

Transform of Anger to Acquaintance – SD model of “Tempest”

Toru Suetake

Japan Futures Research Center
ts178051@yahoo.co.jp

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Abstract: Beneficiaries of infrastructure development project assisted by ODA (Official Development Aid) include areas and countries experienced conflict and violence. People of those country lives in peace and order presently, however, still they keep negative emotion deeply in their mind. International donors request to Including mitigation program in such development project for such country for mitigate negative emotion and leading success to achieve the objective of the project. Author had some experience of those mitigation program and find luck of quantitative model based on theoretical framework for supporting the program. Author develop theoretical framework of changing anger and hate to forgiveness based on concept of the tipping point. Unfortunately, it is difficult to conduct social research for confirm effectiveness of this model. As alternative way of social research, author use Shakespeare’s *Tempest* (1612) as scenario for test and validate this model. This paper aims to show introduce system dynamics model for mitigation program.

Secondly, author hopes more System Dynamics (SD) model should be developed and used for analyzing world literature. There are only 3 quantitative models using SD for study literature. Two of them aim to teaching English in secondary education. These two models only focus to analyze changing of hero’s mind in the story, but not consider any of historical and environmental background of that literature. Since apply SD model for world literature may new and few, it may useful to use socio-economic framework, such as balanced score card widely used in management science. Gladwell’s *Tipping Point* (2000) is one of such frameworks and it help to understand *Tempest* much better. Second aim of this paper promoting application of SD to world literature to increasing more case.

1. Introduction

Projects and program assisted by foreign aid (ODA: Official Development Aid) including countries and areas experienced conflict and violence as target area, such as East Timor and Nepal. International assistance organization normally requests to including mitigation program to such projects. Autor has experience to conduct such mitigation program in the infrastructure development project of such country and surprise to find the program is based on heuristic, lack of theoretical framework, as well as measurement and evaluation are not quantified.

Firstly, the mitigation program looked truly considers attention for melting tension between people who has negative emotion deeply in their heart. Or, at least that does not be quantitatively measured. The program just tries to set opportunity to meet people dislike each other and chance to have conversation as one of participants. Major objective of the

mitigation program is get agreement from participants for avoid resistance to the project, but of course slightly hope to get their support and ownership. In this situation, I need some model for understanding how mind of people shift from anger and hate to acquaintance, what is major factors and leverage points as well as some measurement or at least some indicator to get guts feeling of the mitigation keeps on right track.

Normally, any type of quantitative model should be verified or confirmed their adaptability with fieldwork case studies. It means I should conduct social survey (questionnaire survey) to people in countries and areas that has experience of conflict and violence, and then find right figure of parameters, verify and ensure model could be useful at practical level. However, this type of survey for confirm my mitigation model is quite sensitive as well as I do not have any connection and funds to carry on such survey. Instead, as alternative, I use world classical literature theming change of anger to forgiveness for scenario and validation of the model. And for validation scenario, I use *Tempest* by William Shakespeare (1612).

Second objection is intention to increasing number of cases on SD: System Dynamics adaptation to literature. Adaptation of SD to literature mainly conducted in K12 education for teaching English. There are two quantitative model adapting to literature, namely *Hamlet*, and *Romeo and Juliet*. These models focus to show specifically dynamics of hero’s or heroine’s mental emotion in the story. Also, these messages as dynamics of mental emotion are unquids, whatever in any era and in any counties. Pure love in *Romeo and Juliet* may beautiful, and human could not keep his mind steady and firm as *Hamlet*. It is of course very important lesson students and pupil must learn in secondary education. Such dynamics are sort of truth on humanity. However, literature in high education rather force to understand considering background of stories, believe of author, or people’s sort of common sense at that time. Definitory common way of thinking by people in those days drive behavior of hero or heroine. And some common way of thinking differs by era and area people live. If we try to understand the world literature considering circumstance and environment surrounding people on the story, we may learn from the story differently and SD quantitative modeling could be very powerful tool for analyze such structure surrounding the story. I will discuss this in later section.

Also, I believe using sort of framework for understanding the situation and structure may quite helpful to modeling the world literature. For example, Balanced Score Card or Resources Based View are sort of framework widely used for analyzing in management area. Why SD practitioner hesitate to adapt framework for understanding world literature? Of course, some researcher (but not SD practitioners) uses such framework for study of world literature, such as critical literature. This is way

to understand target world literature using with, such as theoretical concept of women's lib (gender equality), black power human right movement or colonialism and independent movement. It may no necessary to limiting critical literature for such framework but rather we could more easily and widely using other commonly adaptable frameworks including widely used in management or social science.

