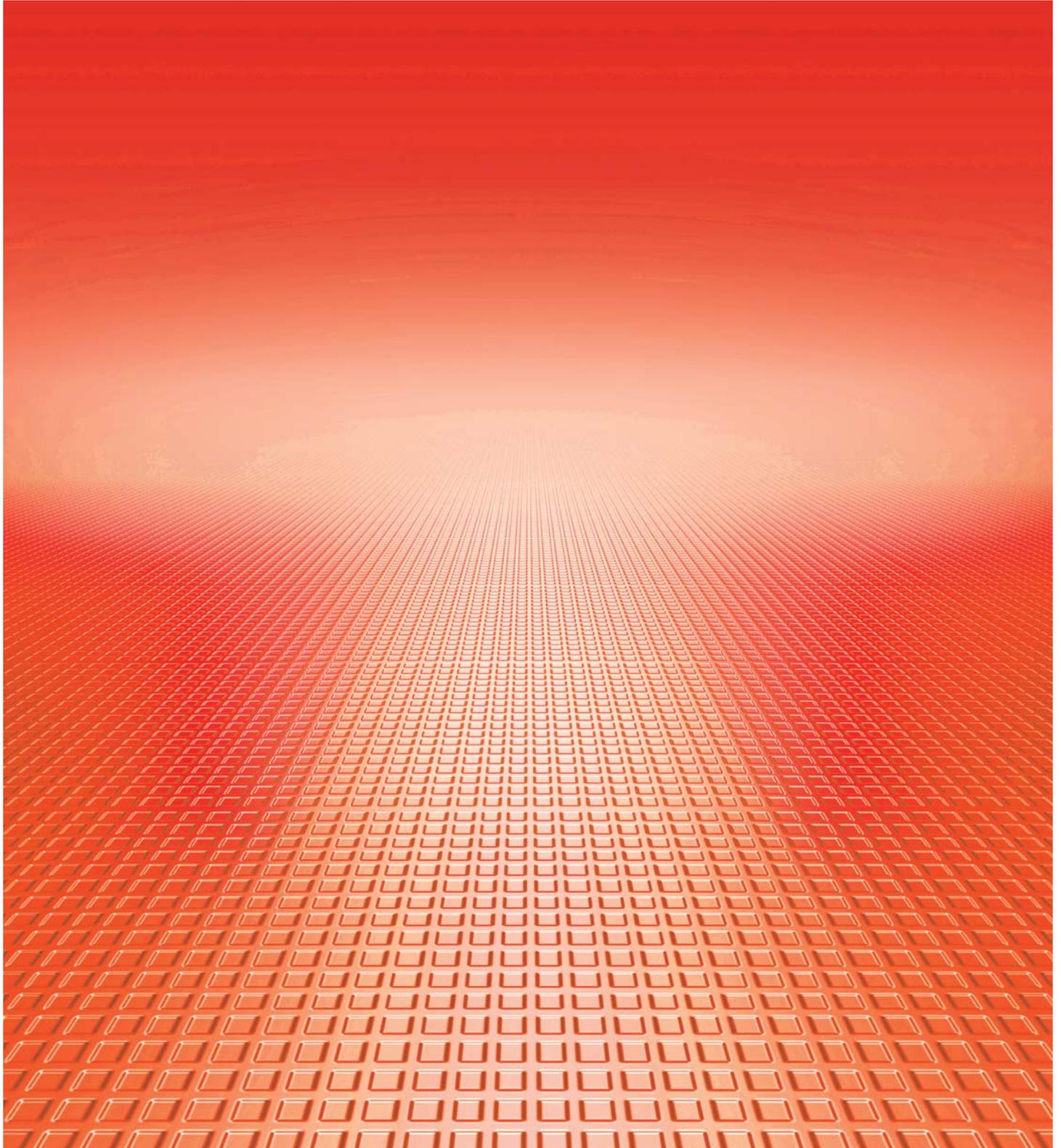


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Editor's Preface

Anne Gonon

Chief Editor, GRM Journal

Professor, Graduate School of Global Studies, Doshisha University

It is my great honor and pleasure to announce the publication of the fourth volume of the Global Resource Management (GRM) Journal.

The next issue will be published online to fit with the main academic trend, but also to receive more papers and new readers.

From the first issue published in 2014, many changes have occurred to reflect students' academic interests. Apart selected student's papers, a large part is now dedicated to student participation in various academic and practical projects through fieldworks and the discoveries of other countries (on site trainee).

The present issue is also representative of the GRM Program that combines practice and theory. Students are becoming increasingly involved in many different types of research and it is fascinating to discover the great diversity of their interests. From Cambodia to Europe, from development to new technologies and environmental problems, now more students than ever are prepared to adopt a social science perspective. They point out some of the most serious problems as environmental destruction.

I am pleased to see that they are also concerned about the European situation and visit countries such as Germany and Slovenia which is very progressive in the academic world. However, their reports on fieldwork show us that they are also open to developing the relationship between sustainability and new technologies.

They also learn group work and are engaged into multicultural communication through academic exchange with students from other universities including those in foreign countries.

The entire issue is testament to the success of the GRM Program in developing human resources as well as a critical perspective on the environment.

What has not changed is the importance accorded to good articles and the strict peer review has authorized only two papers in the present issue which allows us to understand the great diversity of the research conducted by GRM Program students. One concerns Labor, in the Book of Ecclesiastes, relying on the discourse analysis method and the other, adopting data analysis, analyses A Study on Happiness in Bhutan.

We can see that the GRM Journal is rich in its openness to the world's opinions.

View of Labor in the Book of Ecclesiastes: From the Perspective of Biblical Studies

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Abstract:

Problems of slavery have not come to an end and continue as modern slavery. Labor issues including modern slavery seem to be caused by the existing system of employment: laboring with others. Should we not labor together with others? I attempt to approach the problems from the perspective of Biblical Studies. The Book of Ecclesiastes is one of the books in the Hebrew Bible / the Old Testament. Ecclesiastes is full of life's wisdom, which provides us with clues to dealing with life challenges, and has a unique view of labor. Labor in Ecclesiastes is expressed by the word "toil" (*'āmāl*). Toil is done "under the sun." "Under the sun" is a place of vanity, and all toil is also essentially vanity. Ecclesiastes describes two types of vanity: that caused by death and that caused by successor. According to another description, toil becomes vanity when it is related to four things: envy, idleness, overwork, or solitude. Toil accompanied by envy or solitude is vanity, but toil is better than idleness and overwork. Even much better is toil in collaboration. There are two conditions to make toil useful: to collaborate with others and to utilize toil for eating and drinking with fear before God. Though all things including toil are vanity, human beings "toil under the sun," eat and drink, sometimes collaborate with each other as far as possible, and enjoy pleasure as God's gift until death. We can collaborate with others in accordance with the view of labor in the Book of Ecclesiastes, and can enjoy pleasure by laboring and sharing the result of labor in this world.

Keywords: labor, work, vanity, collaboration, the Book of Ecclesiastes in the Hebrew Bible

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- V. Utility of Toil
- VI. Conclusion: View of Labor in Ecclesiastes

Main Text:**I. Introduction**

Problems of slavery have not come to an end. As estimated in the latest statistics,¹ 45.8 million people are still living in slavery: forced labor, debt bondage, human traffic, servile marriage, and child labor. Such situation is recognized as “modern slavery.” Several governments and organizations have been taking action against modern slavery and, in 2015, the United Kingdom enacted the Modern Slavery Act 2015. Nowadays in Japan, the government is moving forward with “work-style reforms” (*Hatarakikata-kaikaku*) and is aiming to improve the labor situation including death by overwork (*Karoshi*), bullying, harassment, and prejudice. This Japanese situation is not yet regarded as a part of modern slavery, but both situations would come from the same origin; the strong oppress and exploit the weak. There is naturally a difference in people’s power, and so it could be said that it is inevitable that one oppresses and exploits others. The problems seem to be caused by laboring with others because both UK’s Modern Slavery Act 2015 and Japan’s “work-style reforms” aim mainly to improve the relationship between laborers and companies. It might be better to quit the existing system of employment so as not to be oppressed or exploited by laboring together with others. Should we not labor together with others?

However, the problems are not so simple. There are numerous reasons and many facets: history, geography, economics, politics, nation, religion, ecology, psychology, and so on. Therefore, it is necessary to make suggestions from an interdisciplinary viewpoint in order to approach the problems. As one of these examples, I make a suggestion from the perspective of my major, Biblical Studies.

In the Hebrew Bible,² there is a collection known as “Wisdom Literature.” This collection contains the Books of Psalms, Proverbs, Job, and Ecclesiastes. All of these examples of “Wisdom Literature” provide those who open the Bible with clues to dealing with life challenges, as if a sage is guiding people with his wisdom. The Book of Ecclesiastes is also full of life’s wisdom and, further, has many references to labor and shows a unique view of labor. According to the view of labor in the Book of Ecclesiastes, how should we labor?

1 See the Walk Free Foundation, *Global Slavery Index 2016*, 4, accessed November 1, 2017, <https://www.globallslaveryindex.org/>. According to ILO’s statistics, 40.3 million people are estimated to be in forced labor and forced marriage (see the International Labour Office, *Global Estimates of Modern Slavery: Forced Labour and Forced Marriage*, 9, accessed November 1, 2017, <http://www.ilo.org/global/topics/forced-labour/lang--en/index.htm>).

2 The term “Hebrew Bible” is a reference to the “Old Testament,” also known as the “Tanakh.” These are different names for the same Text.

II. The Book of Ecclesiastes

The Book of Ecclesiastes is also often called the Book of Qoheleth or the Words of Qoheleth, which may be more familiar titles to you. Qoheleth (קֹהֵלֶת) is originally a Hebrew word and means a teacher or a preacher. The author of this book refers himself as Qoheleth: “The words of Teacher [Qoheleth], the son of David, king in Jerusalem” (Ecclesiastes 1:1).³ Qoheleth is regarded as a kind of title rather than the actual author’s name. The word “Ecclesiastes” is a Latinized form of the Greek translation of Qoheleth.⁴

It is generally agreed that the writings that became the Book of Ecclesiastes were assembled between 300 BCE and 200 BCE.⁵ From the perspective of language and style, this book might have been influenced by Persia,⁶ Phoenicia,⁷ Babylonia, and Egypt.⁸ Therefore, many researchers consider it an important common heritage of wisdom literature of the Ancient Near East.⁹

3 All the translations of the Hebrew Bible in this article are quoted from the *New Revised Standard Version*.

4 For the title of this book, there are many further discussions (see Toshiaki Nishimura, “*Qoheleth no Kotoba*” *Chukai* [Commentary on the Book of Qoheleth] (Tokyo: Board of Publications the United Church of Christ in Japan, 2012), 21-30; C. L. Seow, *Ecclesiastes: A New Translation with Introduction and Commentary* (New York: Doubleday, 1997), 36-38; R. N. Whybray, *Ecclesiastes: Based on the Revised Standard Version* (Grand Rapids; London: Eerdmans; Marshall, 1989), 2-3), but I just refer to Qoheleth as the author and to Ecclesiastes as the title of the book in this article.

5 Ecclesiastes is alluded to in the book of Ben-Shirah, a book written around 180 BCE. See Wesley J. Furst, *The Books of Ruth, Esther, Ecclesiastes, the Song of Songs, Lamentations: The Five Scrolls* (Cambridge: Cambridge University Press, 1975), 97. For the background to Ecclesiastes, there is another opinion that speaks of “an unprecedented era of commercial expansion rife with entrepreneurial opportunities yet overwhelmed with incalculable risks” (William P. Brown, “‘Whatever Your Hand Finds to Do’: Qoheleth’s Work Ethic,” *Interpretation* 55, no. 3 (July 2001): 272).

6 For example, the Hebrew word *pardes* (פַּרְדֵּס) in Ecclesiastes 2:5, which means a park or a forest, comes from Persia (Furst, 97; Seow, 12). Zimmerli comments that such description might come from the ideal of the imperial culture at that time (Helmer Ringgren and Walther Zimmerli, *Sprüche, Prediger* [Proverbs, Ecclesiastes], (Göttingen: Vandenhoeck & Ruprecht, 1962), 158).

7 Furst, 97.

8 The form from Babylonia and Egypt has the feature whereby the author provides a self-introduction at the beginning and the old person passes his life-experience, often together with his office, to the next generation (Ringgren and Zimmerli, 151-152).

9 See also Seow, 305-6; William P. Brown, *Ecclesiastes* (Louisville: John Knox Press, 2000), 52. They point out the relationship with the *Epic of Gilgamesh*. However, for the relationship among places or documents, there is also a deliberate opinion that says, “The diffusion of information and materials in those days makes it impossible for us to speak of

The main theme of Ecclesiastes is “All is vanity,” which is written at the beginning of the book (Ecclesiastes 1:2). “Vanity” is translated from the Hebrew word *hebel* (הֶבֶל),¹⁰ and it means “worthlessness,” “lack of real value,” “hollowness,” “void,” and “emptiness.” The theme “All is vanity” is repeatedly described together with the observations and experiences of the author himself everywhere in Ecclesiastes.

