IE.

Using the existing literature and data from the focus group discussion done in chapter 4, the researchers are able to come up with three sets of analysis, one set for each part of the conceptual framework. Each set is also divided into three more specific analysis (1) based on related literature and studies, (2) based on the focus group discussion data and (3) comparison for 1 and 2. The analysis shows that certain similarities were found between the existing literature and the gathered data from the respondents of the study. Afterwards, the researchers conducted the thematic analysis that are gathered from two focused group discussions wherein they were able to find out minor themes that are later on are categorized into major themes that were used to give meaning to the experience of students and by making sure that these meanings are connected with the objectives of the study.

General Objective: To identify the factors that contributes as to why the undergraduate women are drawn to industrial engineering over other engineering majors in the Philippines.

The conceptual framework of this study as well as its analysis has paved the way for the researchers to consider that the three parts involved in the conceptual framework also belong to those factors that contributes on as to why the undergraduate women are drawn to industrial engineering over other engineering majors. The identified factors are the following:

- 1. Stereotypes About Industrial Engineering**
- 2. Reasons for Choosing the Industrial Engineering Program**
- 3. Knowledge in all about Industrial Engineering**

Specific Objective: To identify the various stereotypes about industrial engineering that affects the students to be drawn to the program.

Through thematic analysis, the researchers indeed found out twelve (12) prevailing stereotypes of undergraduate women that affects the students to be drawn to the program. Such stereotypes are categorized into themes that are explained in the interpretation found in the chapter 4 of the study and these are:

- | | |
|------------------------------------|------------------------------|
| 1. easy | 7. Femininity |
| 2. fun | 8. Flexibility |
| 3. sociability | 9. Opportunity |
| 4. comfortability | 10. Encouragement |
| 5. Belongingness | 11. Women Empowerment |
| 6. Active and participative | 12. Women Development |

6.2 Conclusion

It is evident by the results displayed in the analysis and interpretations for this study that the prevalence of standards associated with the male gender role indeed hinders most of the young women to consider building a career in the field of engineering. The researchers came with an end in view of understanding what shapes the outlook and mentality of students to consider industrial engineering as a degree program using the themes gathered from two focused group discussions were used to give meaning to the experience of students that made them drawn to a specific type of engineering program, which is revealed to be Industrial Engineering. The proponents conclude that undergraduate female students really do have a speckled perspective on industrial engineering.

6.3 Recommendations

Results of this study show that women are indeed drawn to a specific type of engineering program and the researchers recommended that institutions and organizations should create programs that will focus on women empowerment particularly for other engineering fields. It is a kind of need that women should feel the belongingness in other engineering programs not just a specific one to eliminate the gender inequality in engineering that exist in education. Women in engineering organizations will be of great help as interpreted in the study and such organizations should also have continuous or rather more activities and events in the future supporting women that will further encourage them to be drawn to engineering.

REFERENCES

- Beede, D. N., Julian, T. A., Langdon, D., McKittrick, G., Khan, B., & Doms, M. E. *Women in STEM: A gender gap to innovation*. (2011).
- Borlado, Katherine Coffman, Nicola Gennaioli, Andrei Shleifer. *Stereotypes*. 2015
- Bradley, K. *The incorporation of women into higher education: Paradoxical outcomes? Sociology of education*, 1-18. (2000)
- Brawner, C. E., Camacho, M. M., Lord, S. M., Long, R. A., & Ohland, M. W. *Women in industrial engineering: Stereotypes, persistence, and perspectives. Journal of Engineering Education*, 101(2), 288-318. (2012).
- Dana, J. A., & Bourisaw, D. M. *Women in the Superintendency: Discarded Leadership*. Rowman & Littlefield Education. (2006).
- Dasgupta, N., Scircle, M. M., & Hunsinger, M.. *Female peers in small work groups enhance women's motivation, verbal participation, and career aspirations in engineering*. Proceedings of the National Academy of Sciences, 201422822. (2015)
- Elsayed, E. A. *Industrial engineering education: A prospective*. European Journal of Engineering Education, 24(4), 415-421. (1999).
- Etzkowitz, H., Kemelgor, C., Neuschatz, M., & Uzzi, B. *Barriers to women in academic science and engineering*. In Pearson, & Fetcher, *Who Will Do Science?* (1994).
- Hatmaker, D. M. *Engineering identity: Gender and professional identity negotiation among women engineers*. Gender, Work & Organization, 20(4), 382-396. (2013).
- Harris, B. J., Rhoads, T. R., Walden, S. E., Murphy, T. J., Meissler, R., & Reynolds, A *Gender equity in industrial engineering: A pilot study*. NWSA Journal, 186-193. (2004).
- Zengin-Arslan, B., *Women in engineering education in Turkey: Understanding the gendered distribution*. International Journal of Engineering Education, 18(4), 400-408. (2002).

Biographies

Elaiza E. Bautista is a 5th year Bachelor of Science in Industrial Engineering student of Technological Institute of the Philippines Manila. She is an officer of Junior Philippine Institute of Industrial Engineering for two years Elaiza E. Bautista: Elaiza E. Bautista is currently taking BS in Industrial Engineering student and a 5th yr student. She was an officer of Junior Philippine Institute of Industrial Engineering for two years and an officer of the Inhinyera for the SY 2018-2019. SY 2018-2019. She is also a Certified Six Sigma Yellow Belt title holder.

Glyda Aricon B. Marquez is a 5th year Bachelor of Science in Industrial Engineering student of Technological Institute of the Philippines Manila. She has published and been a co-author of case studies and research papers such as “A Study of the Design for Trolley School Bag of Elementary Children in Grades 1-3 Using the National Institute for Occupational Safety and Health (NIOSH) Lifting Equation” which has been published in Scopus indexed journal and “A Comparative Study on Different Checkout Counters of a Grocery Store using Queuing Theory and ProModel Simulation” for Operations Research course. She is a current member of the Junior Philippine Institute of Industrial Engineers (JPIIE), current vice-president of Inhinyera, a women in engineering organization, and a former member of the Student council for the Industrial engineering department. She is a Certified Lean Six Sigma Yellow Belt title holder.

Sheila May P. Gappi is a 5th year Bachelor of Science in Industrial Engineering student of Technological Institute of the Philippines Manila. Sheila is a certified six sigma yellow belt title holder. She also participated in one of the school organization called Inhinyera : Women in Engineering. She is elected as the Internal Vice Chairman last s.y 2017-2018 and as Secretary last s.y 2018-2019.

Jaypy Tenerife is a part-time faculty member of the Industrial Engineering Program, College of Engineering and Architecture of the Technological Institute of the Philippines, Manila. His areas of interest are in the fields of Engineering Education and Training, Organization Development, Gender Studies, and Industrial/Organizational Psychology.

Maria Teresa B. Mendoza is the current head of Industrial Engineering Department of Technological Institute of the Philippines, Manila. She graduated Master in Industrial Engineering and Management at Polytechnic University of the Philippines. Currently she is writing her dissertation for PhD in Technology Management at Technological Institute of the Philippines, Manila. She handles IE students' design projects, community and company-based undergraduate researches as adviser.