In this paper, I attempt to using the Tipping Point, one of famous sociological framework for such framework of modeling the world literature.

2. Literature review

Unfortunately there is no SD study analyze emotional change of human quantitatively aim to explain how emotion shift from anger and hate to acquaintance, as well as mechanism that cause such change.

2.1 SD models adapted world literature focus to analyze change of emotion

I find two quantitative models using for English class of high school education. One is on early issues of System Dynamics Review and other is on support material of Morecroft's textbook (2015, note-1).

Hamlet from Hopkins (1992) aims to show change of Hamlet's emotion regarding wiliness of revenge to his uncle who assassins his father, former king. This model evaluates quantitative value of event emerged in each scene of the play. This quantitative value drives emotion and behavior of Hamlet. Some emotions are accumulated and become power of avenge after exceed threshold when he meets chance to avenge. This model gives good example of how to describe world literature (play) with quantitative model. I was amused three things on this model, regarding quantification. Firstly, this model using 10 points scale for assess value of emotion emerged on every scene. Secondly, this model shows status of alive or dead with 1 or 0. Watching status of alive or dead with binary code looked quite impressive for me. Thirdly, input data discretely according progress of the play. SD practitioner normally insists continuous change, however, this model does not consider that.

However, as I already mentioned before briefly, this model lacks environmental structure surrounding Hamlet. Objective of this model is teaching universal human nature. Emotional change of Hamlet may universal as human nature, no matter where in any situation, is what high school teachers should teach to their students. That is why this model is simplified and omit environment surrounding Hamlet, or only focus change of Hamlet's emotion. Therefore, this model stop to including how common concept of noble people in middle age Denmark, or position of his finance that affect to feeling and behavior of Hamlet.

Second quantitative model is Romeo and Juliet by Anderson et al. (2012). Actually, I know this model from support material of textbook by Morecroft (2015). Again, this model focuses only emotional change between Romeo and Juliet. And change of emotion between this young couple shows continuously. This model ignores to explain how emotion progress by scene and acts of the play. I presume model developer wants to insist, love and passion between young couple would be universal, and high school student of same age with Romeo and Juliet may feel same way. Indeed, in the high school English class, teacher suggests to student what they do if they fall in love with

boyfriend (or girlfriend) her parents do not approve.

However, this model ignores environment surrounding Romeo and Juliet, nor consider more detail character of Juliet. They do make this model too much simplified.

2.2 SD model consider surrounding environment

Suetake (2011, 2013) insists consideration of environment surrounding people on world literature. This model incorporates such environments including conflict of two houses (family) and common idea of people in those days. Romeo is only son of the Montague and Juliet is only daughter of the Caplet. But two houses hate each other. This situation makes forbidden love to Romeo and Juliet. Secondly, noble male of that era (in West Europe, Northern Italy specially) believes the idea of man should behave brave, and man also should scarify his life for protect his (or his family) honor, as well as scarify to save honor of his male friends no matter whatever. This common belief or idea drives behavior of males on the story and cause the tragedy. Also, people believe they should keep the promise swear as name of god, even whatever in any situation. This is common idea and belief in high society of people in those days. Such idea influences the behavior of Juliet.

But some ideas of these days are not so strict in different ear. Since model structure for West Side Story (Louwrens 1957) in Suetake (2011, 2013) looked very similar with model of the Romeo and Juliet, this is no way, as author write this story based of Romeo and Juliet, but just change situation to 20th century New York. This author believes exactly same things may happen, because he just only changes situation (place and era), but not change any characters of people from original play. The author may not intend, however, this small change makes definitory difference because environment (people's idea of the era) is different and that makes stream of the story a bit difference.

In Romeo and Juliet, both these young people suicide themselves. However, in West Side Story, Maria does not suicide. The idea of considering common idea or common way of thinking in the era for understanding history is sort of core concept on the Future Studies (e.g. Ono 2010, Ariell 2010, and Morrow 2007), and I just adapt this concept to model of Romeo and Juliet. But this adaptation surely unveiling different insight of this world classic literature more than simply understanding this is love story and love is universal truth.

Although this model looked complicated, however, core concept is almost same with model of Andersen (2012). Difference is, this model has environment surrounding Romeo and Juliet, and adapt quantitative evaluation of events by scenes and acts of the play, and input that value discretely.