Vanity of vanities, says the Teacher, vanity of vanities! All is vanity. (1:2)

I saw all the living who, moving about under the sun, follow that youth who replaced the king; there was no end to all those people whom he led. Yet those who come later will not rejoice in him. Surely this also is vanity and a chasing after wind. (4:15-16)

All this I observed, applying my mind to all that is done under the sun, while one person exercises authority over another to the other’s hurt. Then I saw the wicked buried; they used to go in and out of the holy place, and were praised in the city where they had done such things. This also is vanity. (8:9-10)

Vanity of vanities, says the Teacher; all is vanity. (12:8)

As quoted above, one theme is repeated again and again. Such repetition is expressed as “his [the author’s] thoughts returned in a pattern, first small, and then like concentric circles in a large and all-embracing arc back to his starting-point.”¹¹ Everything is vanity, worthless, or empty in the Book of Ecclesiastes.

The book has twelve chapters as a whole. It is comparatively small among the different books of the Hebrew Bible. Although the size is small and the theme is simple, both the structure and the contents are highly complicated.¹² In particular, the contents

dependence or influence unless the evidence is clearer and more plentiful” (Fuerst, 100).

10 The word *hebel* has the same origin as the name of Abel, who is well known as the brother of the first murderer, Cain, in the Book of Genesis. *Hebel* is also an especially important concept in Genesis.

11 Fuerst, 95.

12 Many researchers agree that the authors of 1:1-12:8 and 12:9 ff. are completely different and that 12:9 ff. is an addition to 1:1-12:8. There are various opinions about the authors of the addition. For example, Fuerst says that it is an addition by at least three authors because 12:9-10 are written in the third person, 12:11 is written in the second person, and 12:13-14 provide “a conclusion quite foreign to the primary thrusts of Ecclesiastes” (*ibid.*, 98), whereas Loader supposes that 12:9-11 were added by a pupil of the original author of 1:1-12:8, and that 12:12-14 were added by a critic. See J. A. Loader, *Dendo no Sho: Qoheleth*

have been regarded as difficult to understand. The book keeps repeating that everything is vanity, but what does vanity mean? Is it something good or bad? Happy or sad? Some interpreters state that this book expresses the distress of an old sage who was tired of living; other interpreters comment that it tells the truth of life and encourages human beings to live. It is certain that the Book of Ecclesiastes is one of the most confusing books in the Hebrew Bible. Such a complex book as this has a complex view of labor.

III. Labor in Ecclesiastes: “Toil under the sun” (*‘āmāl taḥat haššāmeš*)

In the Book of Ecclesiastes, all things concerned with labor are expressed by a Hebrew word that has the letters *‘āmāl* (עמל) as its root. Words that have *‘āmāl* as the root are also found in many other Semitic languages.¹³ This word *‘āmāl* is translated into “toil” in the New Revised Standard Version of the Bible. The basic meanings of *‘āmāl* are “to be tired,” “to be exhausted,” “to be earning,” and so on. It is regarded as a word that covers the definition of labor in a wide range.¹⁴

The word *‘āmāl* has two significant features as follows:

The first feature is to be used exclusively in the Book of Ecclesiastes. When issues related to labor are described in the Hebrew Bible, words like *lā’k* (לאך) / *mēlā’kâ* (מלאכה), *‘ābaḏ* (עבד), and *‘āsâ* (עשה) are often used,¹⁵ but these words are hardly found in Ecclesiastes.¹⁶ On the other hand, the word *‘āmāl* occurs 76 times in the whole Hebrew Bible. About 40% of those, 35 times, occur in Ecclesiastes.¹⁷ Regarding the rate of

no Kotoba [The Book of Ecclesiastes: The Book of Qoheleth], trans. Katano Aguri (Tokyo: Kyobunkwan, 1994), 264.

13 G. Johannes Botterweck, Helmer Ringgren, and Heinz-Josef Fabry, eds., *Theological Dictionary of the Old Testament: 10*, trans. Douglas W. Stott (Grand Rapids: William B. Eerdmans Publishing Company, 1999), 196.

14 “Work,” “effort,” “what to be gained as a result,” “pain and suffering,” “expression of human beings’ trouble and suffering,” “evil and false behavior” (for the above, see Nishimura, 67), “labor,” “fruit of labor” (for the above, see Ringgren and Zimmerli, 162-163; Nishimura, 164), “task,” “travail” (for the above, see Fuerst, 106).

15 For the Hebrew words that are translated as “labor” or “work” in the Hebrew Bible as a whole, *lā’k* / *mēlā’kâ* occurs 65 times, *‘ābaḏ* occurs 26 times, and *‘āsâ* occurs 11 times. If either meaning or translation is not limited, *lā’k* / *mēlā’kâ* occurs 166 times, *‘ābaḏ* occurs 1,239 times, and *‘āsâ* occurs 2,847 times as a whole.

16 *lā’k* / *mēlā’kâ* never occurs, *‘ābaḏ* occurs 7 times, and *‘āsâ* occurs 43 times. However, *‘ābaḏ* means “to be a slave” and *‘āsâ* simply means “to do”; therefore, these meanings are beyond labor.

17 The remainder of the occurrences is as follows in ascending order: Psalms, 13 times; Job, 11 times; Proverbs, 4 times; Isaiah, 3 times; Judges, 2 times; Habakkuk, 2 times; Genesis, 1 time; Numbers, 1 time; Deuteronomy, 1 time; Jeremiah, 1 time; Jonah, 1 time; I Chronicles, 1 time.

occurrence, *‘āmāl* is a kind of term for labor in the Book of Ecclesiastes.¹⁸

The second feature is to be often connected with the phrase “under the sun” (*taḥat haššāmeš*, תַּחַת הַשֶּׁמֶשׁ). “Under the sun” occurs 27 times in Ecclesiastes and 10 times of those occur together with *‘āmāl*. The phrase “under the sun” is also found in Phoenician documents,¹⁹ but it is not found in the Hebrew Bible except in Ecclesiastes.²⁰ Some of these examples in Ecclesiastes are as follows:

What do people gain from all the toil [*‘āmāl*] at which they toil [*‘āmāl*] under the sun? (1:3)

Then I considered all that my hands had done and the toil [*‘āmāl*] I had spent in doing it, and again, all was vanity and a chasing after wind, and there was nothing to be gained under the sun. (2:11)

Moreover I saw under the sun that in the place of justice, wickedness was there, and in the place of righteousness, wickedness was there as well. (3:16)

Again, I saw vanity under the sun: the case of solitary individuals, without sons or brothers; yet there is no end to all their toil [*‘āmāl*], and their eyes are never satisfied with riches. (4:7-8)

This is an evil in all that happens under the sun, that the same fate comes to everyone. Moreover, the hearts of all are full of evil; madness is in their hearts while they live, and after that they go to the dead. (9:3)

In Ecclesiastes, “under the sun” is a place of *‘āmāl* (1:3, 2:11, 2:18-22, 5:17, 8:15, 8:17), a place where all things happen, especially where evil and misfortune happen (1:9,

18 See also Nishimura, 67; Brown, “‘Whatever Your Hand Finds to Do’: Qoheleth’s Work Ethic,” 272.

19 Fuerst, 103. In the Ancient Near East, the sun was traditionally regarded as the sun-god, the god of justice, and people had to act honestly in trade under the sun-god (see Christopher Mountfort Monroe, *Scales of Fate: Trade, Tradition, and Transformation in the Eastern Mediterranean ca. 1350-1175 BCE* (Münster: Ugarit Verlag, 2009), 40-47).

20 The phrase “on the ground,” an opposite expression to “under the sun,” occurs over 100 times in the whole Hebrew Bible (see Nishimura, 70), but, in Ecclesiastes, it occurs only in 5:1, 8:14, 8:16, 10:7, 11:2, 11:3, and 12:7. The phrase “under heaven” (*taḥat haššāmaim*, תַּחַת הַשָּׁמַיִם), a similar expression to “under the sun,” occurs 18 times in the whole Hebrew Bible, just 3 times of which is in Ecclesiastes (1:13, 2:3, and 3:1). This phrase is also found in the Phoenician inscriptions and the Elam documents of the 12th century BCE (*ibid.*, 70).

3:16, 4:1, 4:3, 4:15, 5:12, 6:1, 8:9, 9:3, 9:6, 9:11, 9:13, 10:5), and a place that symbolizes vanity (1:14, 2:17, 4:7, 6:12, 9:9).

The above is summarized as follows:

Labor in Ecclesiastes is expressed by the word “toil” (*‘āmāl*). Toil is done “under the sun” and, there, iniquity such as evil or misfortune arises as well. “Under the sun” is vanity, as is “toil under the sun.”

IV. Vanity of Toil

As mentioned above, the theme of Ecclesiastes is vanity. Toil is also vanity, which is no exception to this book. The vanity of toil is described in Chapters 2 and 4 in detail.

In Chapter 2, the practice and the result of toil are relayed (verses 1-15). The author of Ecclesiastes practiced everything: he did much toil, built a mansion with large gardens, kept many servants, gathered silver and gold, and became the greatest and richest one. But the result was still vanity. There is nothing to be gained “under the sun.” This is because the same fate befalls everyone. Whatever a person may do, whether a person be wise or not, everyone dies. Therefore, all is vanity; and, of course, toil is also vanity. Of such vanity, it is the latter half of Chapter 2 that gives a clear explanation by two causes.

For there is no enduring remembrance of the wise or of fools, seeing that in the days to come all will have been long forgotten. How can the wise die just like fools? So I hated life, because what is done under the sun was grievous to me; for all is vanity and a chasing after wind. I hated all my toil in which I had toiled under the sun, seeing that I must leave it to those who come after me. (Verses 16-18)

There are two types of vanity, which are caused by death (verses 16-17) and caused by successor (verses 18-23). No matter how hard a person toils, every human being dies eventually, and so loses a place to save the result of toil; it is vanity. And even if one leaves the result of toil to a successor in one’s will, the successor will not necessarily have the qualities to manage it sufficiently and, moreover, the successor dies eventually as well; so, it is vanity. Ecclesiastes repeats that all is vanity like a chasing after wind (verses 11, 17, 26). Here, this book not only refers to the vanity of life and toil, but also scorns the value of family and the prosperity of descendants. As some scholars point out, there is no reference to the value of the connection within a family or a clan.²¹ The other books of the Hebrew Bible often encourage human beings to make a family, and say that

21 See Ringgren and Zimmerli, 163-164.

everyone can live in perpetuity through their descendants. Also, from this point, it is clear that Ecclesiastes has a unique view.

Chapter 4 still admits that toil is essentially vanity, but it talks of vanity from another point of view.

Then I saw that all toil and all skill in work come from one person's envy of another. This also is vanity and a chasing after wind. Fools fold their hands and consume their own flesh. Better is a handful with quiet than two handfuls with toil, and a chasing after wind. . . . the case of solitary individuals, without sons or brother; yet there is no end to all their toil, and their eyes are never satisfied with riches. "For whom am I toiling," they ask, "and depriving myself of pleasure?" This also is vanity and an unhappy business. (Verses 4-8)

Toil becomes vanity when it is related to envy (verse 4), idleness (verse 5), overwork (verse 6), or solitude (verses 7 ff.). Toil caused by envy toward others is vanity, no matter how much and how skillful. However that may be, doing no toil is vanity, too. To live in idleness without skill, that is, to make nothing, leads not only to be poor and hungry, but also finally to eat one's own flesh, that is, "self-destruction."²² But, still, too much toil is vanity, even though there is no idleness. No one can receive the result of toil beyond one's hand. As described in Chapter 2, there is the vanity caused by successor, but it is vanity and unhappy to have no one to share the result of toil with. Therefore, toil accompanied by envy or solitude is vanity, but toil is better than idleness and overwork.²³

However, the preaching of Chapter 4 continues as follows:

Two are better than one, because they have a good reward for their toil. (Verse 9)

Remarkable here, in verses 9-12, are references to the utility of toil although it must be vanity. The book preaches that toil will be much better when there is collaboration with others, which is an opposite state to solitude.

V. Utility of Toil

Toil is essentially vanity in the Book of Ecclesiastes. However, such toil can escape from vanity depending on the conditions. Ecclesiastes indicates two conditions to make

²² Seow, 187.

²³ Loader expresses the idea that labor loses its meaning by envy, that it is relatively superior to idleness, and that it loses its value by solitude. See Loader, 100 ff.

toil useful.

The first condition is collaboration as mentioned above. If a person collaborates with others, that person can take opportunities to engage the companions' help (verse 10), to bring about actual profits (verse 11), and to withstand the enemy (verse 12).

For if they fall, one will lift up the other; but woe to one who is alone and falls and does not have another to help. Again, if two lie together, they keep warm; but how can one keep warm alone? And though one might prevail against another, two will withstand one. A threefold cord is not quickly broken. (Verses 10-12)

If toiling alone, a person will just fall when something goes wrong; if accompanying someone else, a person might easily recover from the damage with the companion's help. Toiling together with the companion brings the necessities more quickly and efficiently than toiling alone. The more companions a person collaborates with, the more strongly and the longer they can stand against failure, damage, or their rivals' attacks. That is to say, even vain toil produces benefits by collaborating with others. Here, this book talks about a great advantage of collaboration although human beings toil in vain and live in vain.²⁴ Furthermore, some researchers point out that Ecclesiastes suggests here "the theological value of community,"²⁵ that is, the value of worship, which is wrought by collaboration.

