

November 2021

CONCEPTUAL MODEL OF STUDENTS ABROAD'S BEHAVIOUR: AGENT-BASED MODELING APPROACH

Tutik Inayati

School of Business and Management, Bandung Institute of Technology, Bandung, Indonesia,
tutik.inayati@sbm-itb.ac.id

Utomo Sarjono Putro

School of Business and Management, Bandung Institute of Technology, Bandung, Indonesia,
utomo@sbm-itb.ac.id

Santi Novani

School of Business and Management, Bandung Institute of Technology, Bandung, Indonesia,
s.novani@sbm-itb.ac.id

Ilham Fadhil Nurdayat

School of Business and Management, Bandung Institute of Technology, Bandung, Indonesia,
ilham.fadhil@sbm-itb.ac.id

Follow this and additional works at: <https://scholarhub.ui.ac.id/amj>



Part of the [Marketing Commons](#)

Recommended Citation

Inayati, Tutik; Putro, Utomo Sarjono; Novani, Santi; and Nurdayat, Ilham Fadhil (2021) "CONCEPTUAL MODEL OF STUDENTS ABROAD'S BEHAVIOUR: AGENT-BASED MODELING APPROACH," *ASEAN Marketing Journal*: Vol. 11 : No. 1 , Article 2.

DOI: 10.21002/amj.v11i1.11480

Available at: <https://scholarhub.ui.ac.id/amj/vol11/iss1/2>

This Research Article is brought to you for free and open access by UI Scholars Hub. It has been accepted for inclusion in ASEAN Marketing Journal by an authorized editor of UI Scholars Hub.

CONCEPTUAL MODEL OF STUDENTS ABROAD'S BEHAVIOUR: AGENT-BASED MODELING APPROACH

Tutik Inayati

School of Business and Management, Bandung Institute of Technology
Bandung, Indonesia
tutik.inayati@sbm-itb.ac.id

Utomo Sarjono Putro

School of Business and Management, Bandung Institute of Technology
Bandung, Indonesia
utomo@sbm-itb.ac.id

Santi Novani

School of Business and Management, Bandung Institute of Technology
Bandung, Indonesia
s.novani@sbm-itb.ac.id

Ilham Fadhil Nurdayat

School of Business and Management, Bandung Institute of Technology
Bandung, Indonesia
ilham.fadhil@sbm-itb.ac.id

ABSTRACT

Manuscript type: *Original Papers*

Research Aims: *To explore the behavioral process of international students on how they can change their decision to remain or return home based on their interactions with other agents during their studies.*

Design/methodology/approach: *This paper uses an agent-based methodology approach to simulate the behavior of students based on their interactions while studying abroad. A combination of four parameters with three different scenarios and 40 repetitions in every scenario are conducted to verify the model; 81 simulations are determined to simulate this model.*

Research Findings: *The number of natives interacting with students is proven as one single important parameter that influences the number of remaining students and their probability density.*

Theoretical Contribution/Originality: *Utilisation of agent-based simulation to predict behavior of students*

Practitioner/Policy Implication: *Supporting good quality of life condition for students environmentally and socially*

Research limitation/Implications: *Interaction with fellow students, natives, recruiters abroad and in home country are the only interactions considered in this model. More elaborate and complicated model is needed.*

Keywords: *behaviour, higher education, students abroad, agent-based methodology, simulation*

INTRODUCTION

Higher education nowadays is almost a compulsory requirement for people to have their first official jobs and to be promoted to the next level in the management in their companies. Higher education can be achieved not only in country of residence, but also abroad. With the globalization opening people's horizon, and the constant economic development especially in particular developing countries, students are able to have choices on where to study for their higher education. Countries also gain benefits by having high rate of university graduates for the development of their countries.

Students from developing countries have their own interests in the prospect of studying abroad. Aside from better education quality (Beine et al., 2014, González et al., 2011), students studying abroad perceive that they have better chances of employment, whether the employment is in the destination or the source country (Choudaha & Chang, 2012); and since the financial capabilities of families in developing countries have increased each year, the number of people studying abroad raise as well. For students who cannot afford to study abroad, nowadays many institutions (governments, private, and social organizations) provide scholarships for university students who in the future will help hopefully their home countries to develop after they graduate, because as stated by Oosterbeek and Webbink (2011), scholarship program raises the probability of students studying abroad. And with the help of financial support and personal financial capabilities, the trend of studying abroad has increased significantly (Bhandari and Blumenthal, 2009). One study about Erasmus Mundus receivers from Poland found that the impact of students mobility have been considered as positive with vast majority of respondents have worked abroad since they graduated and respondents considered higher education and host country's language proficiency were very essential for not only their career development but also job position in the future (Bryla, 2015). The case, however, has not always been successful. Many students in developing

countries who spend some time abroad tend to search for better job for their life quality. The length of their stays affects the often-changing decision on where to stay after graduation. Especially for bachelor degree students, the exposure due to longer stays than Master and Doctoral students causes them to search for better life abroad.