Added more, this model adapts concept of evolving model. From very simple model, feature added one by one depending progress of the story and makes more model more complex. First, shows only conflict situation between two houses as describe scene 1, act 1 of the play. Then added relation between Romeo and Juliet describes act 2. Then two core module links. This style may looked like the Story Telling of Stella.

2.3 Model using Tipping Point

Point of situation suddenly change from positive to negative, or stability to chaos called Tipping Point. Since my model using concept of Tipping Point, I must explain two models using

concept of Tipping point in SD study. Sterman (2000, Chapter 9, Section 6.2) explains Tipping point as threshold of chaotic situation (epidemic disease spread out) emerged from stability.

Taylor and Ford (2008) explains Tipping point on their project model. They explain Tipping Point as place to separate for shifting feedback loop to loop of reinforcing endless re-working or balance loop to reducing remaining works.

3. Model

3.1 Gladwell's Tipping Point using concept of the model

Previous two models use Tipping Point as threshold of shifting status from stable to chaos. But I think change the emotion of anger and hate to acquaintance is rather self-organizing activity, than falling into chaos.

Term of Tipping Point become famous from Gladwell's bestseller, "The Tipping Point: How Little Things Can Make a Big Difference" (2000) and he uses this concept more self-organizing for create ideal situation, such as humble shoe suddenly become famous brand, or small but continuous activity of keep repairing broken windows and catch small criminal in slum area change the place to safe place.

Gladwell (2000) insists 3 factors are necessary to shifting situation above Tipping Point. First factor is called The Law of the Few, composed Connector who connect people, Marven who provides idea and concept, and Salesman who sale such

marvelous idea and concept.

Second factor called The Stickiness Factor. This insists necessity of repeat to showing easy sample for understanding. Without using easily understanding sample, people understand only its surface. And if without repeating many times, people are so easy to forget. The Stickiness Factors shows system of repeating to ensure people's understanding.

Last factor is The Power of Contents, and it means information should have meaningful contents. If content has meaningful power, people would be influenced to act, but if not, people may not act.

Figure 1 show conceptual model for the mitigation program using Tipping Point as framework. In this model, emotion of the people is measured with "total emotion". This total emotion is combined with negative emotion of anger and hate, and positive emotion of forgiveness, as well as image of forgiveness, all represented as stock. Last stock, "image of forgiveness" backups and supports second stock. However, "cognition barrier" walls to mixing these emotions. "Image of forgiveness" was built with "Power of Contents" provided from Marven and strengthened by Stickiness Factor, that represented frequency of activity by Salesman. But this could be work after "Connector" connects Salesman and total emotion for remove cognitive barrier.

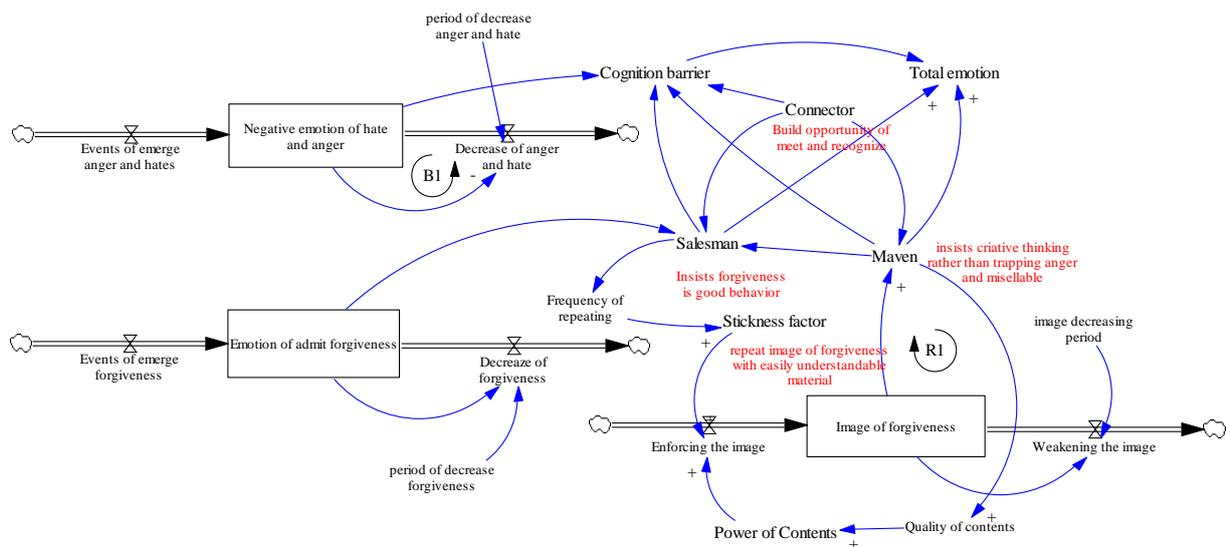


Figure 1: Conceptual model of mitigation program using Tipping Point on Gladwell (2000) (note-2)