The second condition is to utilize toil for eating and drinking with fear before God. In the Book of Ecclesiastes, it is repeatedly said that both life and toil are vanity; but, at the same time, it is often said that there is happiness in utilizing the result of toil in order to eat and drink, enjoy oneself, be satisfied, and accept these pleasures as God's gift.

There is nothing better for mortals than to eat and drink, and find enjoyment in their toil. This also, I saw, is from the hand of God. (2:24)

I know that there is nothing better for them than to be happy and enjoy themselves as long as they live; moreover, it is God's gift that all should eat and drink and take pleasure in all their toil. (3:12-13)

So I commend enjoyment, for there is nothing better for people under the sun than to eat, and drink, and enjoy themselves, for this will go with them in their

24 See also Loader, 106-107. He says that everyone draws common benefits from collaboration, which is the only reason that human beings concentrate their labor.

25 Brown, *Ecclesiastes*, 53.

toil through the days of life that God gives them under the sun. (8:15)

Enjoy life with the wife whom you love, all the days of your vain life that are given you under the sun, because that is your portion in life and in your toil at which you toil under the sun. (9:9)

It is pleasure to utilize toil for eating and drinking together with companions while living with fear before God.²⁶ As mentioned in the former section, when toil is related to envy, idleness, overwork, or solitude, the result is vanity. However, if toil is related to pleasure, that is, if human beings find pleasure in toil in collaboration, it will obtain utility. Ecclesiastes proposes eating and drinking as a practical measure. It is the only sure way that human beings can follow in their vain life.

The second condition for the utility of toil is described throughout the Book of Ecclesiastes, and is a kind of conclusion to the main theme “All is vanity.” Though all things including toil are vanity, it might be valuable to collaborate with other people and enjoy the pleasure of living in gratitude to God.

VI. Conclusion: View of Labor in Ecclesiastes

Should we not collaborate, that is, labor together with others? To this question arising in the introduction to this article, I have attempted to find an answer through analyzing the descriptions of Ecclesiastes. In conclusion, the following points became clear.

A. According to the Book of Ecclesiastes, collaboration is much better in the world where all is vanity.

To summarize this article, the Book of Ecclesiastes shows the view of labor as follows (see also Figure 1):

Labor is toil (*‘āmāl*), and toil is done “under the sun.” “Under the sun” is a place of vanity, and all toil is also essentially vanity. The result of toil is vanity because of death (2:16-17), successor (2:18-23), being related to envy (4:4), or being related to solitude (4:7-12), but such toil is better than idleness (4:5) and overwork (4:6). Even much better is toil in collaboration. There are two conditions to make toil useful: to collaborate with others and to utilize toil for eating and drinking with fear before God. Though all is vanity, human beings “toil under the sun,” eat and drink, sometimes collaborate with

26 Brown calls this place for eating and drinking “Qoheleth’s Café” (“Whatever Your Hand Finds to Do’: Qoheleth’s Work Ethic,” 283). He reads there an implication of the Eucharist (*Ecclesiastes*, 129 ff.). See also Robert Davidson, *Ecclesiastes and the Song of Solomon* (Philadelphia: Westminster Press; Edinburgh: Saint Andrew Press 1986), 3.

each other to the extent possible, and enjoy the pleasure as God’s gift until the end of one’s life.

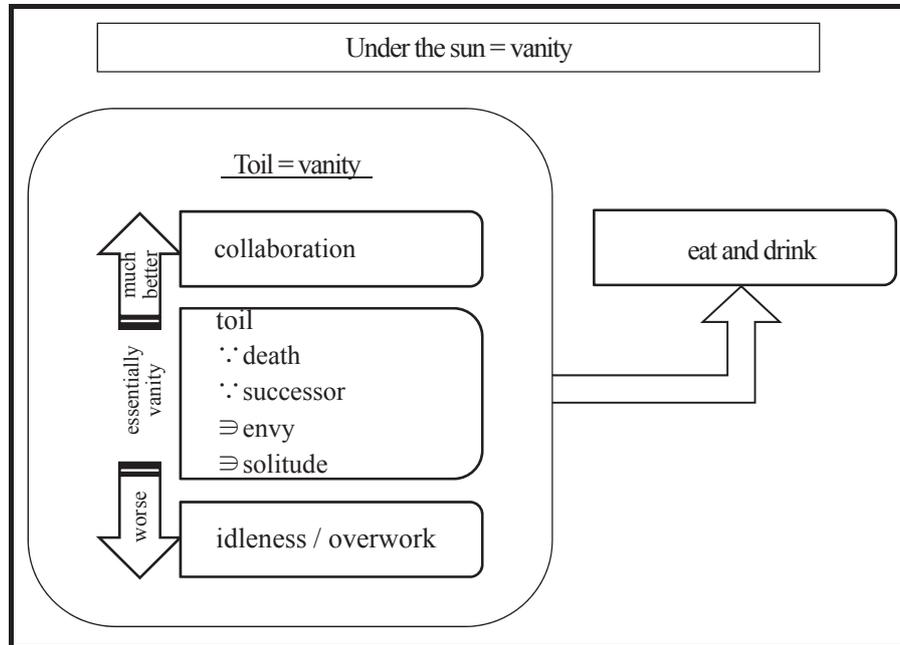


Figure 1: View of Labor in the Book of Ecclesiastes

Ecclesiastes grapples “from start to finish with the problem of death,”²⁷ and indicates that toil will end with death.²⁸ From this perspective, the view of labor in Ecclesiastes may lead to a view of life, and a view of human beings. Although it points out the vanity of toil, the book sheds light on the possibility that toil will obtain utility and the advantages of human beings collaborating with each other. Moreover, it suggests the best and most practicable solution to be the way of eating and drinking. This is a noteworthy concept of Ecclesiastes.

B. It is valuable to labor together with others in order to share the result of labor.

The Book of Ecclesiastes seems to be absurd and pessimistic at first sight. For it excessively repeats that all is vanity. However, as stated in this article, the book has a realistic view. It is a vain reality that human beings die at last. As well as this, it is also a reality that everyone lives among others and needs to eat and drink in order to live. So, to find value in collaboration with others and labor for eating and drinking is a realistic way of life. A form of collaboration is often interpreted as a community in the modern

27 Fuerst, 156.

28 Brown says, “Death, paradoxically, serves as the ultimate impulse for work.” See his “‘Whatever Your Hand Finds to Do’: Qoheleth’s Work Ethic,” 282.

world.²⁹ People will enjoy pleasure by laboring and sharing the result of labor within a community.

C. We have to keep reconsidering our relationship and discussing with the balance of labor and apportionment.

Needless to say, there is room for reconsideration and discussion. For example, when the result of labor is apportioned among companions, the portions might not be appropriate. In other cases where a community falls into a dysfunctional state for political or economic reasons, the community itself might prevent the collaboration from increasing in value. In such cases, it is necessary to reconsider the relationship among members within a community and to discuss the ideal balance of labor and apportionment of each. To reconsider and discuss is the task of all of us: those who are living in this world.

Considering the above-mentioned points A to C, we can collaborate with others in accordance with the view of labor in the Book of Ecclesiastes.

29 See Brown, “‘Whatever Your Hand Finds to Do’: Qoheleth’s Work Ethic,” 283 ff.

A Study on Happiness in Bhutan: From Data of the 2005 AsiaBarometer

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- I. Introduction
- II. Survey Results in Bhutan
- III. Methodology and Results
- IV. Conclusion

Abstract

Income is not the only component of happiness. Many studies suggest that the happiness factor remains constant despite a considerable increase in income. Our analyses reveal the main components of happiness. The Kingdom of Bhutan is the only country to have adopted a happiness policy in its development goals since the early 1970s. To illustrate the actual situation in Bhutan, we consider future developments not only in developing countries, but also in developed countries. Using the data from the 2005 AsiaBarometer, we mainly focus on the following three questions: 1) Is the Happiness Paradox observed in Bhutan?; 2) Is happiness affected by basic infrastructure?; and 3) Are the basic components of happiness the same in European countries and the U.S.? One of the main results of our regression analysis is that higher education (e.g. high school, professional school and university) is a negative contributor to happiness compared to lower education (e.g. no formal education, elementary school and junior high school). This paper suggests possible both sides of positive and negative contributors to happiness in Bhutan.

Keywords: happiness, income, infrastructure, Bhutan

I. Introduction

A. Overview of Bhutan

Bhutan is not a big country, both geographically and economically, located in south Asia between two giants, India and China. The total population is almost 800,000; they live in a 38,394km² area in the Himalayas with significant differences in the terrain. According to the World Bank, the GDP was 2.237 billion USD in 2016, and the main industries are agriculture, forestry and hydropower generation. The official religion is Buddhism; the majority of Bhutanese are of Tibetan origin. In contrast, one of Bhutan's minority groups

is of Nepalese origin; most of them follow the Hindu faith. In the late 1980s to 1990s, many Bhutanese citizens of Nepalese origin were forced to flee because of interethnic conflict. In 2007 over 100,000 Bhutanese refugees were living in UNHCR refugee camps in Nepal; in 2015 fewer than 18,000 refugees remained in the camps in Nepal (UNHCR 2015). In 2008, the political system of Bhutan changed from an absolute to a constitutional monarchy. At the time of this political system change, a new constitution was drafted and adopted. As one of its requirements, Article 9 of this new constitution embraces GNH values: “The State shall strive to promote those conditions that will enable the pursuit of Gross National Happiness” (GNH Centre Bhutan).

B. The Background to GNH

Since the creation of Gross Domestic Product, the development and progress of a country has been measured by only one standard GDP; however, Bhutan measures its development and progress by GNH. In the early 1970s, His Majesty Jigme Singye Wangchuck, the fourth King of Bhutan, suggested the concept of GNH. GNH is defined from the standpoint of four pillars with nine domains of happiness components. According to the GNH Centre Bhutan, these four pillars are as follows: The first is Good Governance: “Good Governance is considered a pillar of happiness because it determines the conditions in which the Bhutanese thrive. While policies and programs that are developed in Bhutan are generally in line with the values of GNH, there is also a number of tools and processes employed to ensure the values are indeed embedded in social policy.” The second represents Sustainable Socio-economic Development: “A thriving GNH economy must value social and economic contributions of households and families, free time and leisure given the roles of these factors in Happiness” (GNH Centre Bhutan). The third pillar is the Preservation and Promotion of Culture. To preserve and promote the Bhutanese culture supports happiness: “Developing cultural resilience, which can be understood as the culture’s capacity to maintain and develop cultural identity, knowledge and practices, and able to overcome challenges and difficulties from other norms and ideals” (GNH Centre Bhutan). Finally, the fourth pillar, Environmental Conservation, is considered one of the key contributors to GNH. Providing critical services such as water and energy is also a key contributor to GNH. The environment is considered to contribute to aesthetic and other stimuli that could be directly healing for people, by their enjoyment of nature’s vivid colors, light and air. The nine domains consist of Living standards, Education, Health, Environment, Community vitality, Time-use, Psychological well-being, Good governance and Cultural resilience and promotion. The nine domains are then measured by 38 sub-indexes, which include 72 indicators and 151 variables. An analysis of Bhutan provides the key to a reconsideration of the development goals and progress for the people.

C. Literature Reviews

Easterlin (1974) is a pioneer of happiness studies in the economic field. The contradiction between individual income and happiness levels has been observed since 1946-70 in the United States; therefore, it is called the “Easterlin Paradox” or “Happiness Paradox.” The fact that higher income did not mean greater happiness in the surveys in the U.S. is attributed to the standard or norm. Easterlin (1974) describes that people tend to judge their happiness in reference to standards or social norms rather than actual economic situations such as individual income.

Economists of happiness studies agree with the importance of the economic situation in the early phase of economic development. For instance, Diener and Seligman (2004) argued that “the fulfillment of basic needs was the main issue” in the early stage of economic development, thus the economic indicators become more important. After that, economic factors become less important than psychological factors such as mental disorders and positive social relationships. Diener and Seligman (2004) review happiness researches by dividing them into six areas: Societal conditions, Income, Work, Physical health, Mental disorders and Social relationships. As pointed out in a paper by Diener and Seligman (2004), the measurement issues of happiness and well-being need to be addressed: different surveys are based on different concepts in different ways. For this reason, it is difficult to make cross-national comparisons.

Despite the measurement issue, happiness research from the economic viewpoint is of great significance. Di Tella, MacCulloch and Oswald (2006) analyzed the effects of public policies on social welfare. They addressed the most important issue of: “Are happiness surveys related to true utility?” If happiness surveys did not relate to true utility, on this point researchers could not use the data in some economic fields; certainly, there are a few situations, in which happiness scores are correlated with other variables. However, Stevenson and Wolfers (2003) imply that the happiness surveys, including suicide rates, are correlated with true utility, and thus such situations are of an acceptable level.