Importantly, how students change their decision is based on the interaction that they find significant to them. The number of friends that they have while they are abroad often influences their decision on whether they will return to their country or remain abroad after graduation. Interactions with recruiters or companies in their country of origin and abroad are also considered as essential considerations. Although many factors (such as economic and political aspects) are also important, discussion on the personal life (Buchori, 2011) is highly crucial because it largely influences our lives now and in the future and personal life is the first thing that comes to mind when people choose where and how they live. So far, what previous literatures had discussed were the motives of international students, and the return or remain of international students and their decision. Very few papers look at the behaviour of students during their studies abroad.

International students are seen from the host country's government are consumers, for the university, as well as the government itself. The reason why students are considered as consumers is because the host country obtains income. For university, the income from international students, who frequently pay more than local or native students, is highly anticipated by the university, while government (national and regional) could have incoming benefits from international students (Andrade, 2006). Meanwhile, when international students decide to stay after graduation, Government could benefit not only economically but also other latent knowledge contributed by foreign workers.

Therefore, this paper's objective or purpose is to explore the conceptual model of behavior in

decision and its changes based on the interactions for students abroad since there are factors influencing students' decision and how far these interactions can influence their decision. The scope of this paper involves students from home country who study in other foreign countries and, within time, decide to whether to return home or stay abroad. This paper is initially dedicated to Indonesian students abroad, but hopefully this concept can be applied to students abroad besides Indonesians. Second scope is that variables or factors influencing students to return or remain abroad included in this paper are only based on interactions. Factors such as salary and education quality (Beine et al., 2014) are not considered in this model, even though those are crucial factors in this matter due to the main point of this paper, which is the relationships of students with other people. Since here students are still at the stage of studying, salary would not be an essential factor, education quality is also not significant because students have already become students and this model's event occurs during their studies. Considering behavior of international students abroad as consumers, especially Indonesian students, and their decision on what to do after they graduate has not been done before; and, the interaction factors that leads to the decision also becomes the state of the art of this paper since it has not been conducted previously. This paper consists of several parts. First, is the background of the problem, the objective, scope, and literature review of this study. Second is the methodology used in this paper, and the last one is the results and scenario analyses.

LITERATURE REVIEW

Higher education research is very much changing (Tilak, 2015), especially in relation to international higher education. As stated by Hunter et al. (2009) that many scientists mobilize to countries with larger Research & Development (R&D) spending. This indicates that support from the government regarding development would be seen as crucial. To achieve such high standard of technology development, education is a crucial parameter for personal and govern-

ment development. The development of technology also leads to a country's development. When a country lacks of capable human resources, then development can be delayed. One reason why a country lacks of capable human resources is because there are many students pursuing studies abroad and not return home. This will lead to disadvantage for the source country.

However, not all of the mobility of students is seen as detrimental for source country; there is a silver lining to this phenomenon. For source country, technology transfer is easier to occur with students studying there. A large amount of scholarships and exchange programs with universities abroad occurs, such as Erasmus Mundus (Altbach, 2009; Goodman & Gutierrez, 2011). Although most scholarships have been granted for international students with requirements to return home, these requirements can be bent, concluded from authors' acquaintance who received scholarship abroad.

There are many factors or motivations for students not only to study abroad, but also why they return or remain. Most common factors can be identified into external or internal factors. However, due to contextual reason, these factors vary. For example, a research by Janda (2016) explained that there are two types of segmentation of factors that determine the mobility of students: "externally-motivated familiarity" and "internally-motivated adventure". Using cluster analysis, most respondents were in the externally motivated familiarity segment, which means mainly people who are close to them motivated these people. Interaction with people in the destination countries needs to be considered as a simple but influential factor for students whether to remain or return to their home country after graduation. One study was conducted by Soon (2010) who attempted to create a bivariate probit model to analyse the change of intention of international students. Soon (2010) explained that factors such as putting skills in the home country could be a consideration for people whether to return or remain. Similar arguments was also stated

by Dustmann et al. (2010) about skills, however they argued that skills can be applicable in home country would result in higher compensation for talented people than in host country. Therefore, it is more beneficial for students to return home after studying abroad.

The length of stay could also be a determining factor to change their intention to return home; even if initially they chose to return. It means that the longer students are exposed to the environment abroad, chances that they will return are declining; this finding was also supported by Hazen & Alberts (2006). Another important finding came from Wei's (2012) research that mentioned that opportunities to work in the host country should be available for international students who want to work in the host country after graduation. Lastly, students, including students from Indonesia recon that equal opportunities based on their race as important determinant factors (Soon, 2010).