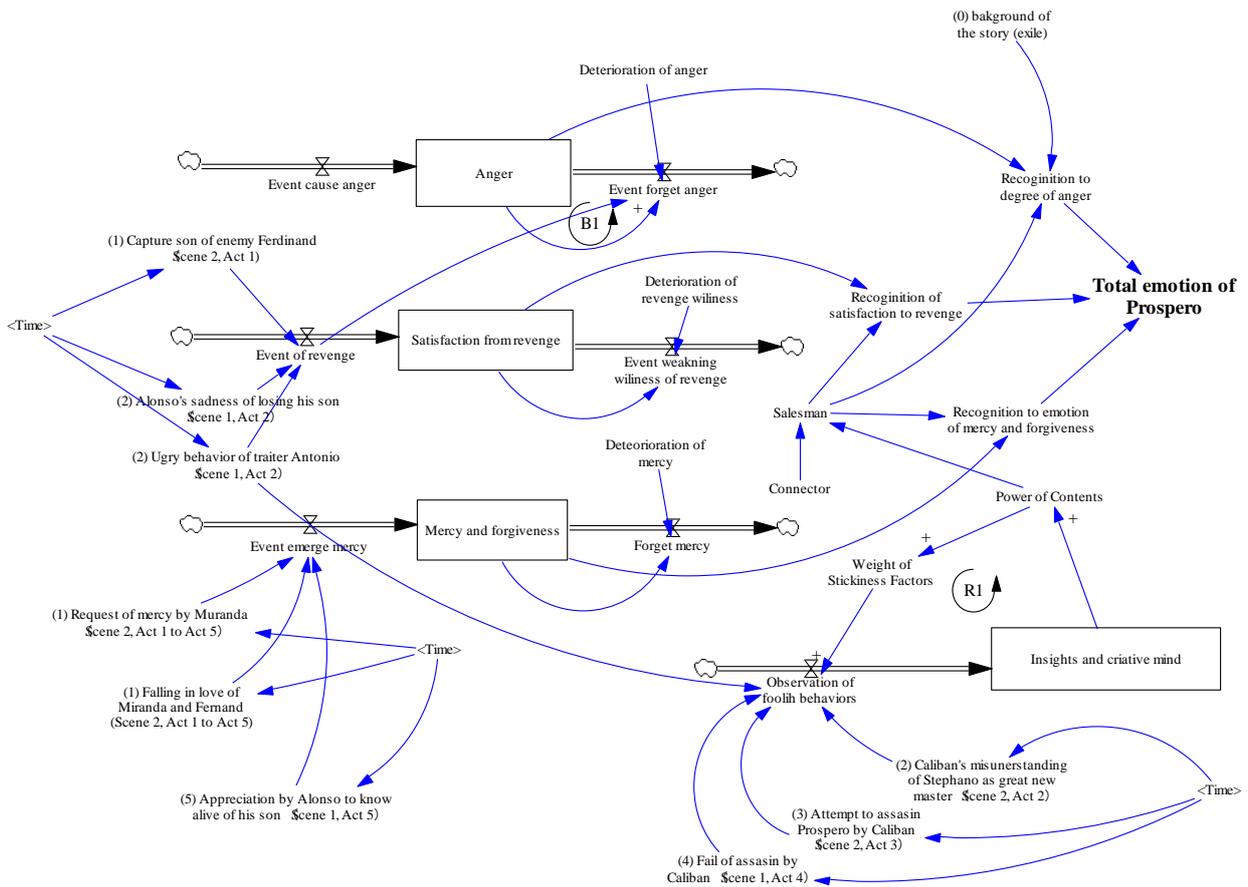


Figure 2: SD model of Tempest (note-2)

This model has two major feedback loops, R1 and B1. B1 weakening strength of negative emotion, however, hampered by “Cognition barrier”, deteriorated present value of negative emotion does not influence to “Total emotion” directly. On the other hand, R1 crate and enforcing “Power of contents” that show positive emotion. This R1 loop further enforced by stickiness factor. So, simply shifting negative emotion to positive emotion in total emotion happen when value of positive emotion exceeds more than value of negative emotion. However, things are a bit complicated. Cracking cognitive barrier is necessary for mixing negative emotion with positive emotion. And this cracking mechanism represented by law of few (connection among maven, salesman and connector supported by power of contents). Without this mechanism, it never success, as well as necessary to spend sufficient time for deterioration of negative emotion (anger and hate) and strengthening power of contents with stickiness factor.

