

“Understanding the Low Proportion of Women in Employment in Indonesia: A System Dynamics Approach”

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Abstract

Despite considerable economic growth and the introduction of gender equality legislation, the labour market participation of women in Indonesia has been stagnating at a level of 37 percent from the total employment (MMTRI, 2013). As a result, Indonesia’s performance on the Gender Inequality Index (GII) is lower than its neighboring countries in the ASEAN region. Therefore, in order to identify policy scenario’s that may contribute to alleviating the unequal proportion of women and men in the Indonesian labour market, we develop and test a formal system dynamics model that explains the dynamic behavior of women’s employment in the Indonesian labour market.

Key words: Gender Equality, Women’s Employment, Ideology, Labor Market, Indonesia

Introduction

The Indonesian economy has showed respectable growth, especially since 2000. In 2001, the growth of Indonesia's Gross Domestic Product (GDP) was only 3.6%, while in 2011 this was 6.5% (The Worldbank, 2013a). Over the past decades, terrorist attacks and nature disasters though impacting on the local economy, had only slight effects on the country's economic development (Van Klaveren et. al., 2010). The GDP growth resulted in more and better jobs (Choi, 2007; Hull, 2009) which are shown by an average growth of total employment of 2% for the last five years (BPS, 2013). However, Indonesia is still facing a lack of gender equality in the labour market, indicated by a score of 0.49 on the Gender Inequality Index (GII), ranking it 121 out of 186 countries in 2012 (UNDP, 2013). Figure 1 shows that Indonesia still lags behind its neighboring countries in the ASEAN region in gender equality. This data illustrates that Indonesia's growth and economic development is not enough to attain gender equality in different dimensions.

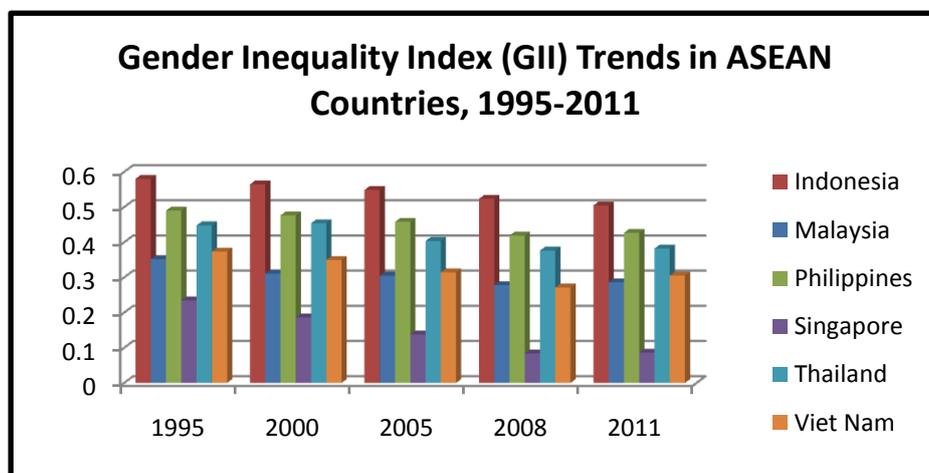


Figure 1. Gender Inequality Index (GII) Trends in ASEAN Countries, 1995-2011
Data sources: UNDP - Human Development Report Office (HDRO)

The GII actually reflected Indonesia's women's disadvantage in the labor market where the number of women in employment (on average from 2008 to 2012) is only 37 percent from the total employment (MMTRI, 2013). Since half of the Indonesian population, also in the productive age, are women (BPS, 2013), this gap indicates an unequal distribution of employment in the labor market in Indonesia. Figure 2 below shows this gender imbalance in the labor market into detail.

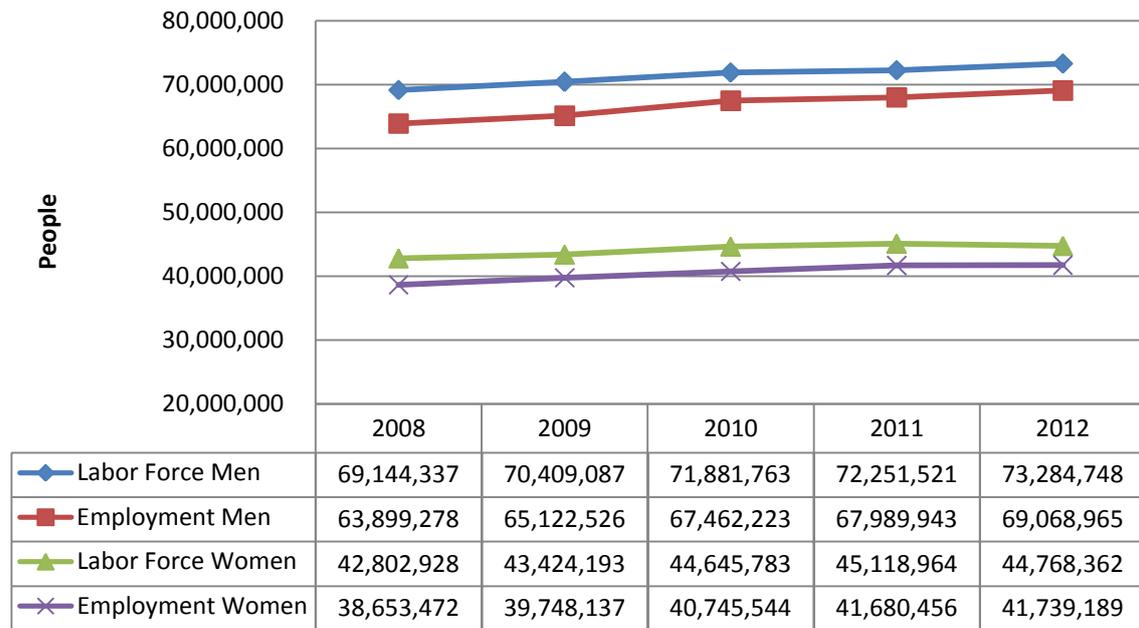


Figure 2. Labor Force and Employment by Gender, 15+ for Indonesia in 2008 - 2012
Data sources: (BPS, 2013)

Number of women in employment is only 60.73% compare to men in the period of 2008 to 2012. Thus, these proportions indicate a low labor participation rate of Indonesian women. This gap raises the question why Indonesian women do not benefit from the economic development of their country, especially since Gender equality legislation was introduced in the new milenim. The Indonesian government ratified two fundamental ILO Conventions (on *Equal Remuneration for Equal Work* and on *Discrimination in Respect of Employment and Occupation*) which work as main reference for the implementation of the Equal Employment Opportunity (EEO) strategy in Indonesia (MMTRI, 2005). EEO is a principle to promote equality at the work place, including equality between men and women (MMTRI, 2005). Other countries that introduced the equal opportunity legislation for men and women, not only were able to increase the sustainability of economic development, but also have created a more prosperous society (The Worldbank, 2013c). In order to ensure significant and proportional involvement of women in the labor market, we need to understand the dynamic structure of the consistent low proportion of women in employment in Indonesia. This understanding may contribute in identifying scenarios that aim to alleviate the unequal proportion of women and men employment in Indonesia.

Research Objective

To identify policy scenario's that may contribute to alleviating the unequal proportion of women and men in the Indonesian labour market

Research Questions

What is the dynamic structure underlying the dynamic behavior of the proportion of women in employment in Indonesia?

- a. What dynamic hypothesis underlies a system dynamics model that is responsible for the proportion of women in employment in Indonesia?

- b. What is the validity of the System Dynamics model that explains the dynamic behaviour of the proportion of women's employment in Indonesia?
- c. What is the expected effect of different scenario's that aim to change the proportion of women in employment in Indonesia?

Research Strategies and Data Collection

The research strategy performed is quantitative SD modeling. This research conducts an explanatory and predictive (future projection) study of the causes that constitute the dynamic behavior of women's employment proportion.

Secondary Data Collection: Desk Research

To test the causal relations between the variables in the formal SD model, we use secondary data (Hox, 2005) from government's official websites and published reports. We use the official websites of Indonesian government institution which are MMTRI (Ministry of Manpower and Transmigration Republic of Indonesia), MWECPRI, Ministry of Religious Affair Republic of Indonesia, and Constitutional Court Indonesia. Next, we used research reports that are published by specialized and trusted agencies, like the worldbank, ILO (International Labour Organization), UNDP (United Nations Development Programme), UNFPA (United Nations Population Fund), and National Commission on Violence against Women (*Komnas Perempuan*) Indonesia. The reports are 'Guideline: Equal Employment Opportunity in Indonesia, (MMTRI, 2005)', 'Independent Report of National Commission on Violence against Women (*Komnas Perempuan*) Indonesia' (Komnas Perempuan, 2012), 'Human Development Reports 2013'(UNDP, 2013a; 2013b), '*Jejak Penyintas* (Trace of Survivors) 2007' (The Worldbank, 2007), 'Toward Gender Equality in East Asia and the Pacific' (The Worldbank, 2012), and 'State of World Population 2000' (UNFP, 2000).

For the simulation purpose, we mainly used macroeconomic data that is taken from open-source statistical databases, which are the Indonesia Central Bureau of Statistic (*Badan Pusat Statistic/BPS*) and the Worldbank. The BPS is a Non-Departmental Government Institution that is responsible for conducting statistical surveys in Indonesia. However, The worldbank data catalog offers a much larger sample time-series data than BPS so we used this dataset to define the reference mode.

Expert Interview

In addition, we interviewed experts, to validate the causal loop diagram that was derived from literature. We interviewed Mrs. Rizki Fillaili and and Mr. Sirojuddin Arif who are currently served as senior researcher at SMERU Research Institute of Indonesia.

Methodology Approach: System Dynamics

System dynamics (SD) is a perspective and set of conceptual tools that enables us to understand the structure and dynamics of complex systems (Sterman, 2000, p. vii). The problem in this study falls under the criteria of a problem that is suitable to be analyzed by SD methodology (Vennix, 1996). As an explanatory study, it is compulsory to explain causal relationships between key variables (Saunders and Lewis, 2012, p.108 and 113). The key

variables in this study are the factors that are causing the behavior of women's employment proportion in Indonesia.

To answer the research question using SD methodology, Sterman (2000, p. 86) has described five major steps in conducting the SD modeling processes, namely problem formulation, formulation of dynamic hypothesis, formulation of a simulation model, testing and policy desing and evaluation. Yet, the SD modeling is a feedback process, not a linear sequence of steps since models go through constant iteration, continual questioning, testing, and refinement (Sterman, 2000, p. 87). Hence, in building the SD model for the current study, the model has been through the steps of modeling process in an iterative (not linear) way.

Dynamic Problem

Gender inequality holds back the growth of individuals, the development of countries, and the evolution of societies, to the disadvantage of both women and men (UNFP, 2000). If the proportion of men and women in the labor market remains the same for the following years, Indonesia will still have gender inequality in the labor market. We define equality here as a fair competition between men and women, which implies the removal of all barriers to the process of competing. A blue line in Figure 3 shows the proportion of women in the labour market, the age cohorts 15 years and older from 2001 to 2010. This proportion is calculated as the percentage of women in employment compared to the total employment. During these time interval, there was no growth in women's employment proportion. It remains at the same level of 37%, which indicates a relatively constant low proportion of women in employment in Indonesia for the past decades. As mentioned in the introduction, the Indonesian government developed the Equal Employment Opportunity (EEO) strategy in Indonesia through Law No. 13 of the year 2003 (MMTRI, 2005), while MWECPRI has formed Policies and Strategies for the Realization of Gender Equality (MWECPRI, 2012). These laws provide a legal framework for promoting EEO and a gender equality atmosphere in Indonesia. We expected the proportion of women in employment to increase in the direction of gender balance after 2003 (a green line in figure 3). However, the proportion remained stable in the following years.