Meanwhile, destination countries have varied throughout the years, as more scholarships are more accessible to foreign students. This implies that major countries, such as USA, are not the only major destination country where foreign students would have interest in, especially in major of Science, Technology, Engineering, and Math (Han et al., 2015).

RESEARCH METHOD

Agent-based model (ABM) is chosen in this paper as the methodology to analyze students' behaviour. Agent-based model can be used as a conceptual model for analysing the behavior of specific aspects that sees the behavior of agents and creates emerging behavior of agents. The behavior of students should be seen by their personal intention, and whether interactions with others may influence their decision regarding staying intention after graduation. An advantage of using ABM is that the model making is rather simple without having to fully understand calculus (Wilensky & Rand, 2015). ABM is used in this research because ABM sees individual behaviour instead of generality of

the behaviour, compared to statistics and other quantitative methods. Nevertheless, ABM generates the behaviour of the likeliness of agents involved in the model. In conclusion, ABM is chosen due to its individuality of looking a phenomenon at microscopic level.

This paper used the software NetLogo, and we make reference to Wilensky and Rand (2015). Simulation should be conducted to achieve objectives of a model, as simulation is defined as the picture of the behavior in real condition (Fioretti, 2013). In this case, ABM is meant to construct collective behavior based on individual interpretation of the behavior (Fioretti, 2013).

The model in this paper is based on before-after concept. The basics of the interaction are from Ajzen's (1991) Theory of Planned Behavior, in which people's decision is heavily influenced by combining intention with perceived behavior control. First, assuming a student is planning to go abroad, she will have her own expectations (or intention) about environment there in the country that she will be studying in and initial plan before leaving about whether she will stay after graduation. This will be the beginning concept, or 'before'. After spending some time in the host country, she will have interactions with fellow students, native students, recruiters from her country, and recruiters from abroad; this interaction is what we interpret as perceived behavioural control. We exclude family because we would like to see the influence of the people who have direct contact with the agent while he/she studies abroad. Then, a student who interacts with other agents will change their previous motivation on their life after graduation, and it will occur every time a student meets someone. The initial intention before a student leaves abroad varies; some students want to return and some would like to remain abroad after they graduate. Therefore, due to the variety, initial intentions for each student are set randomly. When a student heavily interacts with agents from her home country, then the value or intention decreases below her 'before' value; and when a student heavily in-

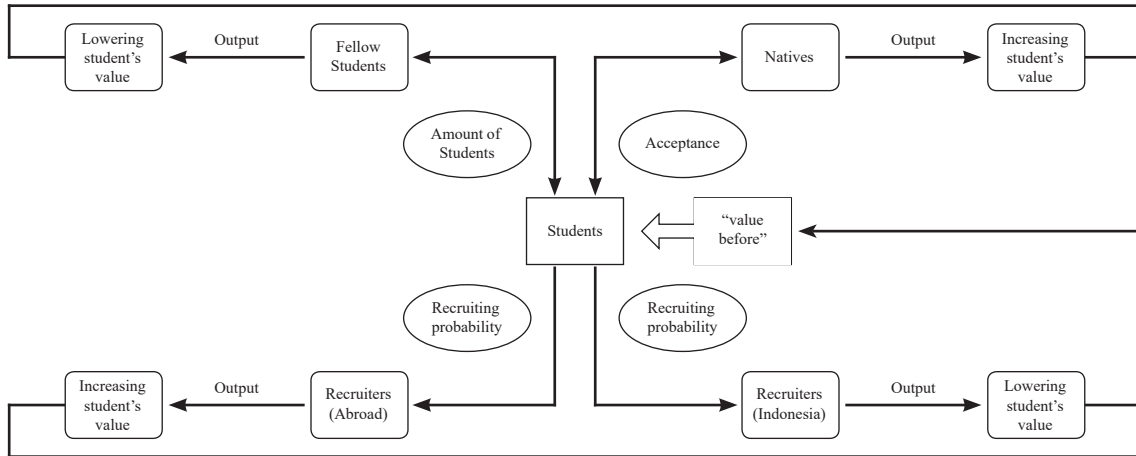


Figure 1. Conceptual Framework

teracts with agents from the host country, then the intention after interaction will be higher than ‘before’ value. And the after concept is the tendency of a student to return or remain after her interaction with other agents.