This model can easily turn to mathematical equation with co-efficiency indicator. Normally, with field work of social survey, I could find sufficient value of co-efficiency parameters for such model purpose to evaluate development project. However, by nature of this model, I could not conduct such field survey for this study.

3.2 Model of Tempest

The model shown on Figure 2 is modified version from conceptual mode of the Tipping Point on Figure 1 for adapt to Tempest (Shakespeare, 1612). Table 1 shows roles and people

on the play or contents build by the story. This model focuses to combined emotion of Prospero, rightful Duke of Milan, main person of the story. Difference with the conceptual model is add new stock shows “satisfaction from revenge”, because he tries revenge and success to capture enemy’s son as hostage. He got some satisfaction. However, other stocks and variables are basically same with the conceptual model. In Law of the Few, Salesman and Maven represented by Miranda, daughter of Prospero as she always asking mercy and forgiveness to Prospero. Connector assumed as Ariel, servant of Prospero, who arrange to meet people including his enemy, Alonzo, king of Naples, and Stephano, king’s drunken butler.

Both model separate emotion with negative character and positive one, because anger and forgiveness are different. Emotion of anger and hate would be deteriorated by passing of time, however, it may never vanish completely. Just that value close to zero. In my experiences of the mitigation program, I understand people who had experience of conflict never ever forgive their enemy truly, but just stop to show emotion and try to behave normal, while they understand violence is criminal and also never consider to solving their anger with violence. But this is so fragile and melting such anger may need so long time as well as some agitation easily burning their anger again. So, emotion of negative character and positive character are not same, and it should be separate.

Gladwell (2000) insists the Stickiness Factors, that is trying of make understanding idea repeatedly for change emotion.

People can understand but that does not mean accept to change emotion. Gladwell insists stickily repeating to make understanding may necessary until people accept that idea. Otherwise, understanding remained only in surface. In this model, the Stickiness Factor represented by continuity of Miranda's request of mercy and this continuity strengthening stock value of "mercy and forgiveness".

Power of Contents repared by stock value of "Insights and creative mind". Prospero saw ugly behavior of Sebastian, brother of Alonso tries to assassinate his brother for usurping throne, and Antonio, usurper Duke of Milan tries to help (at Scene 1, Act 2). He also observes another similar ugliness by human when Stephano tries to kill him by request from Caliban, other servant of Prospero (at Scene 2, Act 3). He can understand human being is basically foolish ugly easy treater and his tragedy is not exception. From such insights, he also understanding trapping anger makes nothing but also foolish. Rather he should consider creative activity including support love of his beloved daughter Miranda to make her happy. Build and emerged such insights represented as stock of "insights and creative mind".

Although Anderson et al. (2012) adapts continuous change of variable, Hopkins (1992) and Suetake (2011 and 2013) rather adapt discrete change based on quantitative evaluation to emotion of people in the play by events emerged on every senses and acts. This model also adapts discrete value for input. Firstly, emotion regarding main player (Prospero) on emerged each scene evaluated with 5 points scale. Actually, assess only "+1" for evaluation value of each incident emerged scenes and acts, except initial value of anger that represents Prospero's anger when he was taken out his throne and exile to remote island with his young daughter.

4. Simulation

Except incident of exile of Prospero with his baby girl to remote island at scene 2, act 1, all incidents happen within few weeks after 12 years from exile. Also, my concern is when total emotion of Prospero shifts from negative status to positive status for forgive his enemy and how much necessary to strengthening the stickiness factor for causes that change. Also showing through 13 years may too long to view. For solving this issue, I divide the simulation to two phases, from exile to beginning of 13th year as first phase, and few weeks when enemy of Prospero drift by storm, arrive to the island, and end of the drama as second phase. Delta t, calculation interval time set as 0.125 and assumes as period of act in the play. This play has 5 acts, therefore, 5 time steps progress in phase 2. Number on top of name of auxiliary variables shows sequence of act in the play.