Another methodology of happiness measurement is the collection of information about life domains such as personal relationships, etc. Table 1 shows the basic life domains, which cover 15 areas, reported by the OECD (2013). Most of the indexes are based on the Stiglitz, Sen and Fitoussi commission (SSF). The commission on the measurement of economic performance and social progress (SSF) was created by the ex-president of the French republic, Nicholas Sarkozy in 2008. According to Table 1, the commission identified nine domains: Material conditions, Economic insecurity, Personal activities,

Health, Education, Social connections, Political voice and governance, Personal insecurity and Environmental conditions. The Better Life Index (BLI) by the OECD adds SSF to Housing, Jobs and earnings and Subjective well-being. The Office for National Statistics (ONS) in the U.K. includes almost the same SSF domains except Individual well-being. The New Zealand General Social Survey (NZGSS) is similar to GNH, in this respect, defining “Cultural identity.” The Personal Wellbeing Index (PWI) by the International Wellbeing Group is modeled on the results of extensive factor analysis. As some of these indices overlap each other, they can be categorized into 10 main topics: Standard of living, Health status, Achievement in life, Personal relationships, Personal safety, Being part of a community, Future security, Time to pursue enjoyable activities, Quality of the environment and Your job (for the employed).

TABLE 1 A COMPARISON OF LIFE DOMAINS

SSF	BLI	ONS	NZGSS	PWI
Material conditions	Income and wealth	Personal finance	Economic standard of living	Standard of living
Economic insecurity		The economy		Future security
	Housing			
	Jobs and earnings	What we do	Paid work	
Personal activities	Work and life balance		Leisure and recreation	
Health	Health status	Health (physical and mental)	Health	Personal health
Education	Education and skills	Education and skills	Knowledge and skills	
Social connections	Social connections	Our relationships	Social connectedness	Personal relationships
				Community connectedness
Political voice and governance	Civic engagement and governance	Governance	Civil and political rights	
Personal insecurity	Personal security	Where we live	Safety	Personal safety
Environmental conditions	Environmental quality	The environment	The environment	
			Cultural identity	
				Achieving in life
	Subjective well-being	Individual well-being	Life satisfaction	

Source: OECD (2013), *OECD Guidelines on Measuring Subjective Well-being*, OECD Publishing, p.169.

D. Research Questions

People’s happiness is one of the goals of the policies and development of countries. On one hand, income such as the GDP and GNP equals happiness itself in a roundabout way (Hubbard 2006). For instance, many newspapers report GDP growth every quarter, and then a high growth rate means achieving high happiness. Thus, if the incomes do not correlate with happiness, the GDP cannot be the only measurement of happiness. Therefore, we mainly focus on the correlation between happiness and income. In addition, we investigate the components of happiness in Bhutan.

First, is the Happiness Paradox observed in Bhutan? Since Easterlin’s research, the existence of the Easterlin and other paradoxes has remained a topic of discussion. In addition, the question has remained unanswered regarding whether “the income saturation point” is observed. The GNH strategy states that income is not the only component of happiness; it is only one of the factors affecting happiness in Bhutan. As

the happiness of the Bhutanese consists of material and spiritual aspects, GNH is measured by the four pillars and nine domains. By using the data of the AsiaBarometer, the presence or absence of the Happiness Paradox and “the income saturation point” are clarified.

Second, is happiness affected by basic infrastructure? Diener and Seligman (2004) pointed out that happiness and basic needs are deeply connected, and therefore, the economic indicators are more important in the early stage of development. In addition, the OECD Better Life Index in 2017 determined that basic needs consist of 11 areas: Housing, Jobs, Education, Civic Engagement, Life Satisfaction, Work-Life Balance, Income, Community, Environment, Health and Safety. Two areas are directly connected with basic infrastructure such as the Housing index, which contains Dwellings with basic facilities, and the Environment index, which contains water quality. Their happiness is not directly affected by other areas; however, people’s daily lives are expected to be indirectly affected by areas such as Education and Life satisfaction. The accessibility to basic infrastructure is one of the keys to happiness in people’s lives.

Third, Bhutan is considered to be a unique country from the viewpoint of the national development plan. In this connection, the government policy prioritizes the conservation of its rich biodiversity such as forest preservation rather than forest development. One of the unique policies about forest protection is that at least 60% of the country’s land must be forest for all eternity. This policy is established by the constitution. The other unique policy concerns tourism and its regulation. Tourism is becoming one of the main industries of Bhutan; however, the government tightly controls tourism by restricting admission to protect its unspoiled beauty and its community. The other unique policy is the regulation of the sale of tobacco. Bhutan is the only country that has completely banned the sale of tobacco. If you wish to import tobacco for personal use, then you have to pay a 100% tax. These large differences indicate how their happiness is affected. Are the basic components of happiness similar to those of European countries and the U.S.?

The rest of the paper is organized as follows. Section II describes the survey results in Bhutan. Section III analyses the methodology and results of our regression, and thus we focus on the components of happiness in Bhutan in this paper. Lastly, Section IV provides the results and future possibilities.

II. Survey Results in Bhutan

A. AsiaBarometer

Our main data source is the 2005 AsiaBarometer, which asks a series of questions covering six areas: Social infrastructure development, Economic conditions, Life values and satisfactions, Social actions, customs, and rules, Identity and Political consciousness. This data has been mainly used in political fields such as the comparative studies of the political situation in Asia and European countries (Blondel and Inoguchi 2006). In the economic field, Manabe (2006) analyzed the correlation between the happiness and the GDP per capita by using the 2004 AsiaBarometer second wave; the happiness of each country is converted from (1 “Very happy” to 5 “Very unhappy”) to (+2 “Very happy” to -2 “Very unhappy”) and then, the average scores are used for the cross-sectional regression analysis. They reveal that the increase of the GDP per capita leads to higher happiness. However, the survey is limited to the correlation between happiness and income. Moreover, other data at the country level use World Development Indicators by the World Bank and the World Fact Book by the CIA.

Question 5 in the 2005 AsiaBarometer concerns life value and satisfaction: “All things considered, would you say that you are happy these days?” The answer is evaluated on a scale of 1 to 5: “1 Very happy,” “2 Quite happy,” “3 Neither happy nor unhappy,” “4 Not too happy” and “5 Very unhappy.” The survey targets people aged 20-69, and the sample size is 801. As we use data on a large number of personal characteristics, a complete set of data is available for all variables (664 observations, 83%).

The survey method used here is a face-to-face interview. This survey was conducted in English; however, the official language in Bhutan is Dzongkha. Therefore, we should focus on the potential for bias. In addition, biased samples are not the only issue among the target people, but also the research location is problematic in this survey. As this survey was conducted in English, the target people are limited to English speakers only. Dorji Penjore stated that there are issues with the AsiaBarometer method: the method is limited and the sample is biased. For instance, the period of the survey is only one month (10th September 2005 - 10th October 2005), thus the research location is only the nation’s capital of Thimphu. He pointed out that the gap in the literacy rate is over 35% between the sample of the AsiaBarometer and the national statistics. Moreover, the occupation rate is also biased; Question F6 concerns the occupation: “What is your occupation? Please select one of the following responses.” 44.9% of people answered “13 Other worker,” meaning that almost half the sample is made up of civil servants (Inoguchi 2009, 50).

The proportion of employment is completely different at the country level. According to the World Bank, of the total employment, employment in agriculture is 43.6% in 2005, although in the agriculture sector in the AsiaBarometer survey, “1 Self-employed in agriculture, forestry or fisheries” is only 2.13% (Table 8). This indicates that the AsiaBarometer survey in Bhutan focuses on the urban situation; however most of Bhutan is rural. We must focus on these biases of the AsiaBarometer; therefore, our result is limited to Thimphu only. However, as Thimphu is the capital and the most developed area in Bhutan, the analysis of Thimphu is becoming an important indicator for the future possibilities of Bhutan.

There are some issues with the scale of household income. Question F8 concerns individual income: “What was the total gross annual income of your household last year?” Answers are evaluated on a scale of 1 to 11. Table 2 explains the scale in detail and the answers. For example, the minimum amount is given as 1: up to 2,500 Indian Rupees (57 U.S. dollars) and the maximum amount is 11: above 25,001 Indian Rupees (567 U.S. dollars)¹. The national currency of Bhutan is Ngultrum (BTN), and BTN is pegged to the Indian rupee: 1BTN equals 1INR.

According to the World Bank, the income per capita in 2005 in Bhutan was 1,172 USD. The mean income according to Question F8 is 14,984 Indian Rupees (340 U.S. dollars). Question F8 concerned household income, thus it was compared with income per capita by the World Bank. In relation to this, we convert household income to individual income. The result of the calculation, the mean of individual income, is 4,563 Indian Rupees (104 U.S. dollars). A comparison of the two averages of individual income reveals an almost 11-fold gap between the World Bank (1,172 USD) and the AsiaBarometer (104 U.S. dollars). The AsiaBarometer defines annual income; in contrast, however, the figure seems to be monthly income. One of the reasons for this gap can be attributed to the scales. Question F8 concerns income at the annual level; however, the responses were at the monthly level. In our regression analysis, the scale poses no major difficulties. Using income quartiles and the scale number allowed us to account for these difficulties.

1 The exchange rate in 2005 was 1 USD = 45.07 INR, 1 INR = 0.022683 USD by Principal Global Indicators (<http://www.principalglobalindicators.org/?sk=E30FAADE-77D0-4F8E-953C-C48DD9D14735>) [Accessed 15/10/2017]

TABLE 2 ANNUAL INCOME

Scale	Household Income	Midpoint	Midpoint
	[IN Rupees]	[IN Rupees]	[U.S. dollars]
1	Up to 2,500	1,250	28
2	2,501 – 5,000	3,750	85
3	5,001 – 7,500	6,250	142
4	7,501 – 10,000	8,750	198
5	10,001 – 12,500	11,250	255
6	12,501 – 15,000	13,750	312
7	15,001 – 17,500	16,250	369
8	17,501 – 20,000	18,750	425
9	20,001 – 22,500	21,250	482
10	22,501 – 25,000	23,750	539
11	25,001 above	26,250	595

Note: [1] Income question is F8: “What was the total gross annual income of your household last year?”

[2] The exchange rate is 1 Indian rupee = 0.022683 U.S. dollars in 2005 by Principal Global Indicators.

B. Survey Results

(1) Income and Happiness

Table 3 shows the proportion of happiness by each category. According to this table, there are differences in the proportion of reported happiness scores between personal income and absolute (household) income.

First, of the top 25% of people in the personal income position, 42.59% responded with “Very happy.” This is a higher percentage compared with the total average of 35.23%. In contrast, of the top quartile in the absolute income position, 35.42% responded with “Very happy”. One of the causes of this gap can be attributed to the number of family members. The total family members of average households in this survey are 4.54 persons. The former group of the top quartile in the personal income position and happiness mainly consists of a single household or a two-person household, and the average household is 1.86 persons. The latter group of the top quartile in the absolute income position and happiness mainly consists of six-person households, and the average household is 4.96 persons. One interpretation of the relationship between happiness and income in the group of the highest personal income position is that a smaller family is happier than a larger family.

Next, we focus on the bottom 25% of people in both personal and absolute income position. As Table 3 indicates, the bottom quartile in the personal income position, who responded with “Neither happy nor unhappy,” is 10.92%. The bottom quartile in the

absolute income position, who responded with “Neither happy nor unhappy,” is 16.18%. Compared with the total average, the former is lower and the latter is higher: $10.92\% < 12.63\% < 16.18\%$. One reason for these differences can also be attributed to the number of families. The former group, the bottom quartile in the personal income position and third happiness position, is mainly four-person households and six-person households, and the average household is 5.89 persons. The latter group of the bottom quartile in the household income position and third happiness position mainly consists of single households, and the average household is 3.32 persons. As far as the group of the lowest personal income position is concerned, a larger family is happier than a smaller family.

Therefore, people who are in a single or two-person household in the highest income group are happier than people in a big family. On the contrary, in the lowest income group, people who live in a big family are happier than people in a small family.

TABLE 3 INCOME QUARTILES

Reprted Happiness	All	Income Percapita Quartiles			
		1st (Lowest)	2nd	3rd	4th (Highest)
Very Happy	35.23	37.93	33.14	33.14	42.59
Quite Happy	47.60	47.13	50.00	54.29	41.36
Neither Happy nor Unhappy	12.63	10.92	13.37	8.57	11.11
Not too Happy	4.29	4.02	3.49	4.00	4.32
Very Unhappy	0.25	0.00	0.00	0.00	0.62
	100.00				

Reprted Happiness	All (Frequency)	House Hold Income Quartiles			
		1st (Lowest)	2nd	3rd	4th (Highest)
Very Happy	279	36.42	39.80	34.12	35.42
Quite Happy	377	41.62	48.47	50.00	54.17
Neither Happy nor Unhappy	100	16.18	9.18	11.76	6.25
Not too Happy	34	5.78	2.55	3.53	4.17
Very Unhappy	2	0.00	0.00	0.59	0.00
	(Total792)				

(2) Marital Status, Sex and Happiness

In the AsiaBarometer, the total sex ratio concerning the number of males for each female is 1.1 male (s)/female (414 males/378 females). According to the World Fact Book by the CIA, the sex ratio of the total population is 1.09 male (s)/female, thus it is almost the

same ratio. Now there are four categories regarding marital status in the AsiaBarometer: Single (25%), Married (72%), Divorced/Separated (2%) and Widowed (1%) (Appendix 1).