Types of agents are the types of people that usually an international student would have a contact with. The source of determining types of agents are by interviewing several Indonesian students abroad and observing while author was studying abroad. Therefore, the sequence and the result of interaction refer to the observation. As per Hazen and Alberts’s results, professional, personal, and social have become decision factors for students to remain or return from abroad. The process of simulation commences with random movements of agents, and when one or more different agents are in the same place as student, then the interaction occurs. As explained previously, there are four types of agents (students in Indonesia, students abroad, natives, and recruiters) who will interact with the student. First interaction created is when a student interacts with students from their home country, she will have tendency more to return to her home country based on their interactions (Nyandara & Egbuonu, 2018; Zhou & Zhang, 2014; Arkoudis et al., 2012). Another interaction in daily basis is influential for students to make a decision in the future. The changing perception is based on the acceptance of natives there. For example, if a student is living and interacting with natives and

the natives are being welcoming and tolerant, it will have positive effect on the student, hence influencing her to want to continue living in the host country. Kashima & Loh (2006) concluded in their study that when students are less stressfull if the they have social ties with locals. Lee (2010) also support the tolerance of natives in the host country to be important, since students from non-Kaukasian countries have more bad experience in the US students who come from Kaukasian countries. On the contrary, if a student receives bad treatments from natives around her then she will have the tendency to return to her home country. As concluded by Hazen & Alberts (2006), beside professional, societal and personal reasons influenced students to change their intention of staying or returning.

$$V_{si} = V_b - E(X_i) \tag{1}$$

Where:

V_n = Value after interaction with other students from the same country

V_b = Value before interaction

$E(X_i)$ = Random number of increase/decrease value from interaction

$$V_n = V_b + (E(X_a) * r_a) \tag{2}$$

Where:

V_n = Value after interaction with natives

V_b = Value before interaction

$E(X_a)$ = Random number of increase/decrease

value from interaction

r_a = Acceptance rate from the natives (environment)

The next two agents that interact with a student have similar attribute but different level of threshold. Recruiters, or future employers, fall into two categories: recruiters in the home country, and recruiters abroad. Recruiters are interesting types of agents who can influence the students' decision to remain or return after graduation because students are more likely remain in the host country if there are job opportunities in order to improve their life quality (Arthur & Flynn, 2011) and had significant and effective communication (Ozturgut, 2013) The more recruiters in the home country are currently recruiting and have high probability of accepting the student, then she has larger tendency to return home. Similar to recruiters in the home country, if recruiters abroad are recruiting and high probability of accepting the student, then she has larger tendency to remain abroad.

$$V_{ri} = V_b - (E(X_{ri}) * (P(A_i)) - E(X_{ri})) \quad (3)$$

Where:

V_{ri} = Value after interaction with recruiters from home country

V_b = Value before interaction

$E(X_{ri})$ = Random number of increase/decrease value from interaction

$P(A_i)$ = Probability of recruiter from home country successful recruitment

$$V_{ra} = V_b + (E(X_{ra}) * (P(A_a)) - E(X_{ra})) \quad (4)$$

Where:

V_{ra} = Value after interaction with recruiters from abroad

V_b = Value before interaction

$E(X_{ra})$ = Random number of increase/decrease value from interaction

$P(A_a)$ = Probability of recruiter from host country successful recruitment

The use of data collection is not necessary in ABM; merely due to making this model an ini-

tial model. However, the concept of interaction between agents refers to previous literatures and researches that authors combine into types of most determined factors: The interaction of students with: (1) Fellow students from home and host country, (2) natives of host country, and (3) recruiters from home and host country. The authors also discuss what kinds of interactions and types of agents can be justified by Indonesian students abroad, and finally group them into these types of agents and their parameters. Interactions conducted by students show that the physical meeting will increase or decrease their value. For instance, if an Indonesian student abroad is more likely interacting with fellow Indonesian students abroad, he or she would decrease his or her value"; "decreasing value" means the tendency for a student to return home after graduation. Another instance, assuming the before value of a student is 0.5, where 0.5 is a dummy number that we set that ranges between 0 to 1, is whenever a student interacts with recruiters from abroad, then their expectation to live abroad increases, and so does the probability of staying abroad because they have a higher probability of being accepted by a recruiter abroad. Therefore, according to the formula we hypothesized, the before value will increase and generate new value, which is the after value. When the after value is added by more positive interactions with agents abroad, then the higher tendency of a student to remain abroad This after value becomes the before value for the next interaction and continues to do so until a student approaches the time of graduation. To acknowledge the final decision, students would decide whether to remain or return when they graduate. It is assumed if a student has the after value < 0.5 after he or she graduate, then he or she decides to return home. If at the end of their study they have after value > 0.5, then they would remain abroad. Even though for some this model is too simple, the originality of this Agent-based interaction concept and the initiative of realizing how important people's decision making to future development should be acknowledged.