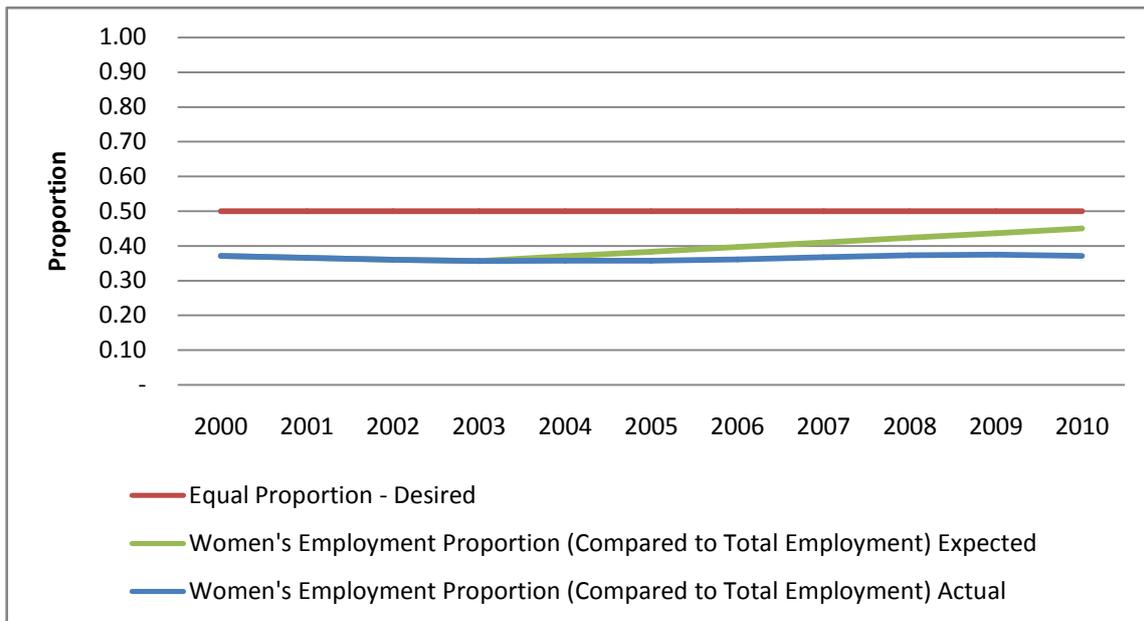


Figure 3. The proportion of women in employment in Indonesia
 Data sources: The Worldbank (2013)

As a conclusion, the problem for this research is the relatively constant low the proportion of women in employment in the labor market in Indonesia over time (the blue line in figure 3), despite that Indonesia has tried to implement the EEO principles. For formal SD modeling, this proportion is set as a reference mode that shows the historical behavior of the key variable and will be used to test the validity of the model.

Dynamic Hypothesis

Once the problem has been identified, a dynamic hypothesis for the problematic behavior has to be built in terms of the underlying feedback loops of the system. The women’s employment proportion is calculated as a percentage of women in employment compared to the total employment (figure 4).

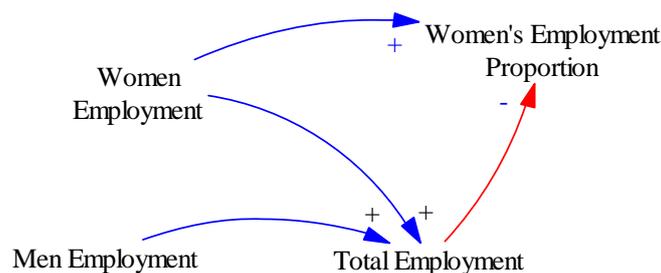


Figure 4. The Measurement of Women and Men Employment Proportion

The more women in employment, the higher the value of women’s employment proportion will be. The value of 50% represents the exact equal proportion between men and women in employment that shows the precise gender equality in the labor market.

The Employment Structure

A general SFD of an employment structure (Sterman, 2000) without distinguishing between the sexes is described in figure 5. Figure 5 below reflects that the level of (total) employment is due primarily to expectation (Keynes, 1973, p.46) which is defined here as the expectation to produce the desired vacancies available for employment over a considerable period (Keynes, 1973, p.47).

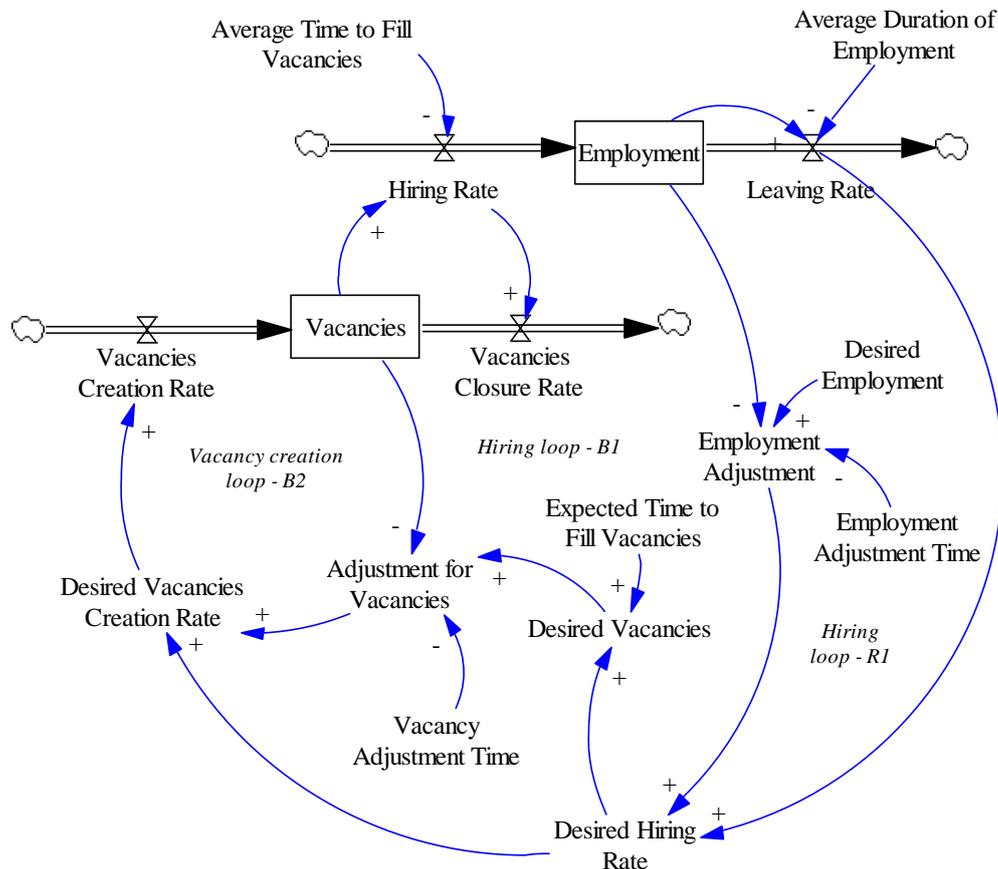


Figure 6. The SFD for Hiring and Vacancy Creation adapted from Sterman (2000, p.758)

The corrective action of employment, will create a balancing loop named the *hiring loop* (B1). Meanwhile, the desired hiring rate is also determined by the leaving rate of employment that represents an attempt to replace those employees who leave the jobs. The desired hiring rate is calculated as a sum of employment adjustment and the leaving rate. So, through this rate, the structure creates a reinforcing loop in hiring new people named *hiring loop* (R1).

The stock of vacancies represents a supply of employment which is the number of vacancies that have been created but have not been filled with workers. The vacancy adjustment seeks to close the gap between the desired and the actual vacancies available over time. The desired level of vacancies is the number of vacancies needed to generate the desired hiring rate, given the expected time required to fill a vacancy. This corrective action of vacancy adjustment will create a balancing loop called *vacancy creation loop* (B2).

Dynamic Hypothesis for Women and Men’s Employment

In order to capture the employment proportion of women, the basic employment structure is divided into two separate categories, the employment structure for women and for men (thus, there are women employment’s stock and men employment’s stock) (figure 7). In this figure, the number of vacancies available will be distributed to the hiring rate for women and men. with the hiring proportion of women that is believed to be negatively affected by the gender role ideology in Indonesia (figure 7).

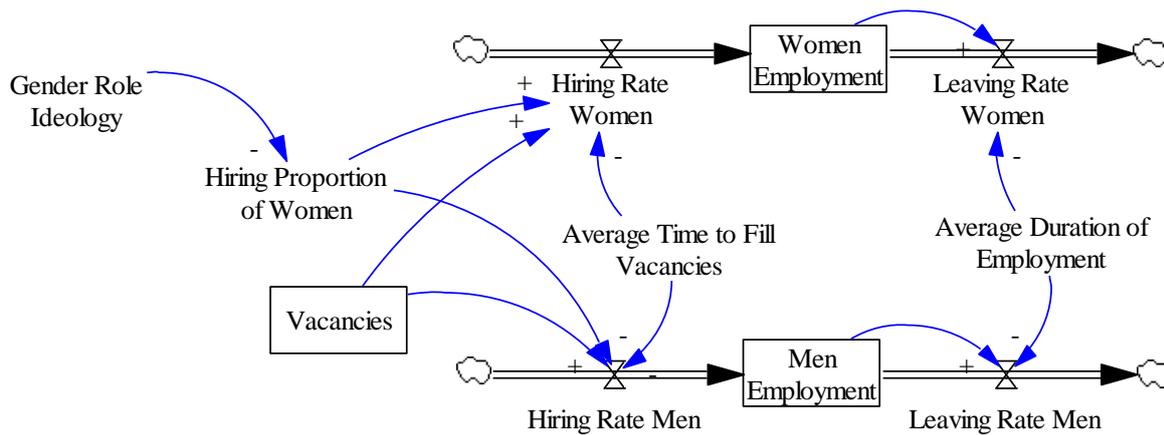


Figure 7. The SFD for Women and Men in Employment with Its Hiring Proportion

With this figure, the first hypothesis is:

The number of vacancies available is distributed to hiring rate for women and men based on its proportion, which is negatively affected by the gender role ideology

Dynamic Hypothesis for Gender Role Ideology in Indonesia

According to literature and the interview results, gender role ideology in Indonesia may be differentiated between *state ideology* and *societal ideology*. The state ideology is represented by the formal policies; in this case the EEO policies. The societal ideology refers to the gender roles that are widely accepted in society. In some cases, a state's gender role ideology supports women’s labour market participation while the societal ideology opposes it. Both state and societal ideology constitute the *gender role ideology* (figure 8), where all the ideology have a value from 0 (zero) to 1 (one).

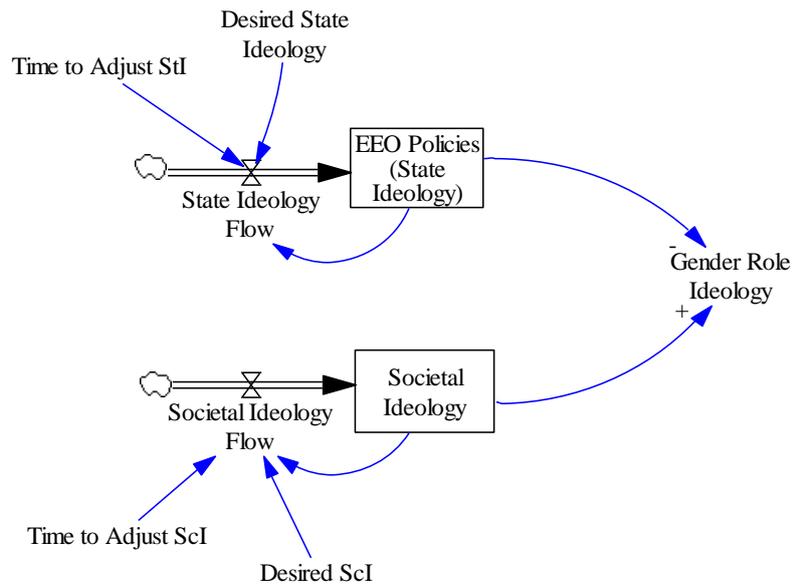


Figure 8. The Formulation of Ideology

State Ideology

The state ideology is reflected by EEO Policies that ensure equal consideration of each individual as job applicant or being an employee (MMTRI, 2005; Syed, 2008). The value of 0 reflects the weakest influence while the value of 1 reflects the strongest influence on women in employment. Based on these policies, the hiring proportion should be equal for both women and men in employment, so its desired value is set to be 0.5 since it aims to bring a gender balance in the labor market. This state ideology has a negative effect on the gender role ideology.