According to Table 4, 36.51% of females responded with “Very Happy”, and 34.06% of males responded with the same happiness score, compared with the total average of 35.23% (Table 3); females feel happier than males in the happiest group. In the second happiness group that responded with “Quite happy,” 45.50% are females and 49.52% are males, with the total average being 47.60% (Table 3); males were happier than females in the second happiness group. The third happiness group has almost the same share with about 12.5% in both males and females; females are happier only 0.64% more than males. In the total trend, females tend to be happier than males; in addition the share of female happiness is more dispersed than male happiness.

Table 4 shows that married people are happier than single and divorced people. In the group that responded with “Very happy,” the happiness rate decreased by marital status in the following order: married 37.48%, single 29.69% and divorced 28.57%. In married people by gender, females have a higher happiness score than males: male (36.30%) < female (38.81%). In single people by gender, females have a higher happiness score than males: male (28.71%) < female (30.77%). Moreover, in divorced people by gender, the numbers in this group are too small to indicate all tendencies; however, one possibility is that females have a higher happiness score than males: male (20.00%) < female (33.33%).

In females that responded “Not too happy” by marital status, single females have higher scores than married females: single female (7.69%) > married female (3.73%). In contrast, in the females that responded with “Very happy” by marital status, married females have higher scores than single females: single female (30.77%) < married female (38.81%).

In the overall trend, married females have a higher score than single females. However, males are less likely to follow this trend; they tend to concentrate in “Quite happy,” which accounts for almost half of them, regardless of whether they are married.

TABLE 4 MARITAL STATUS AND SEX

Reprted Happiness	Marital Status			Sex	
	Single	Married	Divorced/ Separated	Male	Female
Very Happy	29.69	37.48	28.57	34.06	36.51
Quite Happy	48.44	47.11	50.00	49.52	45.50
Neither Happy nor Unhappy	15.10	11.56	14.29	12.32	12.96
Not too Happy	5.73	3.85	7.14	4.11	4.50
Very Unhappy	1.04	0.00	0.00	0.00	0.53

Reprted Happiness	Single		Married		Divorced/Separated	
	Male	Female	Male	Female	Male	Female
Very Happy	28.71	30.77	36.30	38.81	20.00	33.33
Quite Happy	50.50	46.15	49.17	44.78	40.00	55.56
Neither Happy nor Unhappy	16.83	13.19	10.56	12.69	20.00	11.11
Not too Happy	3.96	7.69	3.96	3.73	20.00	0.00
Very Unhappy	0.00	2.20	0.00	0.00	0.00	0.00

(3) Infrastructure and Happiness

Question 1 in the AsiaBarometer concerns infrastructures: “Which of the following public utilities does your household have the use of?” There are seven utilities: Q1_1 The public water supply, Q1_2 Electricity, Q1_3 Liquefied petroleum gas or LPG, Q1_4 Fixed-line phone, Q1_5 Mobile phone, Q1_6 Facsimile and Q1_7 Cable TV. Possible responses are “Have” or “Not Mentioned” We use the answer “Not Mentioned” as some infrastructures in the analysis are not available to people.

(a) Basic Infrastructures (Water, Electricity and Liquefied Petroleum Gas)

The coverage of the water supply system in this survey is 94.46%; therefore, most people have access to the public water supply. However, some of them do not, hence their happiness is of a lower level compared with the total average happiness and those people who can access the public water supply. According to Table 5, 10.71% of people who did not have access to the public water supply responded with “Not too happy.” The rate is very high at over twice that of the total average: 4.29% (Table 3). Moreover, 25% of people in the same group, responded with “Neither happy nor unhappy.” The rate is also twice that of the total average: 12.63% (Table 3). In contrast, only 17.86% of people in the same public water supply group responded with “Very happy.” It is almost half that of the total average: 35.23% (Table 3). The coverage of electricity is near-ubiquity at 99.37% and the LPG penetration rate is also high at 97.98%. However, this is the situation in Thimphu. A lower rate is therefore expected in rural Bhutan.

TABLE 5 BASIC INFRASTRUCTURES

Reprted Happiness	The Public Water Supply		Electricity		LPG	
	Have	Not Mentioned	Have	Not Mentioned	Have	Not Mentioned
Very Happy	35.86	17.86	35.32	40.00	35.18	37.50
Quite Happy	47.64	46.43	47.65	40.00	47.81	37.50
Neither Happy nor Unhappy	12.17	25.00	12.71	0.00	12.76	6.25
Not too Happy	4.06	10.71	4.32	0.00	4.12	12.50
Very Unhappy	0.26	0.00	0.13	20.00	0.13	6.25
[Penetration rate %]	[96.46 %]		[99.37 %]		[97.98 %]	
	(Total 764)	(Total 28)	(Total 787)	(Total 5)	(Total 776)	(Total 16)

(b) Phones

The penetration rate of fixed-line phones is 69.70%. According to Table 6, people who use a fixed-line phone tend to have a happier score than people who do not. People who do not use a fixed-line phone have a higher percentage in low happiness categories: “Neither happy nor unhappy,” “Not too happy” and “Very unhappy.” In contrast, the users of fixed-line phones have higher shares in the happiest category: 36.59% > 32.08%. Does the easier connection to others make people happier? We focus on mobile phones to obtain one of the key answers. Table 6 shows that the penetration rate of mobile phones is 59.09%. Taking into account that the mobile phone service has been in operation since 2003, the penetration rate has rapidly increased in only 2 years. The happiest group suggests that there are fewer users of mobile phones than people who do not use them: 34.19% < 36.73 percent. In the “Neither happy nor unhappy” group, the users of mobile phones have a higher share than people who do not use them: 13.68% > 11.11%.

Therefore, fixed-line phones make people happier; in contrast, mobile phones make people unhappier. The reason for this difference is that connecting with others makes people happier; however, excessive connection with others becomes somewhat of a liability. It might be difficult to obtain both the value of convenience and the value of freedom.

TABLE 6 PHONES

Reprted Happiness	Fixed-line Phone		Mobile Phone	
	Have	Not Mentioned	Have	Not Mentioned
Very Happy	36.59	32.08	34.19	36.73
Quite Happy	47.28	48.33	47.86	47.22
Neither Happy nor Unhappy	11.96	14.17	13.68	11.11
Not too Happy	3.99	5.00	3.85	4.94
Very Unhappy	0.18	0.42	0.43	0.00
[Penetration Rate %]	[69.70%]		[59.09%]	
	(Total 552)	(Total 240)	(Total 468)	(Total 324)

(c) Cable TV

TV broadcasting has been available since 1999 as one of the King's modernization programs. Bhutan was the last country in the world to get TV. At his silver jubilee celebrations, the fourth King stated:

The introduction of television and the Internet is a reflection of the level of progress that we have achieved. I would like to remind our youth that television and Internet provide a whole range of possibilities, which can be both beneficial as well as negative for the individual and the society. I trust that you will exercise your good sense and judgment in using the Internet and television. It is my sincere hope that the introduction of television will be beneficial to our people and country.

His Majesty King Jigme Singye Wangchuck, 2 June 1999. (Tay and Turner 2015)

How does television affect people's happiness? According to Table 7, the cable TV coverage is 92.80%. People who have cable TV are happier than those that do not. There are more people who have cable TV in the happiest category than those that do not: 36.19% > 22.81%. In addition, they also have a higher percentage in the second happiest category: 48.03% > 42.11%. In contrast, in the lower happiness category, people who do not have cable TV have a higher share: "Neither happy nor unhappy" is 26.32% and "Not too happy" is 8.77%. Having cable TV makes people happier; however, clarifying the effect of television is complicated. This is only one aspect of people's happiness. Table 7 shows that the penetration rate of facsimiles is limited to only 4.67%. The percentage of people that have a facsimile and responded "Very Happy" is higher than those that do not have a facsimile: 45.95% > 34.70%. However, some of the happiness categories are reversed, thus we must pay attention to the effects.

TABLE 7 FACSIMILE AND CABLE TV

Reprted Happiness	Facsimile		Cable TV	
	Have	Not Mentioned	Have	Not Mentioned
Very Happy	45.95	34.70	36.19	22.81
Quite Happy	40.54	47.95	48.03	42.11
Neither Happy nor Unhappy	8.22	12.85	11.56	26.32
Not too Happy	5.41	4.24	3.95	8.77
Very Unhappy	0.00	0.26	0.27	0.00
[Penetration Rate %]	[4.67%]		[92.80%]	
	(Total 37)	(Total 755)	(Total 735)	(Total 57)

(4) Employment Status and Happiness

Question F6 concerns employment: “What is your occupation? Please select one of the following responses.” There are 17 categories, and details of the responses are shown below (Table 8).

Table 8 shows that the category of occupation is classified into seven groups. First, Civil Servant is the only group in the category of “13 other worker”; however, it had the largest share of 45.17% of the total occupations. According to Table 9, Civil Servants responding with “Very happy” on the happiness scale, occupy the highest share in all categories; moreover, compared with the average percentage, it has a higher share: 41.24% > 35.23%. One possibility for this is to assume that people who are the top of the elite can become civil servants in Bhutan. This is because there is little industry in Bhutan, and thus there is an insufficient number of white-collar jobs; therefore, the competition is very intense. In addition, the government plays a role; it is the largest company in the country. From this viewpoint, civil servants are people who survive in the fiercest competition. In contrast, the group of civil servants that responded with “Not too happy,” has a higher percentage than other groups: 5.93%.

Next, according to Table 8, the group with the second largest share is the Employed. It includes six categories: “7 Senior manager,” “8 Employed professional or specialist,” “9 Clerical workers,” “10 Sales,” “11 Manual worker (including skilled and semi-skilled)” and “12 Driver,” thus the total share is 26.35%. Table 9 shows that this group’s happiness rating is “Quite happy.” In addition, the small percentage of the “Very happy” category is 26.44%, hence the higher proportion of the “Neither happy nor unhappy” category shared 15.38%. People who are categorized as “Employed” do not face major risks such as unemployment compared with other groups except civil servants, students and retirees. Therefore, this has the smallest share of the “Not too happy” category. At

the same time, as it might be difficult for this group to take advantage of major opportunities while living and following the same old routine, their happiness level might tend to lower from “Very happy” to “Quite happy.”

Third, Table 8 shows that the group with the third largest share is Self Employed. It includes six categories: “1 Self-employed in agriculture, forestry or fisheries,” “2 Business owner in mining or manufacturing industry of an organization with up to 30 employees,” “3 Business owner of a retail organization with up to 30 employees,” “4 Vendor or street trader,” “5 Business owner or manager of an organization with over 30 employees” and “6 Self-employed professional (self-employed doctors, lawyers, writers, etc.)”, thus the total share is 8.90%. According to Table 9, the proportion of happiness is similar to the total average proportion except in the “Very unhappy” category. The category with the least share is “5 Business owner or manager of an organization with over 30 employees” at only 1.41%. One reason is that those that are self-employed have much more freedom than other workers; however, their happiness is a trade-off between freedom and risk, and such freedom may sometimes be seen as a liability.

Fourth, Table 8 indicates that the group with the fourth largest share is “Keeping Home” at 7.78%. According to Table 9, this group has the happiest people as regards employment status. Their responses fall within the third happiest categories, thus there are no “Not too happy” and “Very unhappy” people; moreover, the “Neither happy nor unhappy” people account for half of the total average percentage: $6.45\% < 12.63\%$.

Table 8 shows that the In School group accounted for 6.78% of the total occupations. According to Table 9, over half of them are concentrated in the “Quite happy” category at 56.60%; however, a few of them responded with the two least favorite happiness categories of “Very unhappy”: 1.89% and “Not too happy”: 5.66%. The survey targets people aged 20 and above, with most students being given the opportunity to participate in the highest level of education. At this point, they have good opportunities and are one of the future elite groups. On the contrary, they face certain issues in the job market such as the imbalance of supply and demand. The unemployment rate in 2015 by CIA among youth aged 15-24 is 10.7%. Comparing the average unemployment rate, the younger generation face serious issues in the job market in Bhutan. For instance, people who graduated at the higher education level hope to get white-collar jobs; however, these jobs are limited in the Bhutan economy. Thus, this might affect their happiness.

According to Table 8, 2.89% of people are categorized as Unemployed. The World Fact Book by the CIA states that the unemployment rate is 3.2%, thus it is almost the same

rate at the country level. Table 9 shows that unemployed people concentrate in the category of “Quite happy”: 56.52%, and the happiest category “Very happy” has the lowest percentage: 26.09% by comparison with other employment statuses. Unemployment has only an effect on the group with the greatest happiness; however, it does not affect other groups.

Lastly, Table 8 shows that the Retired group shares 2.01% of the total employment status. Bhutanese people retire in their early 60’s. For instance, civil servants at the officer level retire at age 58, and those at the director level retire at age 60. In addition, the King of Bhutan also has a mandatory retirement age, and it is prescribed in the national constitution. Article 2 of the Institution of Monarchy states that:

6. Upon reaching the age of sixty-five years, the Druk Gyalpo shall step down and hand over the Throne to the Crown Prince or Crown Princess, provided the Royal Heir has come of age.

The Constitution of the Kingdom of Bhutan, Article 2.