To verify this model, a simulation of scenarios

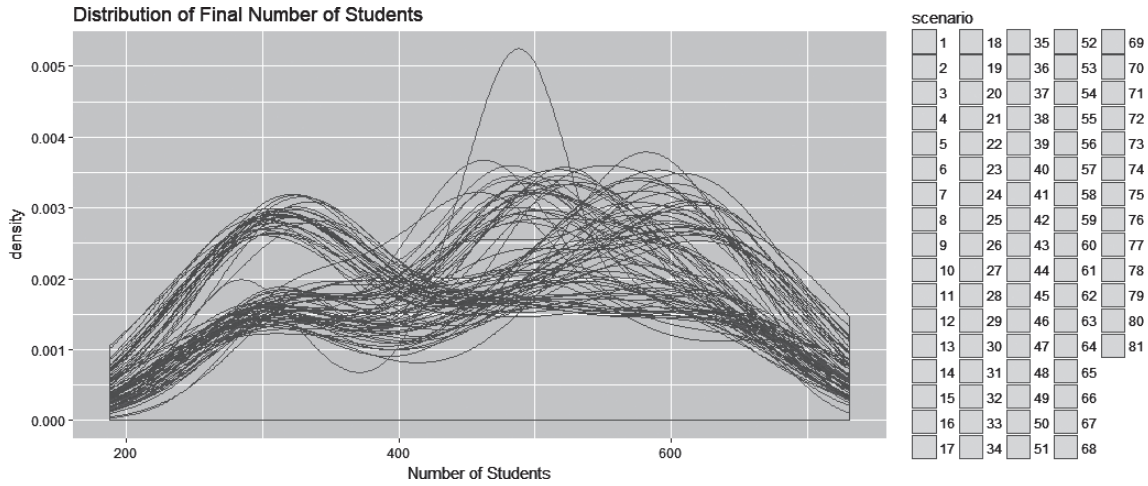


Figure 2. Distribution of total students

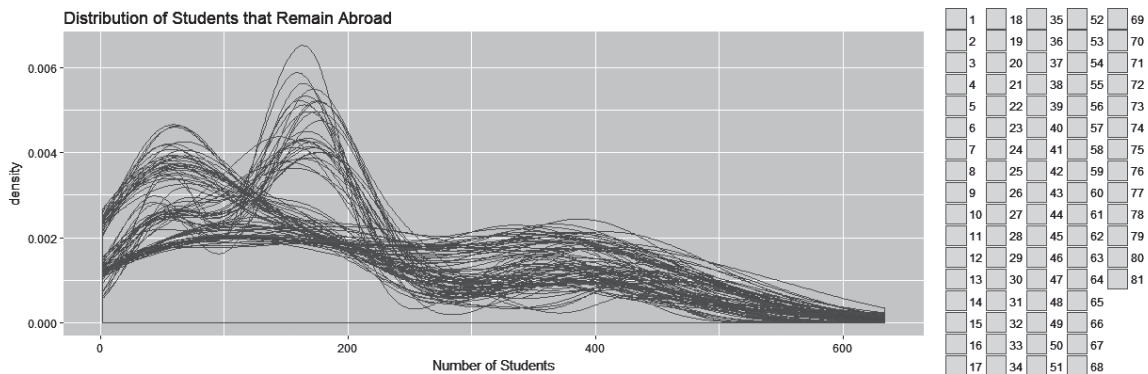


Figure 3. Distribution of remaining students

is run. There are four parameters that will determine the number of remaining students. Four parameters considered are: (1) number of natives per students; (2) probability of acceptance rate of natives; (3) probability of recruited by recruiters abroad; and (4) probability of being recruited by recruiters back home. As explained earlier, interaction with natives and recruiters in previous literatures are indicated to influence the whether international students will remain or return home. Each parameter has three different level that will be combined: low, medium, and high. For the probability of acceptance from natives, recruiters abroad, and recruiters from the home country, numbers were set to 0.1, 0.5, and 0.9 for low, medium, and high levels, respectively. Meanwhile, the number of natives per student is set 1 for low, 5 for medium, and 9 for high level. The total combination of scenarios is 81 scenarios.

RESULT AND DISCUSSION

As a part of verifying the model, simulation is run to see the behaviour of students. The behavior that we wanted to see was the number of students who chose to remain and which factor mostly influenced them. Since there are 40 repetitions in one scenario, the random factor should be sufficient for outcome to distribute properly. Figure 1 is the distribution of all 81 scenarios for total students. The distribution of total students is not normal with the exception of scenario where every parameter is in medium level, this means frequency will peak in the middle. Figure 2 indicates that all scenarios have no normal distribution; however, the trends of several scenarios with similar parameters are similar.