(1) First phase: Scene 1 Act 1, from exile of Prospero to arrive of his enemy by storm

This model shows negative emotion (such as anger and hate)

as minus value and positive emotion (such as mercy and forgives) with plus value. Thus set as value of minus 5 to anger of Prospero when he and his daughter were exiled. Left graph of figure 3 shows simulation result of first phase. Prospero spend 12 years in remote island, and his anger deteriorates from -5, when exiled, to -1.8 at the end of 12th year. However, he does not recognize that deterioration and believes his total emotion is still on -5. His contact with others limited with his daughter and two servants, Ariel and Caliban. In this situation, the Law of Few does not work and cognition barrier stops to mix his anger and his forgiveness into total emotion.

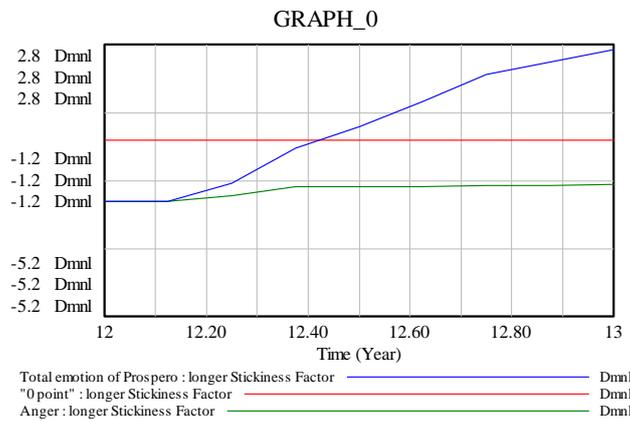
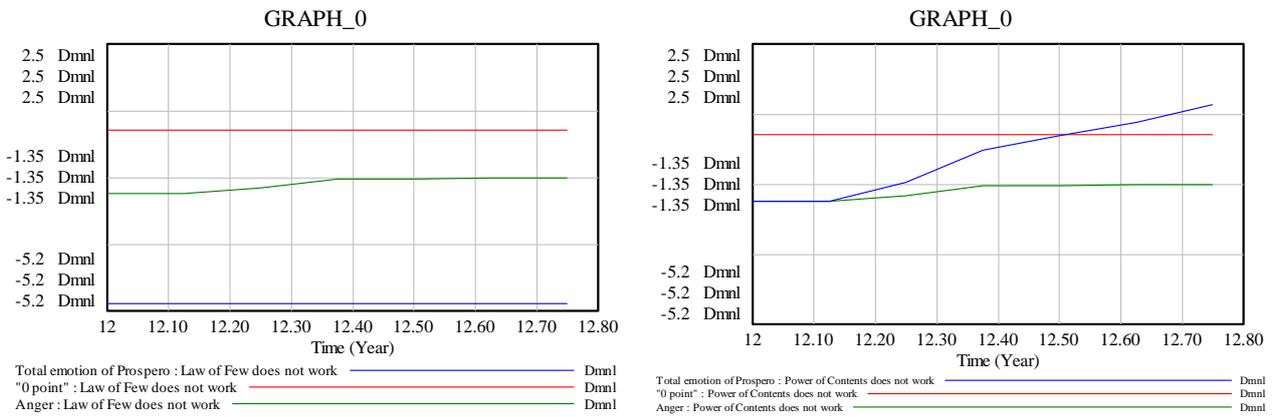
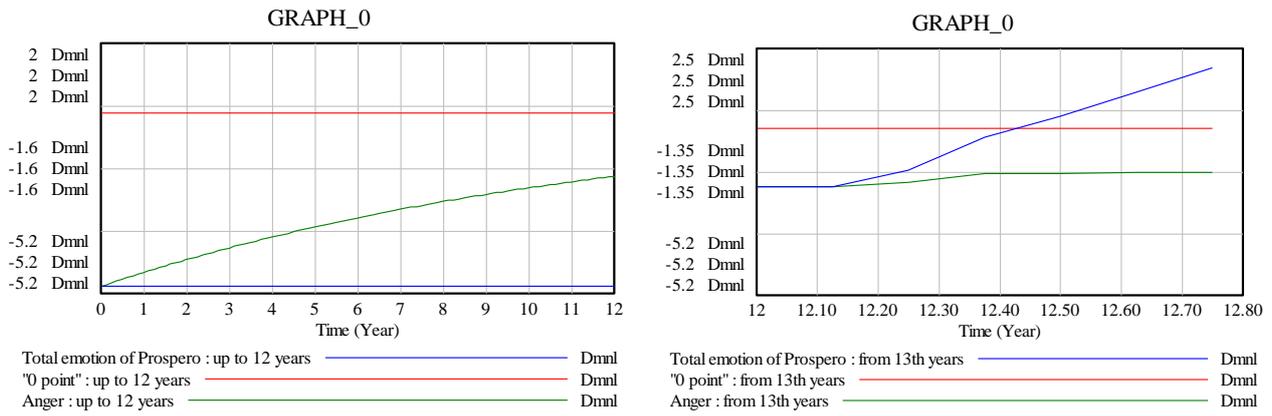
I can confirm this result with my experience of the mitigation program. People who experience conflict try to avoid contact with their enemy to maintaining peace of their mind. Even we make opportunity to meet at workshop or meeting, however, they never try to talk. They know necessary of peace and order, and not attempt to solve their anger with revenge, but keep anger under their mind, as magma. Since their recognition of their emotion keeps original value, and their emotion never improved to positive status, some agitation or some hostile attitudes makes so easy to burn their anger again. Even small mistakes make sparkling oil. This model structure and simulation results seemed fit with these observations.