Societal Ideology

The gender role that is widely accepted in Indonesia arises from a combination of Islamic religious views and the historical legacy of patriarchal norms (Dzuhayatin, 2003; Tremblay, 2005, p.23; Adamson, 2007; Pacamalan, 2008). From an Islamic view, the ideal Muslim woman would be a wife and mother who has successfully pursued an academic or professional career, but has also put her children's and husband's needs before her own (Woodcroft-Lee, cited by Wright and Tellei, 1993, Adamson, 2007). Daulay (2007) defines patriarchal norms as a traditional role of first placing men as breadwinners (pursuing career) and women as the ones who are doing household activities. There are more than 200 ethnic groups in Indonesia that are organized along patrilineal and matrilineal lines, but the strong intervention of the central government in the New Order period (1968–1998) had imposed the cultural uniformity and homogeneity to create the gender ideology, which is Javanese patriarchal norms in nature (Dzuhayatin, 2003; Rahayu, 2005; Dewi, 2007). Thus, the combination of Islamic religious views and Javanese patriarchy has constituted traditional gender roles in Indonesia as its societal ideology.

This societal ideology value of 0 (zero) indicates the weakest patriarchal norms, while the value of 1 (one) indicates the strongest patriarchal norms. Since the above description of

societal ideology in Indonesia mentions, that Indonesia holds the strong patriarchal norms, the value of the desired societal ideology in Indonesia is set to the point of 0.65 which also corresponds to the level of the Gender Inequality Index from the Human Development Indicators by UNDP, which has a value of 0.61 (UNDP, 2013).

Gender Role Ideology (GRI)

The GRI in Indonesia is constituted by the value of state and societal ideology. The value of 0 (zero) indicates the weakest patriarchal norms, while the value of 1 (one) indicates the strongest patriarchal norms. Although stated in the 1945 Constitution, article 27 that all citizens shall be equal before the law and the government; and shall have the right to work and to earn a human livelihood (UUDRI, 1945) and Pancasila (Fox, 2000), Indonesian people still hold strong patriarchal norms that hinder women to join the labor market. They are tightly adhering to the societal ideology. Based on this condition, we conclude that the gender role ideology is more affected by societal ideology rather than by the state ideology. This model assumes that the power of GRI to EEO policy is 70:30.

To conclude above explanation, the second hypothesis is:

The GRI is formed by the state ideology and the societal ideology. The state ideology negatively affects the GRI while the societal ideology positively affects the GRI.

The strong GRI reflects the strong patriarchal norms in Indonesia, and vice versa. As the effect, the GRI negatively affects hiring rate women while positively affects hiring rate men (figure 9).

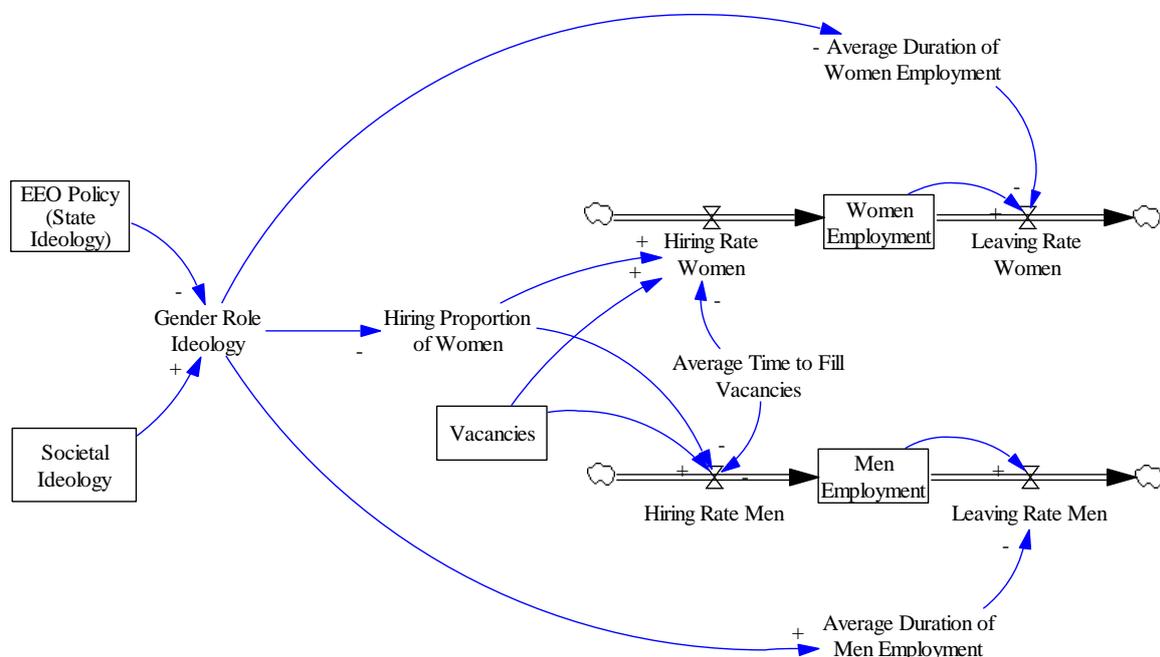


Figure 9. The effect of Gender Role Ideology to Employment

Moreover, Wright and Tellei (1993) found that almost two-thirds of their respondents felt that a woman's primary responsibility was to take care of her household (domestic

responsibilities) due to the strong patriarchal norms that are applied in Indonesia. Thus, the GRI is believed to be not only affect hiring proportion, but also to average duration of employment for both women and men (figure 9). Thus, this makes a third hypothesis, which is:

The GRI negatively affects average duration of employment for women, while positively affects average duration of employment for men.

Along with the formulation of the hypotheses, figure 10 below displays a simplified causal loop diagram (CLD) of the entire model.

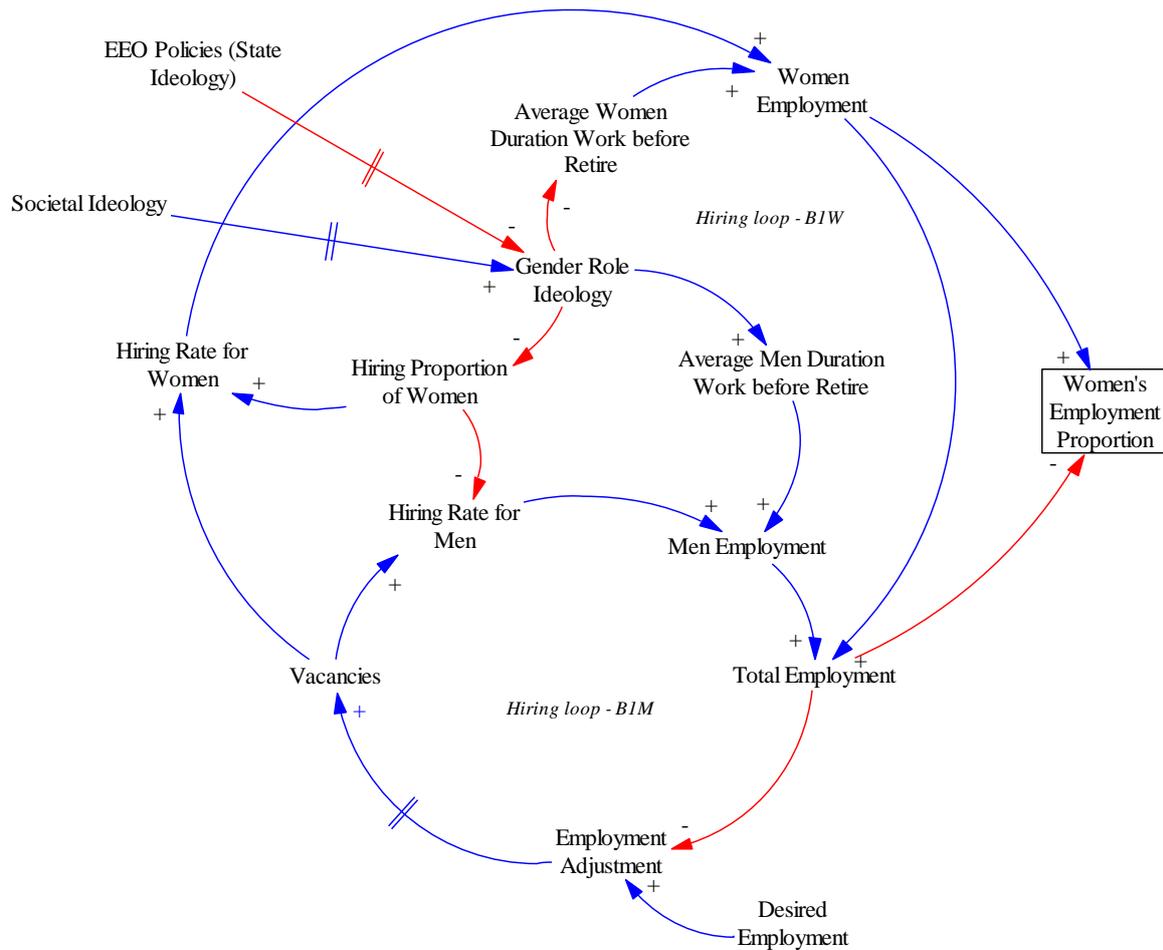


Figure 10. The Simplified CLD for Women's Employment Proportion Model

There are at least two balancing loops that prevents the level of employment from an unlimited increase (has a limit to grow) which are *hiring loop for men* (B1M) and *hiring loop for women* (B2W) (figure 10). From this CLD, it can be seen that GRI operates in four ways in which it affects the women's employment proportion:

1. The stronger the gender role ideology, the lower the hiring proportion of women, the lower the hiring rate for women, the lower the number of women in employment, and the lower the women's employment proportion will be.
2. The stronger the gender role ideology, the lower women's average duration of work, the lower the number of women in employment, and the lower the women's employment proportion will be.

3. Meanwhile, the stronger the gender role ideology, the lower the hiring proportion of women, the higher the hiring rate for men, the higher the number of men in employment, the higher the total employment, and the lower the women's employment proportion will be.
4. The stronger the gender role ideology, the higher men's average duration of work, the higher the number of men in employment, the higher the total employment, and the lower the women's employment proportion will be.

These processes operate in the opposite direction if the GRI becomes weaker.

Model Analysis : Model Testing

Simulated graphs of women's employment proportion as results of model testing, are presented in Appendix 2. First, the model has passed the unit consistency test. Second, reference mode test. Figure 11 shows the simulated behavior of women's employment proportion compared with the reference mode (the actual data) for the first ten years simulation period (2000 to 2010).