According to Table 9, the Retired group that responded with “Neither happy nor unhappy” is smaller than the average rate of $6.25\% < 12.63\%$. The happiness of retired people has an almost higher average proportion except in the third and fourth category of happiness, thus, the scale of their happiness increases. However, a few of them become unhappy.

TABLE 8 OCCUPATIONS

Group	Percent	Category
Civil Servant	45.17	(13) Other worker
Employed	2.01	(7) Senior manager (company director, no lower in rank than a manager of a company section in a company with 300 or more employees, or a manager of a department in a company with less than 300 employees)
	14.05	(8) Employed professional or specialist (hospital doctors, employed lawyers, engineers, etc.)
	4.27	(9) Clerical worker
	2.51	(10) Sales
	2.51	(11) Manual worker (including skilled and semi-skilled)
	1.00	(12) Driver

Self Employment	2.13	(1) Self-employed in agriculture, forestry or fisheries
	0.63	(2) Business owner in mining or manufacturing industry of an organization with up to 30 employees
	0.75	(3) Business owner of a retail organization with up to 30 employees
	2.76	(4) Vendor or street trader
	2.13	(5) Business owner or manager of an organization with over 30 employees
	0.50	(6) Self-employed professional (self-employed doctors, lawyers, writers, etc.)
Keeping Home	7.78	(14) Homemaker
In School	6.78	(15) Student
Unemployed	2.89	(17) Unemployed
Retired	2.01	(16) Retired

Note: [1] The question of occupation is “F6 What is your occupation?.”

[2] The order of the groups is large percentage from the top.

[3] The category numbers are based on the survey.

[4] The category of “Unemployed others” deal with the missing value (0.13%).

TABLE 9 EMPLOYMENT STATUS

Reprted Happiness	Unemployed	Employed	Self Employed
Very Happy	26.09	26.44	33.80
Quite Happy	56.52	56.25	46.48
Neither Happy nor Unhappy	13.04	15.38	14.08
Not too Happy	4.35	1.92	4.23
Very Unhappy	0.00	0.00	1.41

Reprted Happiness	Civil Servant	Keeping Home	In School	Retired
Very Happy	41.24	40.32	30.19	37.50
Quite Happy	39.83	53.23	56.60	50.00
Neither Happy nor Unhappy	12.99	6.45	5.66	6.25
Not too Happy	5.93	0.00	5.66	6.25
Very Unhappy	0.00	0.00	1.89	0.00

(4) Religion

Question F9 concerns religion: “Do you regard yourself as belonging to any particular religion? If yes, which?” and it is followed by a list of possible answers. The answers

consist of 17 categories, and details of the answers are shown in Appendix 2. Appendix 2 shows that the category of religion in Bhutan is classified into six groups. The main religion is Buddhism (Mahayana). Appendix 2 shows that 92% of Bhutanese are Buddhist (Mahayana and Hinayana), with only a few percent of them (6%) being Hindu. Non-Catholic Christian represents about 1%, and Catholic and Muslim (Shiah) comprise less than 1%. Table 10 shows that the Buddhists (Mahayana) are happier than the Hindus in the highest two categories; Buddhist (Mahayana) 35.48% > Hindu 34.69%. The other religions are too small for any significant comparisons to be made².

TABLE 10 RELIGION

Reprted Happiness	1 Catholic	2 Christian religion other than	4 Muslim (Shiah)
Very Happy	0.00	0.00	100.00
Quite Happy	0.00	0.00	0.00
Neither Happy nor Unhappy	0.00	0.00	0.00
Not too Happy	0.00	70.00	0.00
Very Unhappy	100.00	30.00	0.00

Reprted Happiness	5 Hindu	6 Buddhist (Mahayana)	7 Buddhist (Hinayana)
Very Happy	34.69	35.48	16.67
Quite Happy	44.90	47.97	50.00
Neither Happy nor Unhappy	16.33	11.78	33.33
Not too Happy	4.08	4.49	0.00
Very Unhappy	0.00	0.28	0.00

III. Methodology and Results

A. Methodology

Happiness model

Our basic theory follows the Happiness model by Di Tella and MacCulloch (2008), to which we have made a minor change. The basic regression model is as follows:

$$Happiness_{ist} = \alpha Micro_{ist} + \mu_{ist}$$

$Happiness_{ist}$ is the happiness of the individual i , who lives in the country s ($s = \text{Bhutan}$), in year t ($t = 2005$). The vector $Micro_{ist}$ refers to individual characteristics: Occupation, Personal income position, Education, Sex, Age squared, Marital status and Public utilities. The definition of the variables and basic statistics are presented in Appendix 1. The μ_{ist} refers to the error term. As described above, Question 5 concerns degree of

² The religious factor has been tested to check if they constitute determinants of happiness. Coefficients of their dummies are not statistically significant. Please refer to Appendix 3.

happiness: “All things considered, would you say that you are happy these days?” The responses are evaluated on a scale from 1 to 5: “1 Very happy,” “2 Quite happy,” “3 Neither happy nor unhappy,” “4 Not too happy” and “5 Very unhappy.” In addition, there is a small number of “9 Don’t know” (9 observations), so our regression analysis takes this missing value into account. The responses indicate the happiness of the individual is an ordinal ranking; therefore, we are unable to use an Ordinary Least Squares regression model. From this viewpoint, the variables of happiness might define dichotomous variables: $Happiness_{ist}^1 = 1$ if the person responds with “5 Very unhappy” and 0 otherwise; $Happiness_{ist}^2 = 1$ if the person responds with “4 Not too happy” and 0 otherwise; $Happiness_{ist}^3 = 1$ if the person responds with “3 Neither happy nor unhappy” and 0 otherwise; $Happiness_{ist}^4 = 1$ if the person responds with “2 Quite happy” and 0 otherwise; $Happiness_{ist}^5 = 1$ if the person responds with “1 Very happy” and 0 otherwise. The AsiaBarometer answer number has 1 (the happiest) to 5 (the unhappiest). Since most of the indices such as World Values Survey and Eurobarometer are designed so that the large number is associated with happiness (and the small number with unhappiness), we converted the ordered number 1 (the unhappiest) to 5 (the happiest) in our regression analysis. Then, our regression analysis is based on the Ordered Probit model. The Ordered Probit model is considered to theoretically fit better than the Ordered Logit Model in several cases in economic fields. Therefore, we use the Ordered Probit Model.

Appendix 1 shows the basic statistics of the variables. We mainly use eight variables in our regression analysis. Most of them are converted to dummy variables by category. For instance, Question F5 concerns marital status: “What is your marital status?” Thus, the answers consist of four categories: “Single,” “Married,” “Divorced/separated” and “Widowed.” The single dummy variable is that if people respond with “Single,” they are 1 and 0 otherwise (“Married,” “Divorced/separated” and “Widowed”). The other variables are converted to dummy variables using the same methodology.

B. Results

The basic results are presented in Table 11. However, there are too many variables that fail to meet the significance level of at least 10%. To simplify these results, we rejected the variables in order of the increase in the significance levels, and Table 12 summarizes the final results³. Both results are estimated in the Ordered Probit Model and the Ordered Logit Model. As these results are similar, the regression analysis is robust.

3 We try to create a few categories in our regression model. One of the results of grouped regression is shown in Appendix 4. The dummy variables of gender and marital status cannot meet the significance level of at least 10%.

TABLE 11 BASIC RESULTS

Variables		Ordered Probit Model 1		Ordered Logit Model 1	
		Coef.	Std.Err.	Coef.	Std.Err.
Male		0.040	0.099	0.072	0.171
Age Squared	age2	0.000	0.000	0.000	0.000
Education	No formal education	0.000	(omitted)	0.000	(omitted)
	Elementary school/junior high schools/middleschool	-0.582	0.393	-0.966	0.655
	High school	-0.813	0.411	-1.274	0.688
	Professional school/technical school	-1.061	0.417	-1.744	0.699
	University/graduate school	-1.030	0.422	-1.695	0.708
English	Not at all	0.000	(omitted)	0.000	(omitted)
	Very little	0.459	0.395	0.757	0.660
	I can speak it well enough to get by in daily life	0.313	0.410	0.516	0.682
	I can speak English fluently	0.368	0.417	0.597	0.693
Marital status	Single	0.000	(omitted)	0.000	(omitted)
	Married	0.141	0.125	0.205	0.219
	Divorced/ Separated	-0.211	0.358	-0.297	0.636
	Widowed	-0.562	0.377	-1.003	0.669
Occupation (Employment Status)	1 Self-employed in agriculture, forestry or fisheries	0	(omitted)	0	(omitted)
	2 Business owner in mining or manufacturing industry of an organization with up to 30 employees	-0.26	0.706	-0.558	1.274
	3 Business owner of a retail organization with up to 30 employees	-0.771	0.582	-1.22	1.057
	4 Vendor or street trader	-0.201	0.391	-0.353	0.659
	5 Business owner or manager of an organization with over 30 employees	-0.39	0.42	-0.4	0.771
	6 Self-employed professional (self-employed doctors, lawyers, writers, etc.)	-0.324	0.837	-0.495	1.313

Occupation (Employment Status)	7 Senior manager (company director, no lower in rank than a manager of a company section in a company with 300 or more employees, or a manager of a department in a company with less than 300 employees)	-0.273	0.427	-0.475	0.711
	8 Employed professional or specialist (hospital doctors, employed lawyers, engineers, etc.)	-0.088	0.327	-0.118	0.555
	9 Clerical worker	0.169	0.357	0.273	0.611
	10 Sales	-0.392	0.39	-0.718	0.657
	11 Manual worker (including skilled and semi-skilled)	-0.603	0.436	-1.023	0.755
	12 Driver	0.055	0.54	0.161	0.938
	13 Other worker	-0.006	0.299	0.072	0.508
	14 Homemaker	-0.015	0.346	-0.02	0.582
	15 Student	0.058	0.353	0.071	0.598
	16 Retired	0.106	0.437	0.213	0.743
17 Unemployed	0.04	0.405	0.041	0.69	
Personal Income Position in Quartiles	1st (Lowest)	0.000	(omitted)	0.000	(omitted)
	2nd	-0.131	0.126	-0.293	0.217
	3rd	0.044	0.130	0.029	0.224
	4th (Highest)	0.211	0.134	0.365	0.233
Public Utility	Q1_1 Water supply	0.471	0.249	0.958	0.439
	Q1_2 Electricity	0.332	0.701	-0.317	1.620
	Q1_3 Liquefied petroleum gas or LPG	0.290	0.378	0.293	0.666
	Q1_4 Fixed-line phone	0.220	0.106	0.347	0.183
	Q1_5 Mobile phone	-0.004	0.100	0.002	0.174
	Q1_6 Facsimile	0.408	0.228	0.791	0.400
	Q1_7 Cable TV	0.449	0.189	0.912	0.329
	/cut1	-1.864	0.812	-5.300	2.106
	/cut2	-0.551	0.792	-1.953	1.866
	/cut3	0.189	0.791	-0.482	1.860
	/cut4	1.655	0.791	1.987	1.861

Note: [1] Bold-face is significant at 10 percent level.

[2] Ordered Probit Model1; Number of obs. = 669, LR chi2 (38) = 64.53, Prob. > chi2 = 0.0046 and Pseudo R2 = 0.0440.

[3] Ordered Logit Model1; Number of obs. = 669, LR chi2 (38) = 66.18, Prob. > chi2 = 0.0031 and Pseudo R2 = 0.0452.

(1) Education

Question F3 concerns the level of education: “What is the highest level of education you have completed?” Answers are evaluated on a scale from 1 to 6: “1 No formal education,” “2 Elementary school/junior high school/middle school,” “3 High school,” “4 High-school-level vocational-technical school,” “5 Professional school/technical school” and “6 University/graduate school.” As the category, “4 High-school-level vocational-technical school,” is not applicable here; there are only 5 responses used for Bhutan.

In Table 11, the Ordered Probit Model 1 shows that “1 No formal education” and “2 Elementary school/junior high school/middle school” have insignificant effects on the degree of happiness. The percentage of people, categorized in the “1 No formal education” group, is 9% of the total education level (Appendix 1). Moreover, the percentage of people, categorized in the “2 Elementary school/junior high school/middle school” group, is 16% of the total (Appendix 1). For these 25% of people who answered “No formal education” and “Elementary school/junior high school/middle school”, the level of educational attainment has no consequences on their happiness.

In Table 12, the Ordered Probit Model 2 indicates that “3 High school,” “5 Professional school/technical school” and “6 University/graduate school” met the significance level of less than 1%. These three groups are negative contributors to happiness. People categorized as the “3 High school” group account for 28% of the total education level (Appendix 1). Thus, people categorized as the “5 Professional school/technical school” group account for 18% of the total (Appendix 1). And then, people categorized as the “6 University/graduate school” group account for 29% of the total (Appendix 1). One reason for this result may be due to issues in the job market regarding the imbalance of supply and demand. As previously stated, people who graduate at the higher education level such as “6 University/graduate school” hope to obtain white-collar jobs, but such jobs are limited in the Bhutan economy. The mismatch between supply and demand has a negative impact on higher educated people. Inevitably, the government plays an important role in people’s happiness. The policy of industrial development might affect people’s happiness through the labor market.