(2) Second phase: capture of Ferdinando, son of enemy for revenge to the end of the play

Right graph of figure 3 shows simulation results on scene 2 act 1 to end of the story. This second phase starts from value of -1.8 as initial value for stock of anger, and -5 for initial value of total emotion. However, in this simulation, Law of the Few activating inputs and melting cognitive barrier, and allow to mix values of 4 stocks, one of them has negative value and other three positive value from scene 2, act 1, or at time of 12.125. The Stickiness Factor, represented by length of Merinda's entreat of mercy increasing stock value of mercy and forgiveness. The Power of Contents created by insights of foolishness nature on human being and notice of creative thinking create its value and reinforce the value.

At act 5, or at the end of this play on time of 12.750, total emotion of Prospero improving to +1.9. This value means, he may relatively supportive to his enemy. The simulation results also show his total emotion shift from negative to positive at time of 12.50, or at act 4.

Unfortunately, I could not confirm with my observation of my experience in the mitigation program, however, in my other experience of teaching to university student, it is hard to make them understanding framework, or style of thinking, but after that, it makes improving their understanding rapidly. It may depend on how much students try to understand my lecture, as well as my belief of attractiveness on lecture contents. Thus, this model structure and simulation result seemed fits with this experience.



(3) Sensitivity

Conducting sensitivity analysis and confirm how strongly influence first two factors of Gladwell's Tipping Point (2000) framework.

1) Law of the Few

Left graph on Figure 4 shows when the Law of the Few does not effect. Under the Law of the few does not work, obviously

cognitive wall stops to mixing negative and positive emotions, and people still trapped under initial negative emotion of anger and hate.

This situation could be observed in many cases to people who had experience of conflict, or disaster, or accident and lose his family or close friends. These people know necessity to change their mind, though still not much success. For braking such cognitive wall, it is necessary somebody who makes

contact with other people including person or things that cause their negative emotion. Added more, this model shows that is not enough and that may reason why the mitigation program looked not much success to mitigate opposing groups, at least in project duration because mitigation program does endeavor to set opportunity to meet, but not provide powerful contents.

2) Power of Contents

Right graph on Figure 4 shows in case of the Power of Contents does not work properly. Even stickiness factor keeps working, and that itself makes some Power of Contents, however, Power of Contents is weak, and not improving total emotion so much. People's emotion shift from negative to positive value, still, remained low level as total emotion at the end of the simulation is only +0.8. This value means just not hate or not anger anymore, but nor affirmatively supporting to others. People just bend by stickiness of implore, from his close friends or relatives.

I also observed this situation in my experience. Participants joined to my workshop, may be arrangement of my local program member effects, but we could not success to make them talk. They attended, silently listening, but not speak.

This simulation results shows frequency also so important to mitigate negative emotion to positive one and shifting to supportive one. In socio economic development project, cooperation and support among stakeholders are key success factor of the project. For achieving that, contents may so important.

3) Stickiness Factor

Since I assess +1, for value of influence by Miranda, as Salesman in the Law of the Few, and period of keeping stickiness on this input may too short, only 5 time units. This is reason why Prospero's total mind remained only +1.9, relatively low level. So, I keep simulation a bit longer while influence value keep +1. Tempest has only 5 acts, and simulation should be finish at time of 12.625. However, I keep this simulation until time of 13 (Figure 5). At time of 13, total emotion of Prospero increasing to 2.7. This value means he may quite positively support people and quite cooperative, and friendly. This shows even power of contents is a bit weak, and not touch much to people's heart, though keep promoting makes definitory change their mind.