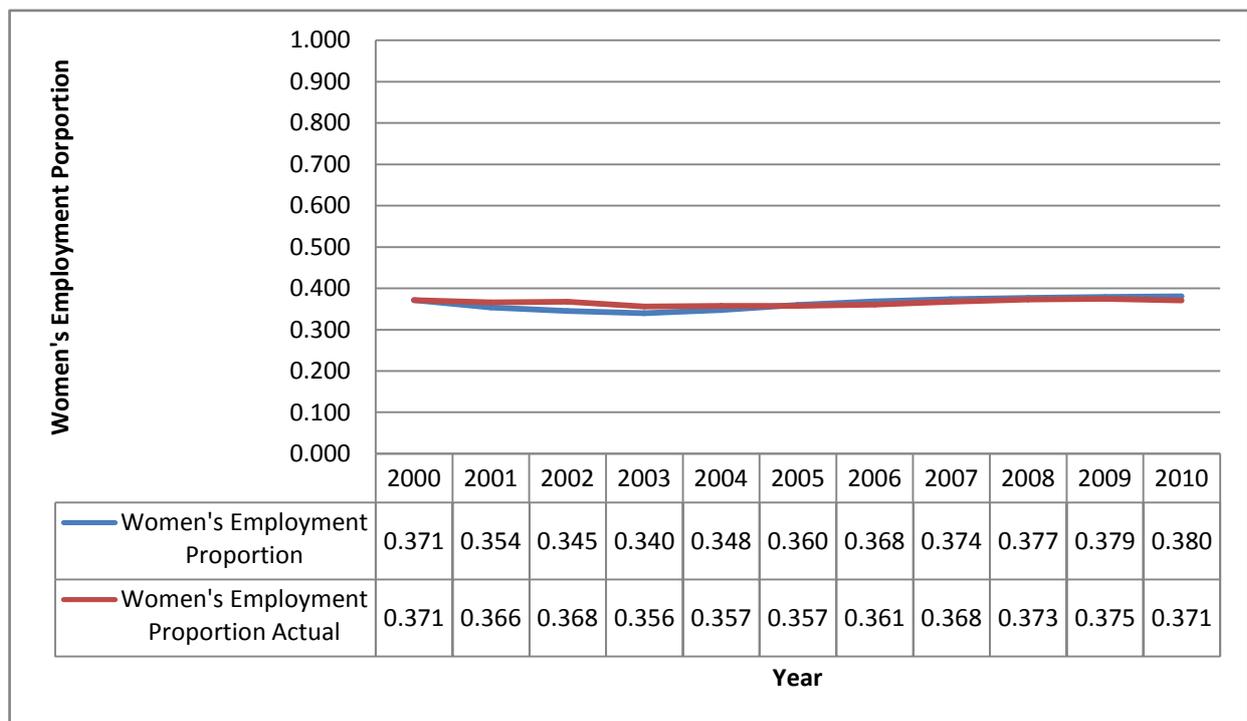


Figure 11. Simulated Behavior Compared with The Reference Mode

The similar pattern of the two lines in the graph above indicates that the SD model structure is able to replicate the actual situation in the labor market in Indonesia for the period 2000 to 2010. The gap between the simulated behavior and the reference mode is due to the simplification of the SD model to the real world.

Another test for extreme condition test and other test such as boundary-adequacy test, and parameter sensitivity test have been carried out (Appendix 2c).

Model Analysis

Future Projection

The future projection of women's employment proportion takes 10 years period, starting from 2010 to 2020. Based on figure 12, we can expect that the value of women's employment proportion in Indonesia will remain the same for the following 10 years (2010 to 2020).

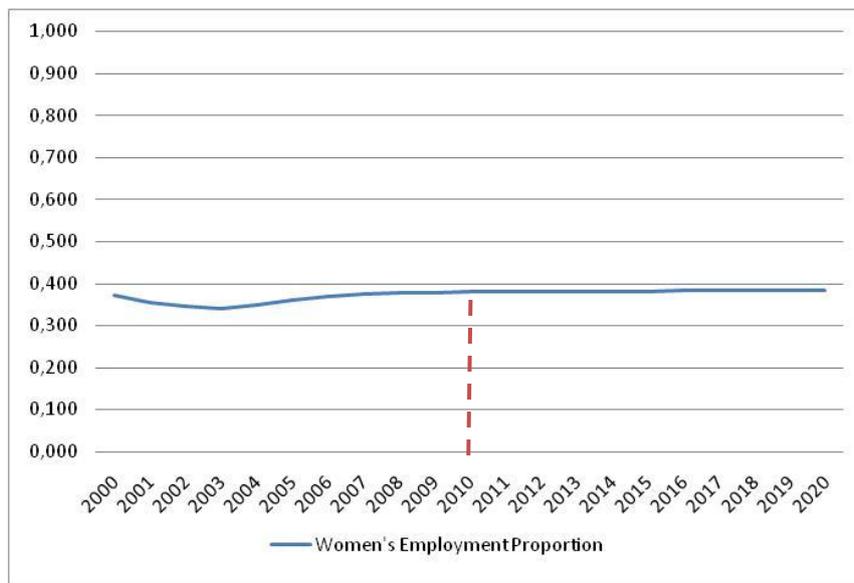


Figure 12. Simulated Behavior of Women's Employment Proportion

The future projection of women's employment proportion from 2010 to 2020 stabilises at 0.380 to 0.382 (38%). It can be concluded that the situation and condition of labor market in Indonesia are in an equilibrium state, so that the employment proportion in Indonesia will not change in the future period.

Policy Design

Scenarios for ten years simulation period (2010 to 2020) that serve as policy recommendations to bring a balance the proportion of women in employment are as follows (figure 13):

1. *Policymakers implement a campaign for women's employment to stimulate women's employment* by promoting gender role equality and women's participation in the labor market (The Worldbank, 2007) i.e.: Providing role models, trainings for women's leadership, career-counseling offices, and supporting activism for gender equality. This way the level of desired societal ideology would reach 0.5 in the SD model. The graph shows that by implementing a campaign for women's employment, the women's employment proportion increases and reaches the value of 0.498 (50%) by the end of simulation period in 2020 (figure 29a)

2. *Better implementation of the law of women empowerment or gender equality in Indonesia.* There are several laws that ensure gender equality in the labor market in Indonesia i.e. EEO Policy and UURI No. 7 year 1984 about the Ratification (Convention) on The Elimination of All Forms of Discrimination against Women but these laws suffer a lack of implementation (The Worldbank, 2007). If these laws are successfully implemented, the power of societal ideology compared to the power of state ideology can be expected to reach the proportion of 10:90. Hence, the value of women's employment proportion increases and reaches the value of 0.483 (48%) by the end of simulation period in 2020. Due to the 10% effect of societal ideology and the delay in the system, this value is not going to reach the exact equal proportion, yet shows an improvement.

3. As stated in the Worldbank programs for gender in Indonesia and the interviews, women's needs are still not accommodated by the government or by the companies. (The Worldbank, 2013). Thus, *policymakers development of policies to support and accommodate women's needs in the labor market* i.e. Lactation rooms, (affordable) childcare services, parental leave polices, etc, Since this policies positively affects women's employment, the value of state ideology in the model would increase, and will be set to 0.75, showing a strong endorsement for women to participate actively in employment. The graph in figure 31 shows that women's employment proportions rises gradually and reaches 0.465 (47%) by the end of simulation period in 2020. With this policy, the women's employment proportion does not reach the value of equality precisely, which is due to the strong influence of gender role ideology in Indonesia. However, this policy also shows an improvement of women's employment proportion.

From the figure below, we conclude that the gender inequality in the labor market in Indonesia can be improved by performing at least one of the three scenarios of policy recommendations.

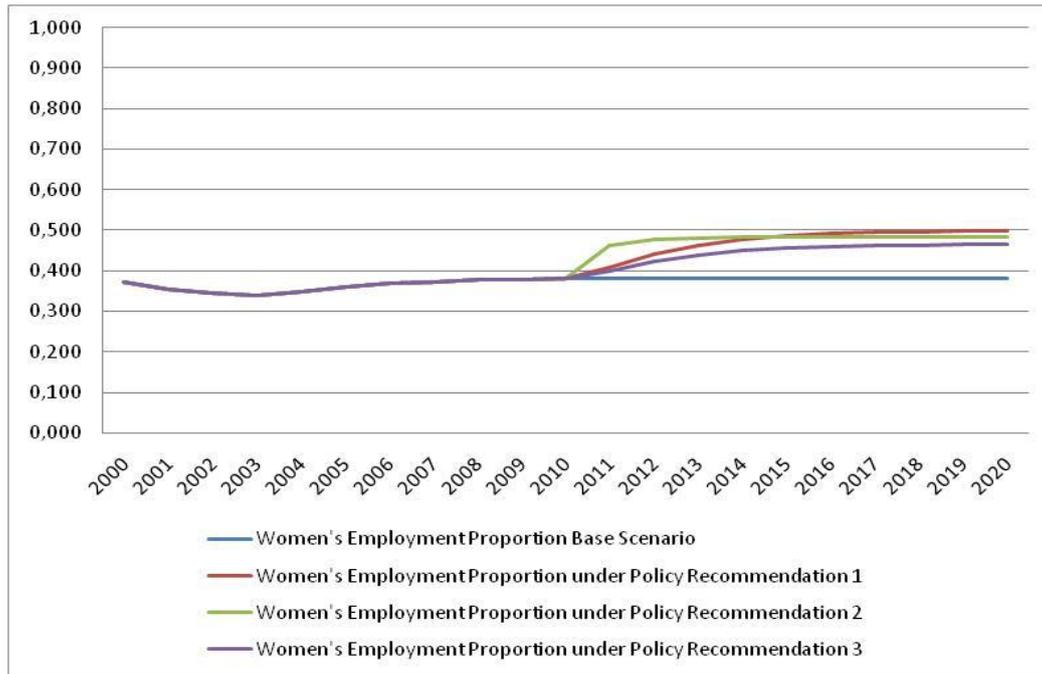


Figure 13. Simulated Behavior of Women’s Employment Proportion under the Three Policy Recommendation

Conclusion and Discussion

This study aimed to explain and test the constant low the proportion of women in employment in Indonesia. Even when Indonesia implemented EEO policies in 2003, the proportion of women in the labour market showed only little change. It remained constant for the past ten years (2000 to 2010). In this study, a formal SD model was built in order to answer the research question “What is the dynamic structure underlying the behavior of the the proportion of women in employment in Indonesia?”. This research question was answered in three steps. First, the explanation of the main dynamic hyphothesis is that the number of women in employment and men in employment are affected by the gender role ideology that is applied in Indonesia. This gender role ideology is formed by the state ideology and the societal ideology. The state ideology seems to support women to join the labor market while the societal ideology is hindering women to participate in the labor market. Second, validity tests have been conducted to test the robustness of the developed model. Last, some policy scenarios have been tested. Those scenarios are: (1) policymakers implement a campaign to stimulate women’s employment, or (2) better implementation of the law of women empowerment or gender equality, and (3) policymakers development of policies to support and accommodate women’s needs in the labor market. By implementing these scenarios, the value of women’s employment proportion is expected to increase to the level of equality (50%).

As a remark, this study is expected to contribute to better conditions in the labor market in Indonesia. However, it is important to note that although the model is able to replicate and predict the women’s employment ratio, this model should be viewed as a diagnostic guide rather than as an accurate prediction of the system viewed more (Chun Chun, 2012)

Limitation and Further Research

We realize that there are still unavoidable shortcomings and limitations that could be a guidance and suggestion for further research. First of all, the translation of the variable of ideology into quantitative values can be debated. Carrying out more interviews, distributing questionnaires or other methods may to improve quantifying these variables. Though SD models rely heavily on feedback loop, there were only few main loops identified in this model. In fact, there is no feedback from the indicator of the problem (women's employment proportion) to any other variables. Further research may emphasize the reinforcing effect of this variable. Third, due to a lack of information some variables (parameters) are treated exogenously. And last, SD models are a simplified version of the real problem. The model does not include all elements or factors that might have an effect on the problem. Therefore, possible extentions of the model for further research are suggested, by adding unemployment structure or economic growth to the current model. Considering all the limitations above, this study may serve as a basis for further research in the same topic.