To which extent is the most influential fac-

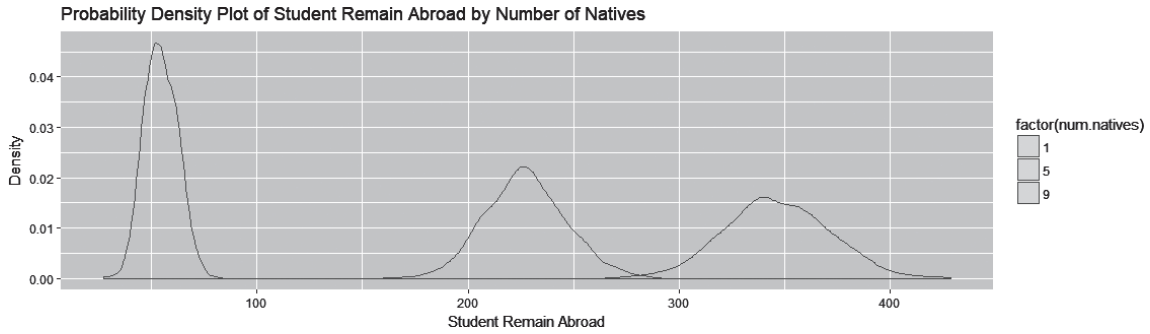


Figure 4. Plot of remaining students by number of natives

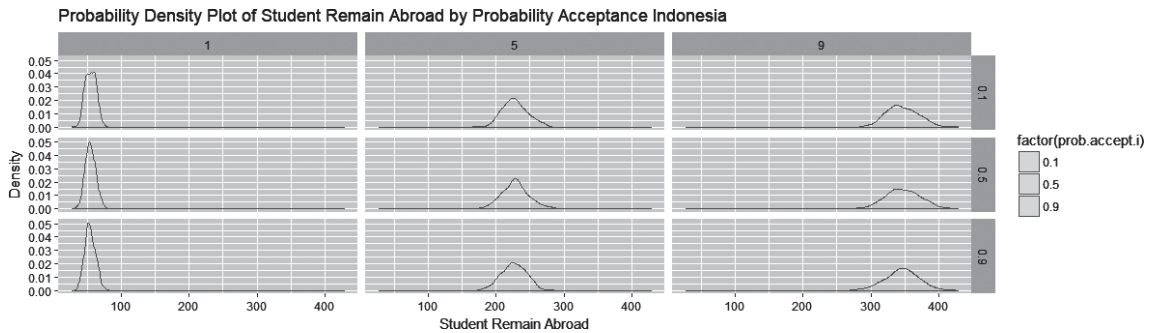


Figure 5. Plot of remaining students by number of natives and acceptance probability from recruiters in home country

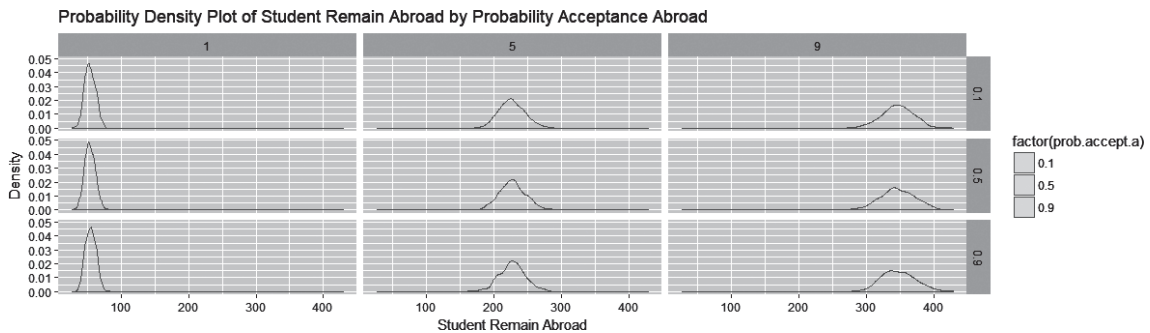


Figure 6. Plot of remaining students by number of natives and acceptance probability from recruiters abroad

tor for remaining students, figure 3 shows the distribution for remaining students affected by the number of natives per student. In figure 3, when the number of native is in minimum (1 person per student), the distribution of output is more narrow compared to other levels and the probability density is the highest compared to other level. This means that after 40 random repetitions, the number of students who interact the least with natives is located between 30 to 80 students with 52 students being the highest probability. Meanwhile, medium number and

high number of natives showed that the distributions are wider. The probability density of high number of natives compared to medium is lower, considering the output has wider spread after 40 repetitions. The number of remaining students with a medium number of natives is also lower compared to a high number of natives.

In this simulation, the probability to be recruited by recruiters abroad and back home is set similar for every level, the number of recruit-

ers abroad and in home country are also similar. Figure 4 and figure 5 show the comparison between recruiters abroad and home country and how they influence the number of remaining students. Both figures reflect similar pattern and output, even though there are minor difference between recruiters abroad and back home when the number of natives and probability of being recruited both being in minimum level and maximum level. This finding indicates that the probability of recruitment does not significantly influence the number of remaining students and their probability. The only significant determinant on the number of remaining students and its probability density is the number of natives that students are interacting with on daily basis.