5. Conclusion and expectations to adaptation of SD to world literature

(1) First objective

This study starts from my frustrations to the mitigation programs for developing countries where people experienced conflict by civil war. These programs where I experienced in developing countries were conducted so heuristic way and could not find any theoretical framework for develop sufficient implementation plan, or evaluate effects of the program. I develop the theoretical framework as SD model shown in this paper to know theoretical framework for mitigate hate and anger of people who experienced conflict and civil war.

I adapt Gladwell's Tipping Point (2000) for framework of the model. This framework explains more sufficiently about changing as mechanism of self-organizing rather than simply explain sifting to chaos emerged when parameter value

exceeds its threshold.

With this SD model, I can explain quantitatively how people's emotion can change from negative status to positive status, in case of Prospero, main person of Tempest. With this SD model and scenario of Tempest, I can confirm emotion of people who had conflict in developing countries that I observed on my experience. It looked to have plausible structure and simulation results.

This model may need further consideration for adapting to actual mitigation program. However, with this model, we can assess who could be factors of the model, and how much we need to prepare resources and frequency of activity. For example, in Christian society such as East Timor, we can expect role of Salesman to father of Catholic church. We can incorporate message to their speech in mass and prepare short pamphlet to deliver. Unfortunately, this mechanism does not work in Hindu society such as Nepal. We may need alternative player such as female social worker. We can assess and evaluate who could be Salesman, Marven and Connector, and how the Law of the Few could be adapted to that target society. We can also assess what contents and message we can incorporate as Power of Contents. Thus, I believe this model and framework is useful for the mitigation program. At last, we should stop to do the program heuristic, but more theoretic way.

(2) Second objective

Second objective is increasing case of SD adaptation to world literature. I also have sort of frustration to SD adaptation to existing case on world literature. Of course, I can understand their objective on secondary education, however it may no need to limiting to second education. Lecture of world literature in high education such as Faculty of English Literature of university is different with lecture in English class of high school. Teacher recommends to understanding the literature considering environment and structure surrounding people in the literature. That may make more easily and deeply on emotion and behavior of people on the literature. For achieving such objectives, critical literature may use to understanding common thinking of the era. This may sort of framework, in socio economic study, specially management science. And I show such socio-economic framework also useful to understanding structure of the world literature. While I use framework of Gladwell's Tipping Point (2000), I explain how emotion of people could changing from structure and mechanism view. With this view, I believe reader can understanding Tempest with differently. If, without having such model, Tempest may looked something mysterious story of magic and fantasy. We can understand people in this play behave and think very rational if we use SD model. That is what I want to insist and hopes more adaptation of SD to world literature.

Notes:

- 1) I find this model from support material on Internet for Morecroft's "Strategic Modeling and Business Dynamics" (2015) rather CLE database because I cannot find and confirm equations from original material by Anderson et al. (2012).
- 2) Two models show only important polarities and major feedbacks for avoid complexity.

Reference

- Anderson et al. (2012), "Background Information on Simulation Created for Lesson 2: Romeo and Juliet: In Rapturous Oscillation?", *Creative Learning Exchange*
- Ariell, A (2010), "Forest Future: A Causal Layered Analysis", *Journal of Futures Studies* V14 N4, p49-64
- Gladwell, M (2000), "The Tipping Point: How Little Things Can Make a Big Difference", *Little Brown*
- Hopkins, P.L. (1992) "Simulating Hamlet in the Classroom", *System Dynamics Review* 8 (No. 1, Winter 1992): 91-98
- Laurens, A (1957), "West Side Story", scripts from <http://www.aellea.com/script/westside.txt> (at 2018)
- Morecroft, J (2015) "Strategic Modeling and Business Dynamics: A Feedback Systems Approach 2/E", *John Wiley and Sons*
- Morrow, R, "What is the Debate around Paid Maternity Leave Really about Using CLA to Delve under the Surface...", *Journal of Futures Studies* V11 N4, p59-76
- Ono, Ra. (2010) "Tips for change Future", *Kodansha Modern Library*, p124-142
- Shakespeare, W (1612), "Tempest"
- Sterman, JD (2000), "Business Dynamics: Systems Thinking and Modeling for a Complex World, *Irwin McGraw Hill*
- Suetake, T (2011), "SD model of Romeo and Juliet", *System Dynamics*, Japan Chapter of System Dynamics, No.10 2011.9
- Suetake, T (2013), "SD model of Romeo and Juliet", *13th International SD Conference*
- Taylor, T. and Ford, D.N. (2008) "Managing Tipping Point Dynamics in Complex Construction Projects," *Journal of Construction Engineering and Management*, Vol.134, No.6, pp.421-431.