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APPENDIX 1

The Complete Model (using Vensim® PLE)

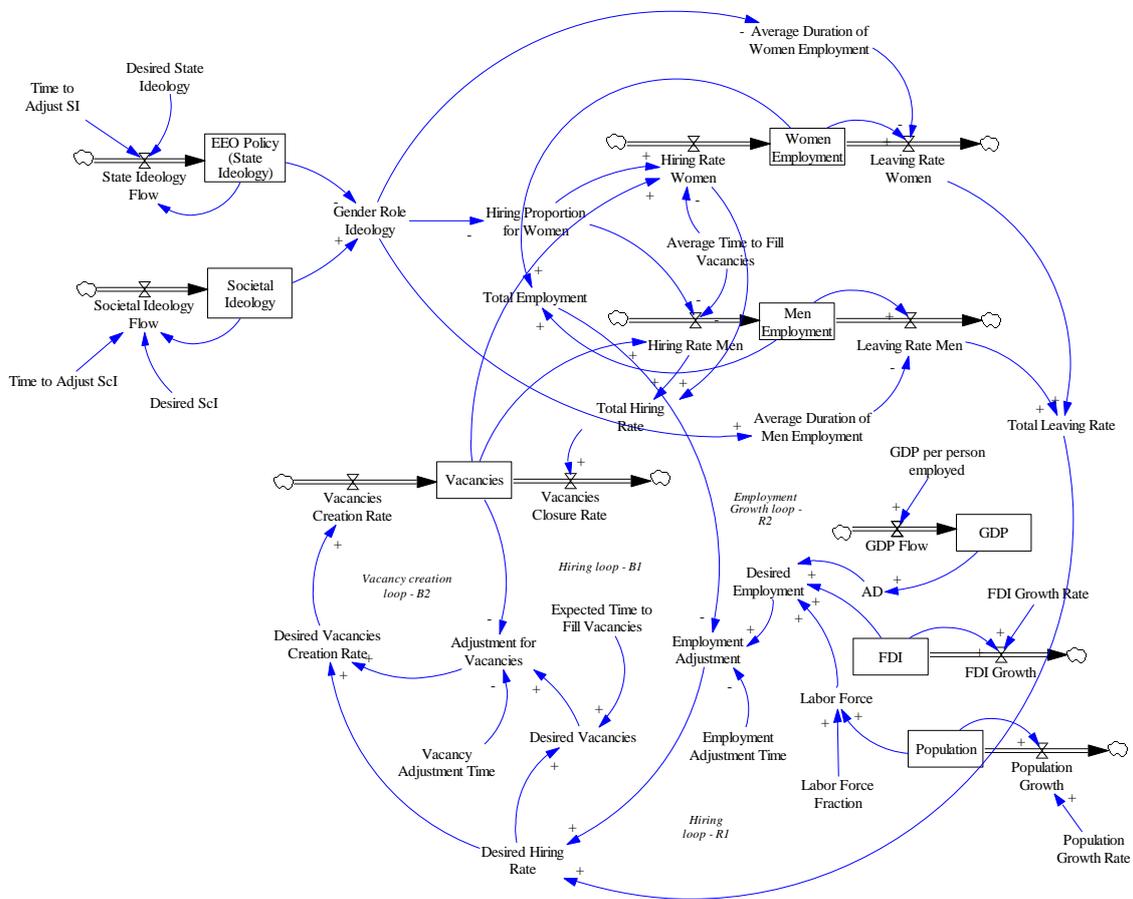


Figure 1A. The Complete SFD using Vensim® PLE

APPENDIX 2

Comparison Graph (using iThink 9.1.4)

A. Reference Mode Test: Comparison Graph of Simulated Behavior of Certain Variable with Its Actual Data (520 weeks/10 years from 2000 to 2010)

1. Total Employment

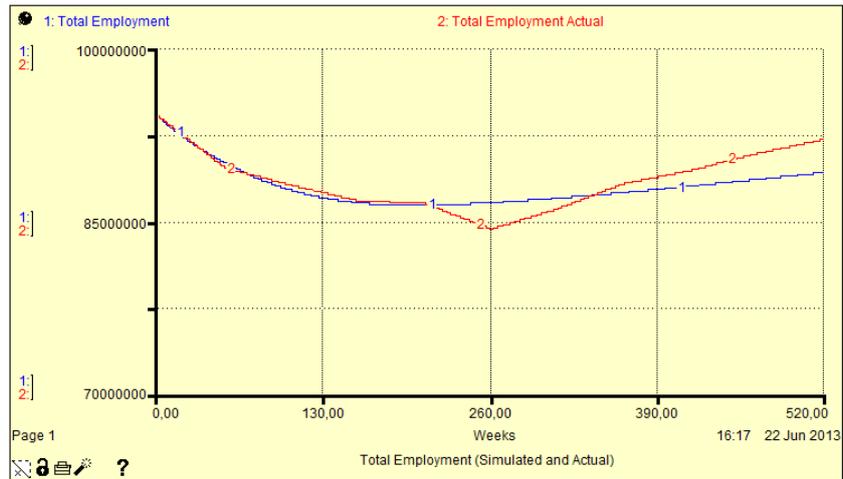


Figure 2A. Simulated Behavior Compared with The Reference Mode for Total Employment

2. Men in Employment



Figure 3A. Simulated Behavior Compared with The Reference Mode for Men in Employment

3. Women in Employment

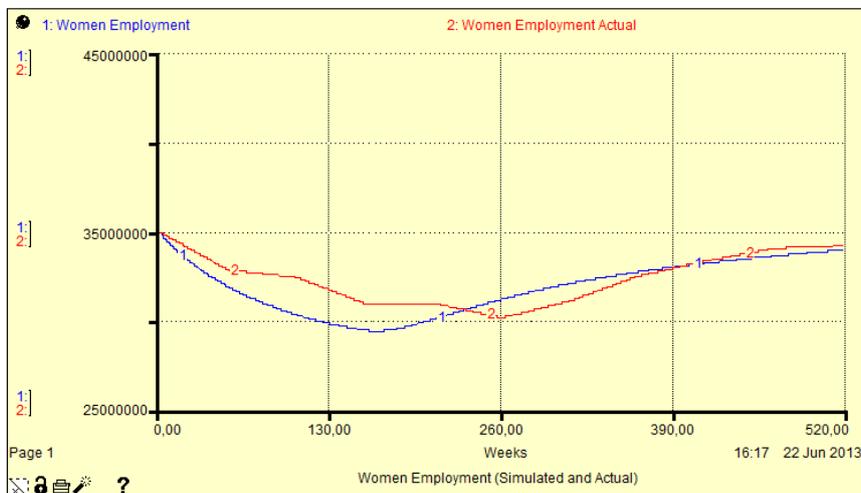


Figure 4A. Simulated Behavior Compared with The Reference Mode for Women in Employment

4. Population

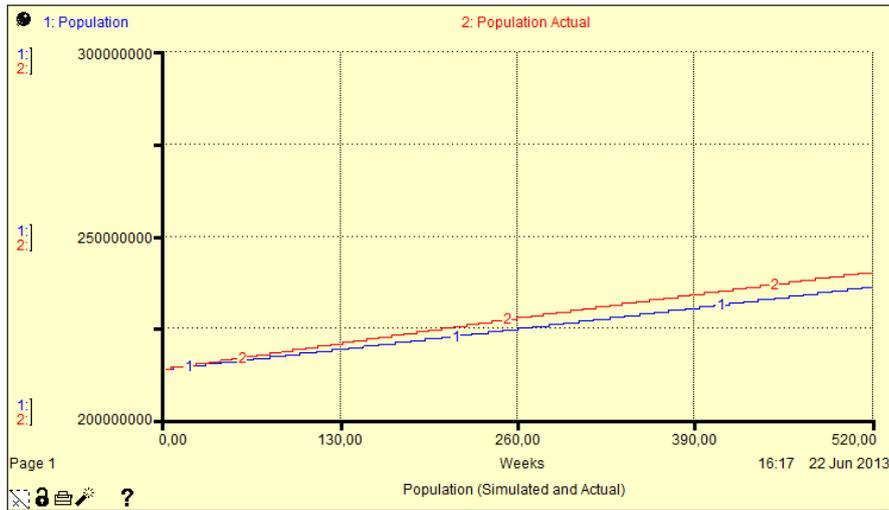


Figure 5A. Simulated Behavior Compared with The Reference Mode for Population

B. Extreme Condition Test: Comparison Graph of Simulated Behavior of Certain Variable Under Normal Condition and Extreme Condition (1040 weeks/20 years from 2000 to 2020)

Extreme Condition Test 1

Scenario 1 : Base Run

Scenario 2 : Gender role ideology in Indonesia holds the strongest patriarchal norms (GRI = 1)

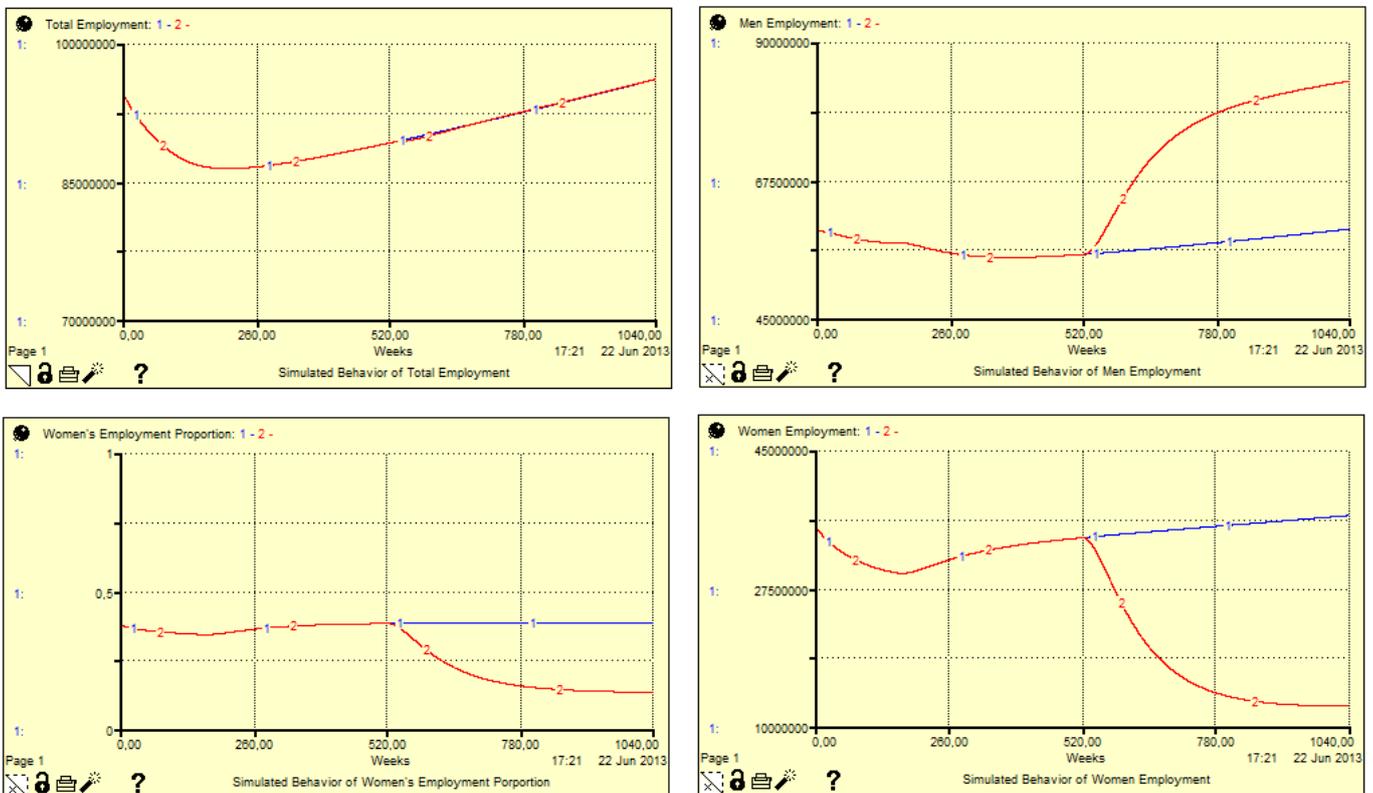


Figure 6A. Total Employment, Men in Employment, Women in Employment, and Women's Employment Proportion under Extreme Condition Test 1

The figure above (figure 6A) compares the graphs of a base run scenario and scenario where Gender Role Ideology holds its strongest patriarchal norms. Under the first extreme condition test, the proportion of men in employment increases significantly while the proportion of women in employment drops significantly. Because of the strong patriarchal norms nearly only men are hired. Only few women remain in employment since Indonesia is still having EEO policies. The proportion of women and men in employment may change but the the level of employment is not affected. Under this extreme condition, the model indeed shows the predicted behavior.