CONCLUSION

These results implicate that the environment where students live highly influences them to remain abroad after graduation; therefore, the less hostile the environment, the more reluctant the students to return home. Recruiters have less influence since interaction in personal level is not conducted with agents, in this case, students.

By acknowledging the factors that influence how students make their decisions, governments from host and home countries could benefit from the results in relation to how to promote their country to be more attractive to international students. It could be crucial for host-country governments to promote their countries as having a supportive environment for international students in order to attract international students and to pool highly talented people to work in their countries. For example, creating programs in universities intended to social life of international students and connect them to students who originally come from the host countries. Another example is to promote tourism and bring more international tourists to their host countries could be a tool for promoting the country as safe as the home country. Meanwhile, home-country governments should also think about promoting their country as a

safe place for students to return to. A government's way of promoting its country is not like promotion by a company; a government's role is to create policies that could enhance the convenience for students who have been abroad, and who will become future talent, and to attract them to return by making sure that their return will have more benefits compared to staying abroad after graduation.

This paper is a conceptual paper that explores the decision changes in students studying abroad on their decision after graduation, since it is an important issue to handle: what makes students abroad remain or return home based on their interaction while they study abroad. Students have four types of interaction with other agents: fellow students, natives, recruiters from abroad, and recruiters in home country. Each agent representative has his or her own parameters and levels. Four parameters from each agent and three levels of each parameter are determined. From parameters and levels determined, total 81 combinations of scenarios were conducted to test the validation of the model. The model shows that probability of being recruited by recruiters abroad and in home country identifies minor influence to the total of remaining students when the number of natives interacting with students is in the same level. Therefore, we can conclude that from the model only one parameter that influences the number of remaining students and their probability density; that is the number of natives interacting with students. The limitation of this study is that only four types of interactions are used as consideration in this simulation. To have more thorough examination of interaction, types of interaction should be added.

This paper is only the beginning of further development of the model. Adding more parameters and thresholds to the model will make model more realistic. Calibration of the simulation should also be conducted for further research ideas. Including more types of agents also may produce more realistic model since it will depict student agent in real life.

REFERENCES

- Ajzen, I., 1991. The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), pp.179-211.
- Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). Trends in global higher education: Tracking an academic revolution.
- Andrade, M. S. (2006). International students in English-speaking universities: Adjustment factors. *Journal of Research in International education*, 5(2), 131-154.
- Arkoudis, S., Watty, K., Baik, C., Yu, X., Borland, H., Chang, S., ... & Pearce, A. (2013). Finding common ground: enhancing interaction between domestic and international students in higher education. *Teaching in Higher Education*, 18(3), 222-235.
- Arthur, N., & Flynn, S. (2011). Career development influences of international students who pursue permanent immigration to Canada. *International Journal for Educational and Vocational Guidance*, 11(3), 221-237.
- Bhandari, R., & Blumenthal, P. 2011. Global Student Mobility and the Twenty-First Century Silk Road: National Trends and New Directions. In R. Bhandari, & P. Blumenthal (Eds.), *International Students and Global Mobility in Higher Education: National Trends and New Directions*. pp. 1-23. New York: Palgrave Macmillan.
- Beine, M., Noël, R., & Ragot, L. (2014). Determinants of the international mobility of students. *Economics of Education review*, 41, 40-54.
- Bryła, P. (2015). The impact of international student mobility on subsequent employment and professional career: a large-scale survey among polish former erasmus students. *Procedia-Social and Behavioral Sciences*, 176, 633-641.
- Buchori, A. I. 2011. International Students Mobility, Potential Channel for Brain Drain or Brain Circulation? The Netherlands: Maastricht Graduate School of Governance, Maastricht University.
- Choudaha, R., & Chang, L. (2012). Trends in international student mobility. *World Education News & Reviews*, 25(2).
- Dustmann, C., Fadlon, I., & Weiss, Y. (2011). Return migration, human capital accumulation and the brain drain. *Journal of Development Economics*, 95(1), 58-67.
- Fioretti, G. 2013. Agent-based Simulation Models in Organization Science. *Organizational Research Methods*. Vol. 16, No. 2. pp. 227 – 242.
- Goodman, A. E., & Gutierrez, R. 2011. The International Dimension of U.S Higher Education: Trends and New Perspectives. In R. Bhandari, & P. Blumenthal (Eds.), *International Students and Global Mobility in Higher Education: National Trends and New Directions*. pp. 83-106. New York: Palgrave Macmillan.
- Han, X., Stocking, G., Gebbie, M.A., & Appelbaum, R.P. 2015. Will They Stay or Will They Go?

International Graduate Students and Their Decisions to Stay or Leave the U.S. upon Graduation. *PLoS ONE*. Vol. 10, No. 3. pp. 1 – 18.