(2) Manual worker

Occupation is classified into 17 categories, and the details are shown in Table 8. In Table 11, the Ordered Probit Model 1 implies that most of the occupations have insignificant effects. However, according to Table 12, in the Ordered Probit Model 2, only the category of “11 Manual worker (including skilled and semi-skilled)” met the

significance level of 5%. Thus, the Manual worker group is a negative contributor to happiness. The category of Manual worker is only 1% of the total occupations. Manual work might be simple routine work. In the early nineteenth century, Sir Charles Spencer, Charlie Chaplin, criticized routine work in his movie *Modern Times*; thus, routine work might not be good for people's mental and physical health.

(3) The Highest Quartile of Income per capita

In Table 12, the Ordered Probit Model 2 shows that only the group who are categorized as the top 25% of the income per capita met the significance level of 5%. This contributes to happiness, i.e. the people who are in the highest category are happier than other categories. Our analysis has the disadvantage that we could not identify the correct direction of the relation between cause and effect. Therefore, it can be presumed that people who place a high value on income earn a lot of money; hence they are happier than others. In contrast, one interpretation of the result is that rich people are happier than others. More attention should be paid to the fact that the Happiness Paradox was not observed in this result.

(4) Infrastructures

As shown in Section II in B. Survey Results, Q1_1 to Q1_7 concern infrastructures. They ask about basic infrastructures such as "1 The public water supply," "2 Electricity" and "3 Liquefied Petroleum gas or LPG," in addition, other facilities such as "4 Fixed-line phone," "5 Mobile phone," "6 Facsimile" and "7 Cable TV."

In Table 12, the Ordered Probit Model 2 shows that "1 The public water supply" affects people's happiness; thus, having access to the public water supply contributes to their happiness at a significance level of 5%. In contrast, the other basic infrastructures, "2 Electricity" and "3 Liquefied Petroleum gas or LPG," do not affect happiness. How do we account for this difference? One interpretation is people's ordering of priorities. Bhutan has rich water resources, and therefore the country exports the electricity generated by hydropower and bottled natural mineral water to neighboring countries. However, Bhutan also faces water shortage issues, because the water and sewerage systems are restricted, depending on areas and seasons. In Thimphu, the houses have water storage tanks and water is supplied to the tanks only twice a day from the public water system. Therefore, the people might appreciate the value of having a water supply. They also might appreciate the value of "2 Electricity" and "3 Liquefied Petroleum gas or LPG." However, Hirayama (2005) said that some Bhutanese who were asked about the electricity say that if they were able to access electricity, then they would want to use it; however, if they were not able to access it, then they would not need to use it. In

conclusion, the first priority is the water supply, thus indicating that a water supply is one of the requisite and satisfactory conditions for happiness. Electricity and LPG are useful facilities; however, these are not requisite and satisfactory conditions for happiness in 2005. As the life style situation changes dramatically in Bhutan, the result from 2005 has limitations.

In other modern equipment, in Table 12, the Ordered Probit Model 2 indicates that “4 Fixed-line phone,” “6 Facsimile” met the significance level of 10% and “7 Cable TV” met the significance level of 1%. These facilities contribute to people’s happiness. However, only the “5 Mobile phone” has an insignificant effect on happiness.

TABLE 12 FINAL RESULTS

Variables	Ordered Probit Model 2				Ordered Logit Model 2				
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z	
Education	High school	-0.314	0.122	-2.570	0.010	-0.464	0.209	-2.230	0.026
	Professional school/ technical school	-0.562	0.138	-4.060	0.000	-0.958	0.237	-4.040	0.000
	University/graduate school	-0.536	0.126	-4.250	0.000	-0.917	0.214	-4.290	0.000
Occupation	11 Manual worker (including skilled and semi-skilled)	-0.660	0.318	-2.080	0.038	-1.167	0.559	-2.090	0.037
Personal Income Position in Quartiles	4th (Highest)	0.211	0.105	2.010	0.045	0.431	0.182	2.370	0.018
Public Utility	Q1_1 Water supply	0.493	0.241	2.040	0.041	0.918	0.422	2.180	0.030
	Q1_4 Fixed-line phone	0.185	0.099	1.860	0.063	0.311	0.170	1.830	0.067
	Q1_6 Facsimile	0.360	0.217	1.660	0.097	0.691	0.375	1.850	0.065
	Q1_7 Cable TV	0.492	0.182	2.710	0.007	0.937	0.317	2.960	0.003
	/cut1	-2.261	0.413	-3.070	-1.452	-5.126	1.114	-7.310	-2.942
	/cut2	-1.039	0.298	-1.622	-0.455	-1.779	0.529	-2.817	-0.741
	/cut3	-0.304	0.293	-0.878	0.270	-0.308	0.512	-1.310	0.695
	/cut4	1.133	0.295	0.554	1.711	2.107	0.520	1.087	3.127

Note: [1] Bold-face is significant at 5 percent level.

[2] Ordered Probit Model 2; Number of obs. = 675, LR chi2(9) = 43.29, Prob. > chi2 = 0.0000, Pseudo R2 = 0.0293.

[3] Ordered Logit Model 2; Number of obs. = 675, LR chi2(9) = 46.79, Prob. > chi2 = 0.0000, Pseudo R2 = 0.0316.

IV. Conclusion

In this study we proposed three research questions. First, is the Happiness Paradox observed in Bhutan? Considering the results of the regression analysis, it seems natural to conclude that the Happiness Paradox did not exist in this study. The final results of regression analysis show that the highest income group is happier than other groups, thus “the income saturation point” might be absent in Bhutan. However, one of the limitations of this study is that we used panel data, thus we could not explain the correct direction of the connection between cause and effect. The relationship between income and happiness requires further study.

Second, is happiness affected by basic infrastructures? Our results indicate that the public water supply, fixed-line phone, facsimile and cable TV make a positive contribution to people’s happiness. One of the limitations of this study is that we were not able to collect sufficient data necessary for current day Bhutan and the country in its entirety. The situation in Bhutan has changed dramatically from 2005 until now. Further study of these changes would be of value to the field of happiness studies.

Finally, are the basic components of happiness the same in the European countries and the U.S.? Our results lead to the conclusion that the components of happiness might not be similar in the European countries and the U.S. According to Di Tella and MacCulloch (2008), age, gender and marital status met the significance level; however, these variables were insignificant in this study. In addition, the levels of education are different in our results. A continuous study of how these differences affect happiness would demonstrate possible actions to be taken in the future. It is hoped that the results presented in this paper will contribute to a better understanding of the happiness of the Kingdom of Bhutan.

APPENDIX 1 BASIC STATISTICS

Variables	Units	Mean	Std. Dev.	Min.	Max.	
Male	Dummy	0.52	0.50	0	1	
Age	Years	35.54	10.82	20	69	
Age Squared	(Years) ²	1380.28	858.42	400	4761	
Education	No formal education	Dummy	0.09	0.28	0	1
	Elementary school/junior high schools/ middleschool	Dummy	0.16	0.37	0	1
	High school	Dummy	0.28	0.45	0	1
	Professional school/technical school	Dummy	0.18	0.38	0	1
	University/graduate school	Dummy	0.29	0.46	0	1
English	Not at all	Dummy	0.08	0.27	0	1
	Very little	Dummy	0.11	0.32	0	1
	I can speak it well enough to get by in daily life	Dummy	0.45	0.50	0	1
	I can speak English fluently	Dummy	0.36	0.48	0	1
Marital Status	Single	Dummy	0.25	0.43	0	1
	Married	Dummy	0.72	0.45	0	1
	Divorced/ Separated	Dummy	0.02	0.13	0	1
	Widowed	Dummy	0.01	0.12	0	1
Employment Status	Employed	Dummy	0.26	0.44	0	1
	Unemployed	Dummy	0.03	0.17	0	1
	Self Employed	Dummy	0.09	0.28	0	1
	Retired	Dummy	0.02	0.14	0	1
	Keeping Home	Dummy	0.08	0.27	0	1
	In School	Dummy	0.07	0.25	0	1
	Otherworker (civil servant)	Dummy	0.45	0.50	0	1
Personal Income Position in Quartiles	1st (Lowest)	Dummy	0.25	0.44	0	1
	2nd	Dummy	0.25	0.43	0	1
	3rd	Dummy	0.26	0.44	0	1
	4th (Highest)	Dummy	0.24	0.43	0	1
Public Utilities	Water supply	Dummy	0.97	0.18	0	1
	Electricity	Dummy	0.99	0.08	0	1
	LPG	Dummy	0.98	0.14	0	1
	Fixed-line phone	Dummy	0.70	0.46	0	1
	Mobile phone	Dummy	0.59	0.49	0	1
	Facsimile	Dummy	0.05	0.22	0	1
	Cable TV	Dummy	0.93	0.26	0	1

APPENDIX 2 BASIC STATISTICS

		Units	Mean	Std. Dev.	Min.	Max.
Religion	1 Catholic	Dummy	0.00	0.04	0	1
	2 Christian religion other than	Dummy	0.01	0.11	0	1
	3 Muslim (Sunnah)	0				
	4 Muslim (Shiah)	Dummy	0.00	0.04	0	1
	5 Hindu	Dummy	0.06	0.24	0	1
	6 Buddhist (Mahayana)	Dummy	0.91	0.29	0	1
	7 Buddhist (Hinayana)	Dummy	0.01	0.09	0	1
	8 Confucian	0				
	9 Jewish	0				
	10 Sikh	0				
	11 Taoism	0				
	12 Other	Dummy	0.01	0.07	0	1

APPENDIX 3

Variables	Ordered Probit Model 3				
	Coef.	Std. Err.	z	P > z	
Education	High school	-0.530	0.127	-4.160	0.000
	Professional school/technical school	-0.582	0.140	-4.170	0.000
	University/graduate school	-0.296	0.123	-2.410	0.016
Occupation	11 Manual worker (including skilled and semi-skilled)	-0.672	0.318	-2.110	0.035
Personal Income Position in Quartiles	4th (Highest)	0.215	0.106	2.020	0.043
Public Utility	Q1_1 Water supply	0.478	0.243	1.970	0.049
	Q1_4 Fixed-line phone	0.205	0.100	2.050	0.040
	Q1_6 Facsimile	0.419	0.220	1.910	0.057
	Q1_7 Cable TV	0.500	0.182	2.740	0.006
Religion	1 Catholic	4.955	177.897	0.030	0.978
	2 Christian religion other than	0.033	0.383	0.090	0.932
	4 Muslim (Shiah)	5.212	177.897	0.030	0.977
	5 Hindu	-0.203	0.179	-1.130	0.257
	7 Buddhist (Hinayana)	-0.675	0.451	-1.500	0.134
	12 Other	-0.094	0.772	-0.120	0.903
	6 Buddhist (Mahayana)	0	(omitted)		
	/cut1	-2.267	0.413		
	/cut2	-1.049	0.299		
	/cut3	-0.319	0.294		
	/cut4	1.135	0.297		

Note: [1] Bold-face is significant at 10 percent level.

[2] Orderd Probit Model3; Number of obs. = 673, LR chi2 (15) = 51.77, Prob. > chi2 = 0.0000 and Pseudo R2 = 0.0352.

APPENDIX 4

Variables		Ordered Probit Model 4			
		Coef.	Std. Err.	z	P > z
Education	High school	-0.334	0.127	-2.620	0.009
	Professional school/technical school	-0.579	0.143	-4.060	0.000
	University/graduate school	-0.571	0.131	-4.350	0.000
Occupation	11 Manual worker (including skilled and semi-skilled)	-0.607	0.321	-1.890	0.059
Personal Income Position in Quartiles	4th (Highest)	0.223	0.107	2.090	0.037
Public Utility	Q1_1 Water supply	0.532	0.243	2.190	0.028
	Q1_4 Fixed-line phone	0.206	0.100	2.050	0.040
	Q1_6 Facsimile	0.341	0.218	1.570	0.117
	Q1_7 Cable TV	0.484	0.183	2.650	0.008
	d_maritals_sex2	0.014	0.146	0.100	0.922
	d_maritals_sex3	-0.623	0.573	-1.090	0.277
	d_maritals_sex4	-0.639	0.650	-0.980	0.325
	d_maritals_sex5	-0.248	0.185	-1.340	0.182
	d_maritals_sex6	0.003	0.150	0.020	0.982
	d_maritals_sex7	-0.091	0.396	-0.230	0.818
	d_maritals_sex8	-0.502	0.413	-1.210	0.224
	d_maritals_sex1	0	(omitted)		
	/cut1	-2.296	0.439		
	/cut2	-1.053	0.326		
	/cut3	-0.312	0.321		
	/cut4	1.136	0.323		

Note: [1] Bold-face is significant at 10 percent level.

[2] Orderd Probit Model4; Number of obs. = 674, LR chi2 (16) = 50.26, Prob. > chi2 = 0.0000 and Pseudo R2 = 0.0340.

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Table 2-12 and Appendix 1-4 are made by the author.