Extreme Condition Test 2

Scenario 1 : Base Run
 Scenario 2 : EEO Policies are fully applied

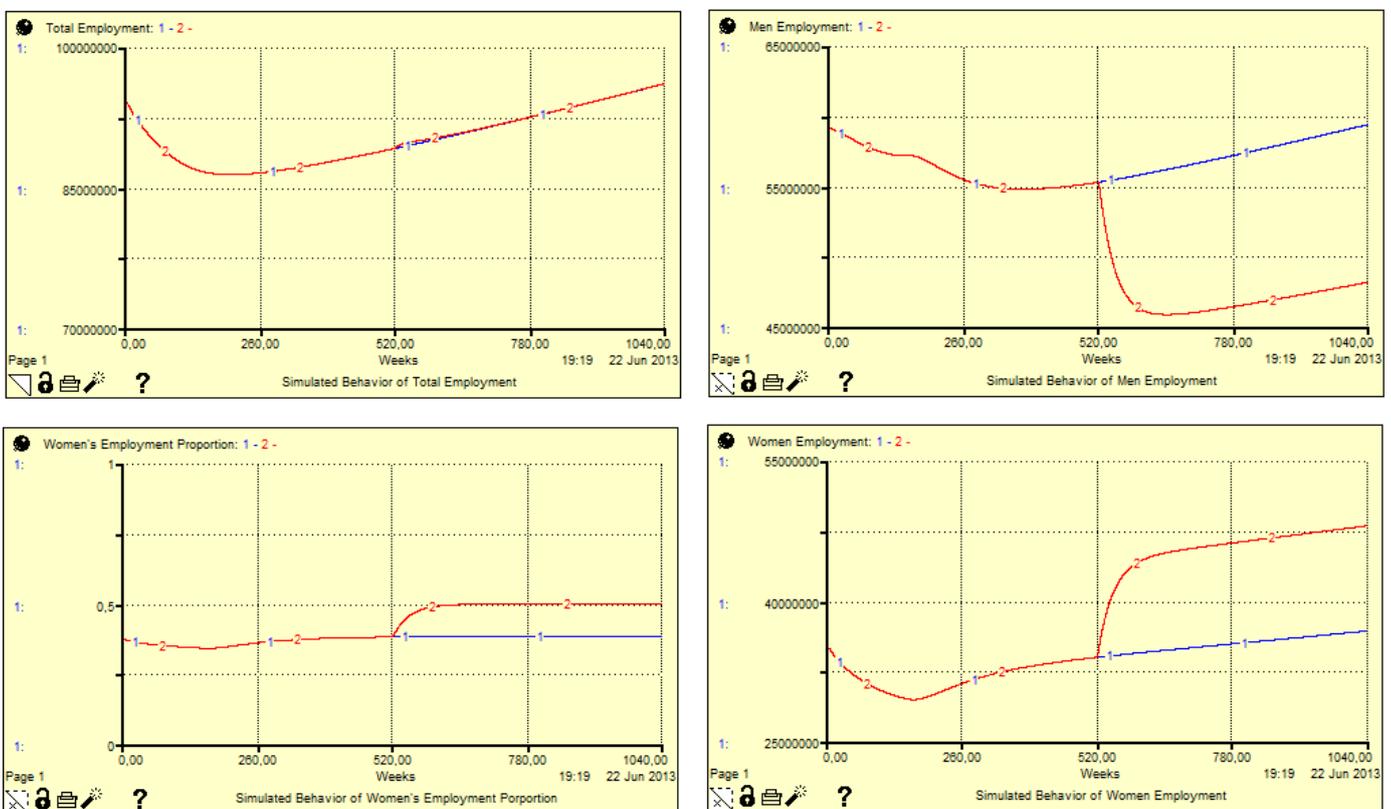


Figure 7A. Total Employment, Men in Employment, Women in Employment, and Women's Employment Proportion under Extreme Condition Test 2

Figure 7A shows the simulated behavior of the base run scenario and under the second extreme condition test. After EEO policies become fully in operation in Indonesia, the number of men in employment decreases while the number of women in employment increases. They are moving towards gender balance. Men in employment are approaching the number of 50million, while women in employment is approaching the value of 45million. Due to delay, a gap in the number of women and men in employment remains.

c. Parameter Sensivity Test: Comparation Graph of Simulated Behavior of Certain Variable Under Normal and Extreme Condition (20 years/1040 weeks, 2000 to 2020)

Parameter Sensivity Test 1

- Scenario 1 : Base Run
- Scenario 2 : The Vacancy Adjustment Time is set to 2 years
- Scenario 3 : The Vacancy Adjustment Time is set to 10 years

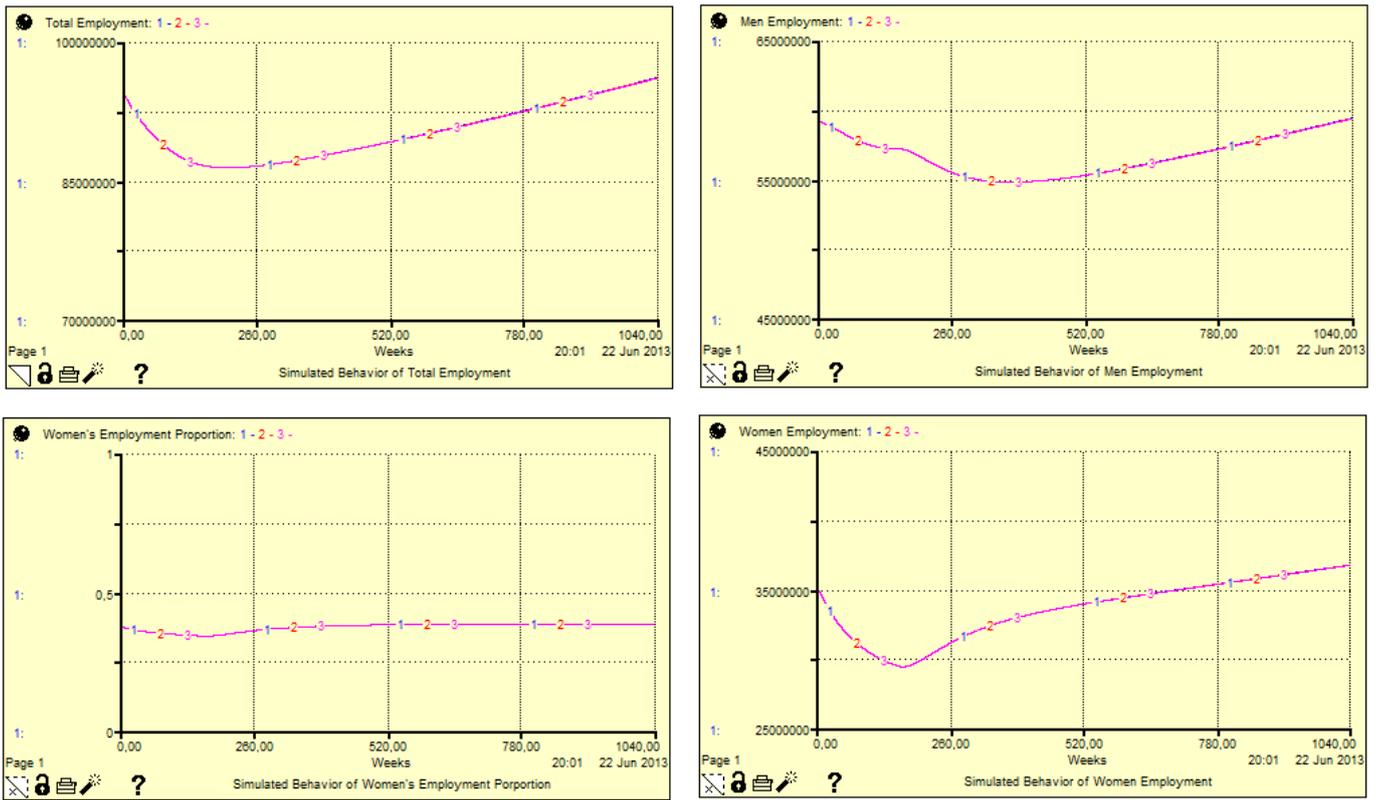


Figure 8A. Total Employment, Men in Employment, Women in Employment, and Women's Employment Proportion under Parameter Sensivity Test 1

Parameter Sensitivity Test 2

- Scenario 1 : Base Run
- Scenario 2 : Societal Ideology Power 0.9
- Scenario 3 : Societal Ideology Power 0.5

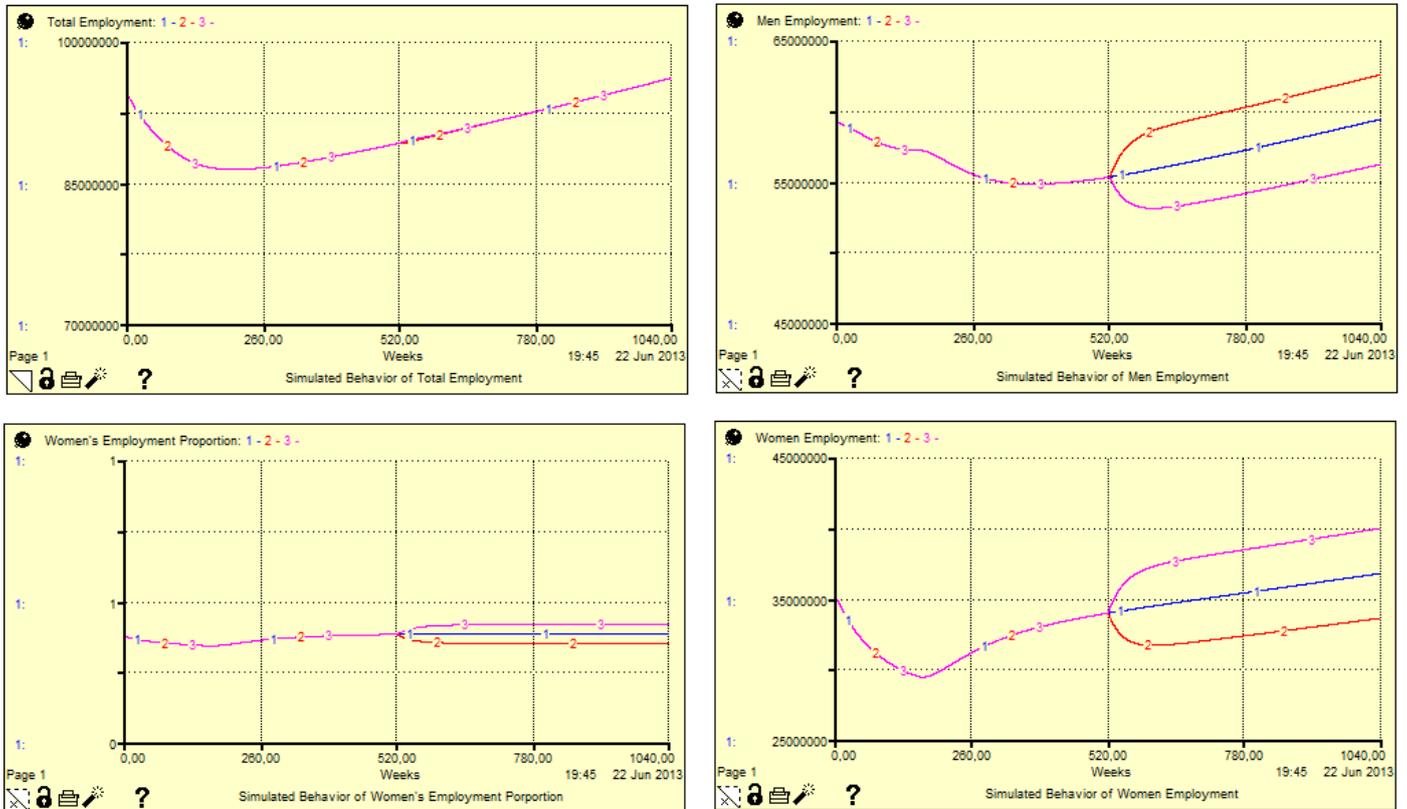


Figure 9A. Total Employment, Men in Employment, Women in Employment, and Women's Employment Proportion under Parameter Sensitivity Test 2

Parameter Sensitivity Test 3

- Scenario 1 : Base Run
- Scenario 2 : Desired Societal Ideology 0.55
- Scenario 3 : Desired Societal Ideology 0.75