Hazen, H.D. & Alberts, H. C. 2006. Visitors or Immigrants? International Students in the United States. *Population, Space and Place*. Vol. 12. pp. 201-216.

Hendrickson, B., Rosen, D., & Aune, R. K. (2011). An analysis of friendship networks, social connectedness, homesickness, and satisfaction levels of international students. *International Journal of Intercultural Relations*, 35(3), 281-295.

Janda, S. 2016. Segmenting Students Based on Study Abroad Motivations, Attitudes, and Preferences. *Journal of International Education in Business*. Vol. 9, No. 2. pp. 111-122.

Kashima, E. S., & Loh, E. (2006). International students' acculturation: Effects of international, conational, and local ties and need for closure. *International journal of intercultural relations*, 30(4), 471-485.

Lee, J. J. (2010). International students' experiences and attitudes at a US host institution: Self-reports and future recommendations. *Journal of Research in International Education*, 9(1), 66-84.

Nyandara, Z. I., & Egbonu, N. G. L. (2018). INTERNATIONAL STUDENTS' INTERACTION PROCESSES IN RELATION TO THEIR LEARNING EXPERIENCES AT ONE UNIVERSITY IN NORTHERN CHINA. *European Journal of Education Studies*.

Oosterbeek, H., & Webbink, D. (2011). Does studying abroad induce a brain drain?. *Economica*, 78(310), 347-366.

Ozturgut, O. (2013). Best practices in recruiting and retaining international students in the US. *Current Issues in Education*, 16(2).

Soon, J. 2010. A Change of Heart? A Bivariate Probit Model of International Students' Change of Return Intention. *International Journal of Business and Economics*. Vol. 9, No. 2. pp. 115 – 129.

Tilak, J.B.G. 2015. Higher Education in South Asia: Crisis and Challenges. *Keynote address delivered at the International Symposium on 'Higher Education in South Asia – Crisis and Challenges'*. Vol. 43, No. 1-2. pp. 43 – 59.

Tremblay, K. 2004. Links Between Academic Mobility and Immigration. Retrieved November 19, 2013, from <http://www.wes.org/>

Wei, H. (2013). An empirical study on the determinants of international student mobility: a global perspective. *Higher Education*, 66(1), 105-122.

Wilensky, U & Rand, W. 2015. *An Introduction to Agent-Based Modeling: Modeling Natural, Social, and Engineered Complex Systems with NetLogo*. Cambridge: The MIT Press.

Zhou, G., & Zhang, Z. (2014). A study of the first year international students at a Canadian university: Challenges and experiences with social integration. *Comparative and International Education/Éducation Comparée et Internationale*, 43(2), 7.

S	A	B	C	D	S	A	B	C	D
1	L	L	L	L	41	M	M	M	M
2	L	L	L	M	42	M	M	M	H
3	L	L	L	H	43	M	M	H	L
4	L	L	M	L	44	M	M	H	M
5	L	L	M	M	45	M	M	H	H
6	L	L	M	H	46	M	H	L	L
7	L	L	H	L	47	M	H	L	M
8	L	L	H	M	48	M	H	L	H
9	L	L	H	H	49	M	H	M	L
10	L	M	L	L	50	M	H	M	M
11	L	M	L	M	51	M	H	M	H
12	L	M	L	H	52	M	H	H	L
13	L	M	M	L	53	M	H	H	M
14	L	M	M	M	54	M	H	H	H
15	L	M	M	H	55	H	L	L	L
16	L	M	H	L	56	H	L	L	M
17	L	M	H	M	57	H	L	L	H
18	L	M	H	H	58	H	L	M	L
19	L	H	L	L	59	H	L	M	M
20	L	H	L	M	60	H	L	M	H
21	L	H	L	H	61	H	L	H	L
22	L	H	M	L	62	H	L	H	M
23	L	H	M	M	63	H	L	H	H
24	L	H	M	H	64	H	M	L	L
25	L	H	H	L	65	H	M	L	M
26	L	H	H	M	66	H	M	L	H
27	L	H	H	H	67	H	M	M	L
28	M	L	L	L	68	H	M	M	M
29	M	L	L	M	69	H	M	M	H
30	M	L	L	H	70	H	M	H	L
31	M	L	M	L	71	H	M	H	M
32	M	L	M	M	72	H	M	H	H
33	M	L	M	H	73	H	H	L	L
34	M	L	H	L	74	H	H	L	M
35	M	L	H	M	75	H	H	L	H
36	M	L	H	H	76	H	H	M	L
37	M	M	L	L	77	H	H	M	M
38	M	M	L	M	78	H	H	M	H
39	M	M	L	H	79	H	H	H	L
40	M	M	M	L	80	H	H	H	M
					81	H	H	H	H

Notes:

S: Scenario

A: Acceptance rate

B: Number of natives

C: Recruitment probability abroad

D: Recruitment probability in Indonesia