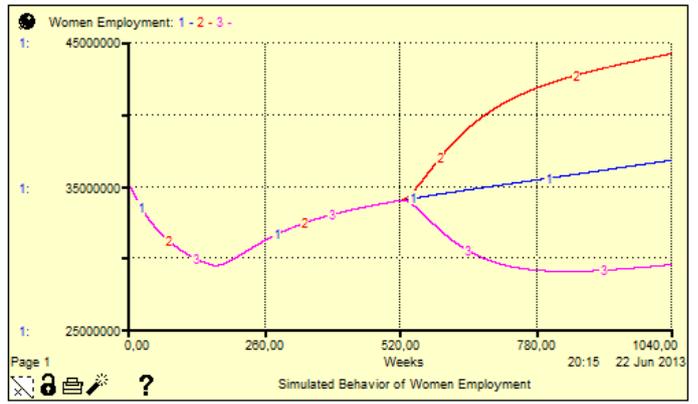
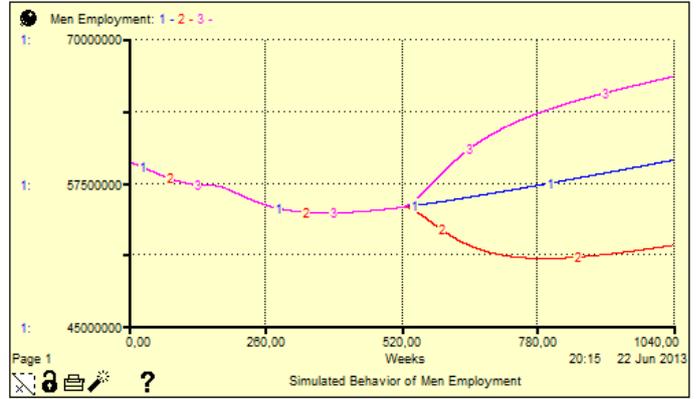
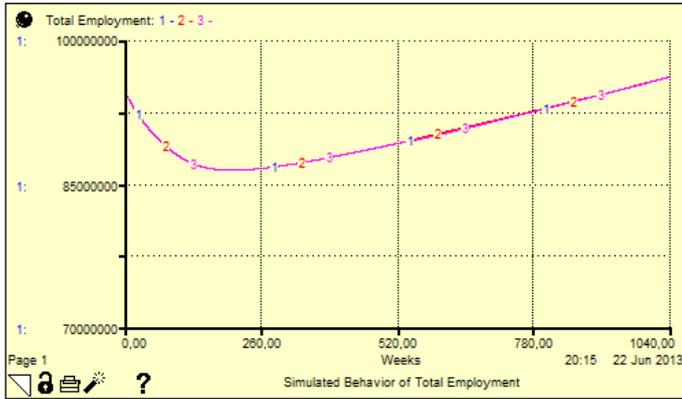


Figure 10A. Total Employment, Men in Employment, Women in Employment, and Women's Employment Proportion under Parameter Sensitivity Test 3

Parameter Sensitivity Test 4

- Scenario 1 : Base Run
- Scenario 2 : Desired State Ideology 0.3
- Scenario 3 : Desired State Ideology 0.7

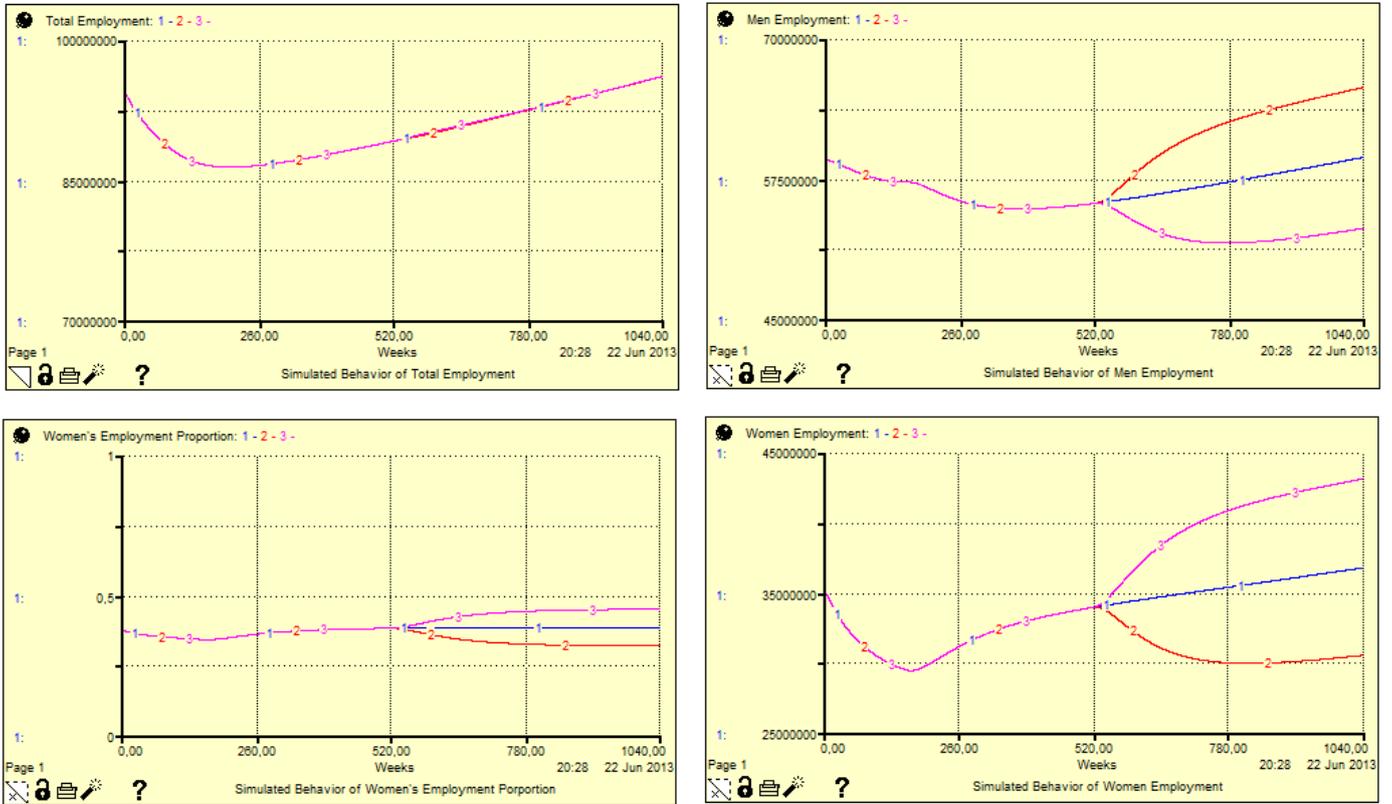


Figure 11A. Total Employment, Men in Employment, Women in Employment, and Women's Employment Proportion under Parameter Sensitivity Test 4

d. Future Projections (20 years/1040 weeks, 2000 to 2020)

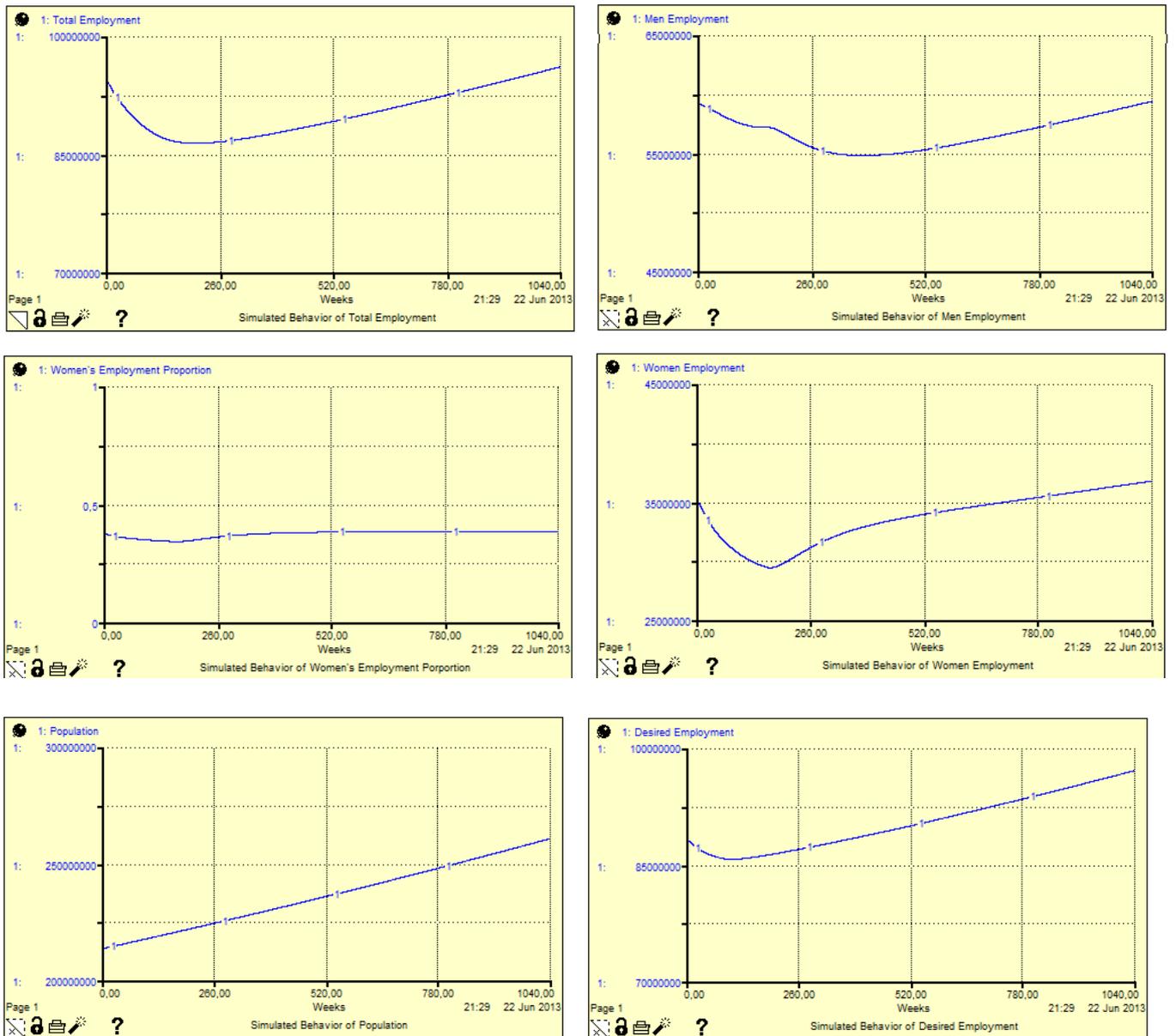


Figure 13A. Future Projection of Total Employment, Men in Employment, Women in Employment, Women's Employment Proportion, Population, and Desired Employment

APPENDIX 3

List of Equations (using iThink 9.1.4)

$$\text{FDI}(t) = \text{FDI}(t - dt) + (- \text{FDI_Changes}) * dt$$

$$\text{INIT FDI} = 0.1 * \text{GDP}$$

OUTFLOWS:

$$\text{FDI_Changes} = \text{FDI} * \text{FDI_Growth_Rate}$$

$$\text{GDP}(t) = \text{GDP}(t - dt) + (\text{Change_in_GDP}) * dt$$

$$\text{INIT GDP} = 559744217646/1000000$$

INFLOWS:

$$\text{Change_in_GDP} = (\text{Desired_GDP} - \text{GDP}) / \text{Adj_GDP_Time}$$

$$\text{Men_Employment}(t) = \text{Men_Employment}(t - dt) + (\text{Hiring_Rate_Men} - \text{Leaving_Rate_Men}) * dt$$

$$\text{INIT Men_Employment} = 59169591$$

INFLOWS:

$$\text{Hiring_Rate_Men} =$$

$$\text{Max}((\text{Vacancies_Available_for_Men} / \text{Avg_Time_to_Fill_Vacancies}), 0)$$

OUTFLOWS:

$$\text{Leaving_Rate_Men} =$$

$$\text{Men_Employment} / \text{Average_Men_Retirement_Year}$$

$$\text{Population}(t) = \text{Population}(t - dt) +$$

$$(\text{Population_Growth}) * dt$$

$$\text{INIT Population} = 213395411$$

INFLOWS:

$$\text{Population_Growth} =$$

$$\text{Population} * \text{Population_Growth_rate}$$

$$\text{Societal_Ideology}(t) = \text{Societal_Ideology}(t - dt) + (\text{Change_in_ScI}) * dt$$

$$\text{INIT Societal_Ideology} = \text{GRI_Perceived}$$

INFLOWS:

$$\text{Change_in_ScI} =$$

$$\text{ScI_Adjustment} / \text{Time_to_Adjust_ScI}$$

$$\text{State_Ideology}(t) = \text{State_Ideology}(t - dt) + (\text{Changes_in_State_Ideology}) * dt$$

$$\text{INIT State_Ideology} = \text{GRI_Perceived}$$

INFLOWS:

$$\text{Changes_in_State_Ideology} =$$

$$(\text{Desired_State_Ideology} - \text{State_Ideology}) / \text{Adj_Time_for_State_Ideology}$$

$$\text{Vacancies}(t) = \text{Vacancies}(t - dt) + (\text{Vacancy_Creation_Rate} - \text{Vacancy_Closure_Rate}) * dt$$

$$\text{INIT Vacancies} = \text{Desired_Vacancies}$$

INFLOWS:

$$\text{Vacancy_Creation_Rate} =$$

$$\text{MAX}(0, \text{Desired_Vacancy_Creation_Rate})$$

OUTFLOWS:

$$\text{Vacancy_Closure_Rate} = \text{Total_Hiring_Rate}$$

$$\text{Women_Employment}(t) = \text{Women_Employment}(t - dt) + (\text{Hiring_Rate_Women} - \text{Leaving_Rate_Women}) * dt$$

$$\text{INIT Women_Employment} = 34923403$$

INFLOWS:

$$\text{Hiring_Rate_Women} =$$

$$\text{Max}((\text{Vacancies_Available_for_Women} / \text{Avg_Time_to_Fill_Vacancies}), 0)$$

OUTFLOWS:

$$\text{Leaving_Rate_Women} =$$

$$\text{Women_Employment} / \text{Average_Women_Retirement_Year}$$

$$\text{AD} = \text{G} + \text{C} + \text{I} + \text{X} - \text{M}$$

$$\text{Adjustment_for_Vacancies} = (\text{Desired_Vacancies} - \text{Vacancies}) / \text{Vacancy_Adjustment_Time}$$

$$\text{Adj_for_Employment} = (\text{Desired_Employment} - \text{Total_Employment}) / \text{Employment_Adj_Time}$$

$$\text{Adj_GDP_Time} = 3 * 52$$

$$\text{Adj_Time_for_State_Ideology} =$$

$$\text{Adj_Time_for_State_Ideology_PST}$$

$$\text{Adj_Time_for_State_Ideology_Policy} = 5 * 52$$

$$\text{Adj_Time_for_State_Ideology_PST} = (1 - \text{Policy_Act_5}) * \text{Adj_time_for_State_Ideology_Actual}$$

+

$$\text{Policy_Act_5} * \text{Adj_Time_for_State_Ideology_Policy}$$

$$\text{AD_per_Population_Ratio} = \text{AD} / \text{Population}$$

$$\text{Adj_time_for_State_Ideology_Actual} = 2 * 52$$

$$\text{Average_Men_Retirement_Year} =$$

$$\text{Average_Retirement_Year} * \text{Effect_to_Men}$$

$$\text{Average_Retirement_Year} = 30$$

$$\text{Average_Women_Retirement_Year} =$$

$$\text{Average_Retirement_Year} * \text{Effect_to_Women}$$

$$\text{Avg_Time_to_Fill_Vacancies} = 12$$

$$\text{C} = \text{GDP} * \text{Percentage_of_Consumption}$$

$$\text{Desired_Employment} =$$

$$\text{LF} * \text{Effect_of_AD_on_DE} * \text{Effect_of_FDIAD_on_DE}$$

$$\text{Desired_GDP} =$$

$$\text{Total_Employment} * \text{GDP_per_Person_Employed} / 1000000$$

$$\text{Desired_Hiring_Rate} =$$

$$\text{Exp_Attrition_Rate} + \text{Adj_for_Employment}$$

Desired_ScI =
 Desired_Societal_Ideology_ECT_or_PST
 Desired_Societal_Ideology_Actual = 0.65
 Desired_Societal_Ideology_ECT_or_PST = (1-
 Policy_Act_2)*Desired_Societal_Ideology_Actual
 +
 Policy_Act_2*Desired_Societal_Ideology_Policy
 Desired_Societal_Ideology_Policy = 0.5
 Desired_State_Ideology = (1-
 Policy_Act)*GRI_Perceived
 +
 Policy_Act*EEO_Policy
 Desired_State_Ideology_Actual = 0.5
 Desired_Vacancies =
 MAX(0,Exp_Time_to_Fill_Vacancies*Desired_Hi
 ring_Rate)
 Desired_Vacancy_Creation_Rate =
 Adjustment_for_Vacancies+Desired_Hiring_Rate
 Desired__State_Ideology_Policy = 0.75
 Desired__State_Ideology_Policy_After = 1-
 Desired__State_Ideology_Policy
 EEO_Policy = EEO_Policy_PR
 EEO_Policy_PR = (1-
 Policy_Act_6)*Desired_State_Ideology_Actual
 +
 Policy_Act_6*Desired__State_Ideology_Policy_Af
 ter
 Employment_Adj_Time = 1*52
 Exp_Attrition_Rate = Total_Leaving_Rate
 Exp_Time_to_Fill_Vacancies =
 DELAY(Avg_Time_to_Fill_Vacancies,3)
 FDI_Growth_Rate = 0.01/52
 FDI_per_AD_Ratio = FDI/AD
 G = GDP*Percentage_of_Govt_Spending
 GDP_per_Person_Employed = 8000
 Gender_Role_Ideology =
 (Societal_Ideology*Societal_Ideology_Power)+(St
 ate_Ideology*State_Ideology_Power)
 GRI_Perceived = WEP_effect_to_GRI_Perceived
 I = GDP*Percentage_of__Investment
 LF = Population*LF_fraction_to_Population
 LF_fraction_to_Population = 0.45
 M = GDP*Percentage_of_Import
 Percentage_of_Consumption = 0.58
 Percentage_of_Expors = 0.3
 Percentage_of_Govt_Spending = 0.08
 Percentage_of_Import = 0.28
 Percentage_of__Investment = 0.23
 Policy_Act =
 if(Policy_Switch=1)and(time>Year_of_Policy)then
 (Policy_Switch)else(0)

Policy_Act_2 =
 if(Policy_Switch_2=1)and(time>Year_of_Policy_2
)then(Policy_Switch_2)else(0)
 Policy_Act_3 =
 if(Policy_Switch_3=1)and(time>Year_of_Policy_3
)then(Policy_Switch_3)else(0)
 Policy_Act_4 =
 if(Policy_Switch_4=1)and(time>Year_of_Policy_4
)then(Policy_Switch_4)else(0)
 Policy_Act_5 =
 if(Policy_Switch_5=1)and(time>Year_of_Policy_5
)then(Policy_Switch_5)else(0)
 Policy_Act_6 =
 if(Policy_Switch_6=1)and(time>Year_of_Policy_6
)then(Policy_Switch_6)else(0)
 Policy_Switch = 1
 Policy_Switch_2 = 0
 Policy_Switch_3 = 0
 Policy_Switch_4 = 0
 Policy_Switch_5 = 0
 Policy_Switch_6 = 1
 Population_Growth_rate = 0.01/52
 ScI_Adjustment = Desired_ScI-Societal_Ideology
 Societal_Ideology_Power =
 Societal_Ideology_Power_ECT_or_PST
 Societal_Ideology_Power_Actual = 0.7
 Societal_Ideology_Power_ECT_or_PST = (1-
 Policy_Act_3)*Societal_Ideology_Power_Actual
 +
 Policy_Act_3*Societal_Ideology_Power_Policy
 Societal_Ideology_Power_Policy = 0.1
 State_Ideology_Power = Total_Power-
 Societal_Ideology_Power
 Time_to_Adjust_ScI = 2*52
 Total_Employment =
 Men_Employment+Women_Employment
 Total_Employment_Actual =
 Men_Employment_Actual+Women_Employment_
 Actual
 Total_Hiring_Rate =
 Hiring_Rate_Men+Hiring_rate_Women
 Total_Leaving_Rate =
 Leaving_Rate_Men+Leaving_Rate_Women
 Total_Power = 1
 Vacancies_Available_for_Men =
 Vacancies*Gender_Role_Ideology
 Vacancies_Available_for_Women = Vacancies*(1-
 Gender_Role_Ideology)
 Vacancy_Adj_Time_Actual = 1*52
 Vacancy_Adj_Time_Policy = 10*52
 Vacancy_Adj_Time_PST = (1-
 Policy_Act_4)*Vacancy_Adj_Time_Actual

+ (0.00, 3.5e+007), (52.0, 3.3e+007), (104, 3.2e+007), (156, 3.1e+007), (208, 3.1e+007), (260, 3e+007), (312, 3.1e+007), (364, 3.2e+007), (416, 3.3e+007), (468, 3.4e+007), (520, 3.4e+007)

Policy_Act_4*Vacancy_Adj_Time_Policy
 Vacancy__Adjustment_Time =
 Vacancy_Adj_Time_PST
 Women's_Employment_Proportion =
 Women_Employment/Total_Employment
 Women's_Employment_Proportion_Actual =
 Women_Employment_Actual/Total_Employment_Actual
 X = GDP*Percentage_of_Exp
 Year_of_Policy = 3*52
 Year_of_Policy_2 = 10*52
 Year_of_Policy_3 = 10*52
 Year_of_Policy_4 = 10*52
 Year_of_Policy_5 = 10*52
 Year_of_Policy_6 = 10*52
 Effect_of_AD_on_DE =
 GRAPH(AD_per_Population_Ratio)
 (0.00, 1.00), (0.0005, 1.00), (0.001, 1.00), (0.0015, 1.01), (0.002, 1.01), (0.0025, 1.02), (0.003, 1.03), (0.0035, 1.04), (0.004, 1.06), (0.0045, 1.07), (0.005, 1.10)
 Effect_of_FDIAD_on_DE =
 GRAPH(FDI_per_AD_Ratio)
 (0.05, 0.8), (0.065, 0.81), (0.08, 0.832), (0.095, 0.858), (0.11, 0.904), (0.125, 0.99), (0.14, 1.06), (0.155, 1.13), (0.17, 1.16), (0.185, 1.18), (0.2, 1.20)
 Effect_to_Men = GRAPH(Gender_Role_Ideology)
 (0.00, 0.75), (0.1, 0.8), (0.2, 0.85), (0.3, 0.9), (0.4, 0.95), (0.5, 1.00), (0.6, 1.00), (0.7, 1.00), (0.8, 1.00), (0.9, 1.00), (1, 1.00)
 Effect_to_Women =
 GRAPH(Gender_Role_Ideology)
 (0.00, 1.00), (0.1, 1.00), (0.2, 1.00), (0.3, 1.00), (0.4, 1.00), (0.5, 1.00), (0.6, 0.95), (0.7, 0.9), (0.8, 0.85), (0.9, 0.8), (1, 0.75)
 Men_Employment_Actual = GRAPH(TIME)
 (0.00, 5.9e+007), (52.0, 5.7e+007), (104, 5.6e+007), (156, 5.6e+007), (208, 5.6e+007), (260, 5.4e+007), (312, 5.5e+007), (364, 5.6e+007), (416, 5.6e+007), (468, 5.7e+007), (520, 5.8e+007)
 Population_Actual = GRAPH(TIME)
 (0.00, 2.1e+008), (52.0, 2.2e+008), (104, 2.2e+008), (156, 2.2e+008), (208, 2.2e+008), (260, 2.3e+008), (312, 2.3e+008), (364, 2.3e+008), (416, 2.3e+008), (468, 2.4e+008), (520, 2.4e+008)
 WEP_effect_to_GRI_Perceived =
 GRAPH(Women's_Employment_Proportion)
 (0.00, 1.00), (0.1, 0.9), (0.2, 0.8), (0.3, 0.7), (0.4, 0.6), (0.5, 0.5), (0.6, 0.4), (0.7, 0.3), (0.8, 0.2), (0.9, 0.1), (1, 0.00)
 Women_Employment_Actual = GRAPH(TIME)