A Review of the Energy Situation in Slovenia

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Abstract

This paper discusses the energy situation in Slovenia, by reviewing the current energy resources and future energy potential. The electric grid system of Slovenia is outstanding, it covers the whole area of the country and transmits electricity from various sources to the community. Slovenia has to share some electric generation and solid fuel with Croatia due to an agreement since both were in Yugoslavia, causing the stability of the country to lower. Energy security is an important issue to be discussed because Slovenia, where oil and gas are used in various sectors including industry and transportation, depends 100% on imported oil and gas. To increase energy security, some resources of renewable energy are introduced and show the potential to develop in Slovenia, and the environmental aspects are also considered. The migrant crisis in 2015 is briefly discussed from the related viewpoint of energy and suitability.

Keywords: Slovenia, Energy security, Renewable energy, Energy consumption

I. Introduction

After the breakup of the Federal People's Republic of Yugoslavia (Yugoslavia) in 1991, the Republic of Slovenia (Slovenia) seceded from Yugoslavia and was established as independent country at that time [1]. Slovenia joined the European Union (EU) and the Organization for Economic Co-operation and Development (OECD) in 2007 and 2010, respectively, which stabilized Slovenia in term of politics, and economics as well as energy [2-3]. However, Slovenia has fewer natural resource reserves, and the share of energy dependence in its energy supply is about 52.1% and, of that figure, the average energy dependence of the EU is 53.8% (shown in Fig. 1) [4].

Electric power generation in Slovenia is mainly divided into three difference resources nuclear energy (34.4%), hydro energy (30.2%), and thermal energy (32.9%); others come from renewable energy resources [5]. The trend of Slovenia's energy security has positive changed compared with in the past [6]. It is evident that Slovenia has high security in terms of energy; however, the country is facing a lack of self-sufficient energy supply. Slovenia also agreed in the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) [7], which aims to

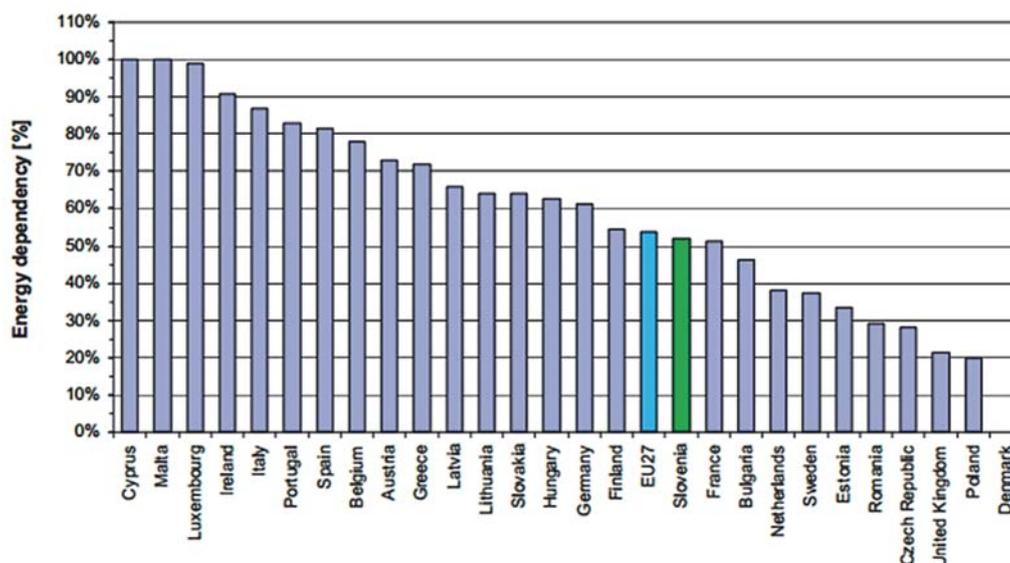


Fig. 1 Energy dependency of EU member countries in 2006. Source: Eurostat [4].

achieve a greenhouse gas emission of 20% reduction by 2020 (from the base year 1986) [8].

In this paper, the current situation in energy of Slovenia is discussed, the three main energy resources are reviewed, and the potential for sustainable development of future energy resources is considered. Furthermore, this paper also discusses the energy security of the country and other related factors, whose details will be discussed in next session.

II. Overview of the energy structure of Slovenia

With a current population of 2.1 million, Slovenia's gross domestic product (GDP) growth rate is on average 0.6% per year and energy consumption per capita has increased in average 1.7% per year since the country's independence in 1991 [9]. The total primary energy consumption in Slovenia has been slightly above than the average of the EU: the highest can be found in the year 2007 when it reached 7.33 Mtoe (million tons of oil equivalent) while net imports were around 3.88 Mtoe [10], with a strong drop in the year 2009 due to the economic crisis in Europe [11].

The final energy consumption of Slovenia amounted to 4.59 Mtoe in 2014 and 4.69 Mtoe in 2015 [12], in which gasoline and diesel oil equaled 2 Mtoe, natural gas 0.5 Mtoe, and electric energy 1 Mtoe (shown in Table 1) [13].

Table 1. Final Energy Consumption (2013 – 2015) - Thousand TOE (tonnes of oil equivalent) Source: Knoema.

Product	2013	2014	2015
All products	4,795.800	4,589.300	4,688.900
Solid fuels	46.900	44.400	38.400
Liquefied petroleum gas (LPG)	83.600	80.300	88.000
Gasoline (without bio components)	482.800	452.500	442.000
Aviation gasoline	1.100	1.100	1.100
Kerosene type jet fuel (without bio components)	26.000	26.000	26.000
Gas/diesel oil (without bio components)	1,608.600	1,582.200	1,582.200
Total fuel oil	6.700	5.700	2.900
Petroleum coke	34.200	35.600	24.500
Natural gas	540.600	518.100	558.000
Electric energy	1,073.000	1,071.300	1,099.600

The population distribution of Slovenia is shown in Fig. 2 [14]. It can be seen that the population is dense almost covering the whole area of the country, except the southern area (Croatian border side) and northwestern area (mountainous land), which have low population density. Looking at an electric grid map (Fig. 3) [15], it can be seen that the electric transmission grid of Slovenia consists of three voltage levels: 400 kV (high), 200 kV (middling) and 110 kV (low). The electric grid is connected to various types of power stations throughout the whole country (hydro, thermal, and nuclear power plants) and to neighboring countries for electric transmission, with total net production of electric energy being approximately 13,000 GWh [16]. It is apparent that the electric grid covers the population-inhabited areas of the whole country, and accessibility to electricity in Slovenia is 100 % of the population [17].

III. Security of energy supply

In 2015, Slovenia's energy dependency was 48%, which is lower than the average of the EU. For this reason, Slovenia is classified as a medium-dependent country among EU countries [18]. Slovenia can produce more than 75% of coal for domestic consumption, which is mostly used for electric power generation purpose [19]. Slovenia is a net crude oil-importing country, and the import is mostly from EU countries [20]. Oil is mainly used for transportation purposes. However, Slovenia depends essentially on gas import from outside the EU (60% from Russia) [21], which may lead to Slovenia facing an energy crisis, such as the 2009 Russia–Ukraine gas dispute [22]. A map of the South Stream pipeline route transferring gas from Russia to Eastern Europe (Fig. 4) shows that the pipeline passes through many countries before arriving in Slovenia [23].

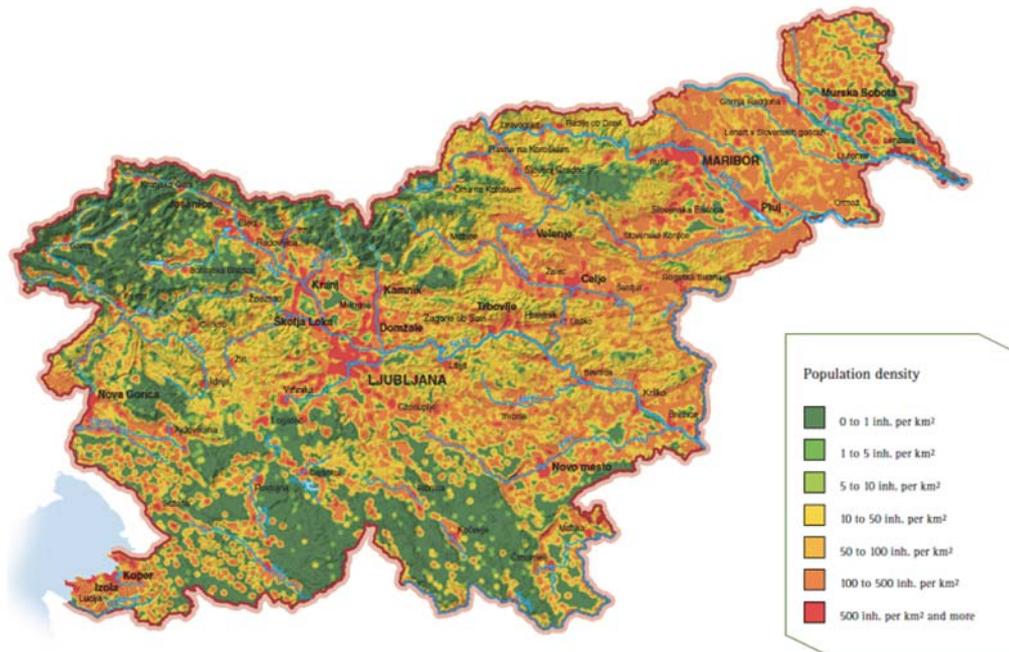


Fig. 2 Population density of Slovenia. Source: *Environment in the palm of your hand: Slovenia, 2008.*

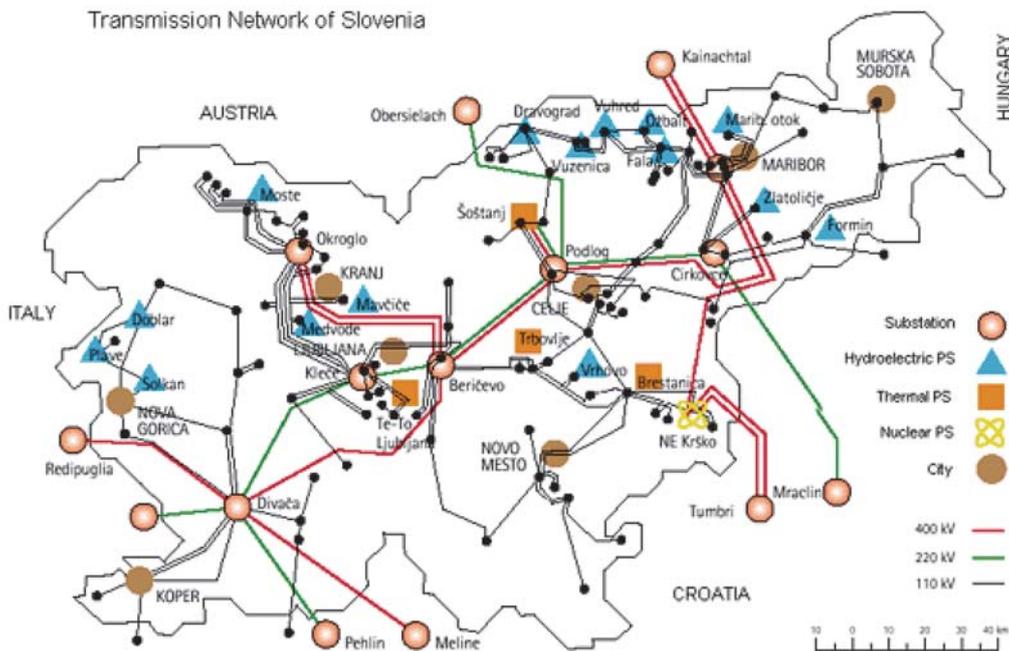


Fig. 3 Transmission network of Slovenia. Source: International Atomic Energy Agency (IAEA).

The industrial production of Slovenia is very energy intensive, equaling to 26.3% of the final energy demand in 2014, while the transportation sector, in which use of oil and gas is an important factor propelling the country’s economy, has the largest share; of 39% [24].



Fig. 4 South Stream route. Source: Gazprom.

IV. Primary energy resource

The energy resources of Slovenia are rather limited. The estimated energy resources are shown in Table 2 [25]. Figure 5 shows the energy mix of Slovenia [26]. The details of each energy resource are shown and discussed in this session.

Table 2. Estimated Energy Reserves. Sources: WEC Survey of Energy Resources.

Estimated energy reserves (2011) (Solid and Liquid in million tons, Uranium in metric tons, Gas in billion cubic metres, Hydro in TWhr per year)					
	Solid (1)	Liquid (2)	Gas (3)	Uranium (4)	Hydro (5)
Amount	223	-	-	1,700	9,145

- (1) Coal including Lignite: proved recoverable reserves, the tonnage within the proved amount in place that can be recovered in the future under present and expected local economic conditions with existing available technology
- (2) Crude oil and natural gas liquids (Oil Shale, Natural Bitumen and Extra-Heavy Oil are not included): proved recoverable reserves, the quantity within the proved amount in place that can be recovered in the future under present and expected local economic conditions with existing available technology
- (3) Natural gas: proved recoverable reserves, the volume within the proved amount in place that can be recovered in the future under present and expected local economic conditions with existing available technology
- (4) Reasonably Assured Resources (RAR) under < USD 130/kgU
- (5) Hydropower: technically exploitable capability, the amount of the gross theoretical capability that can be exploited within the limits of current technology

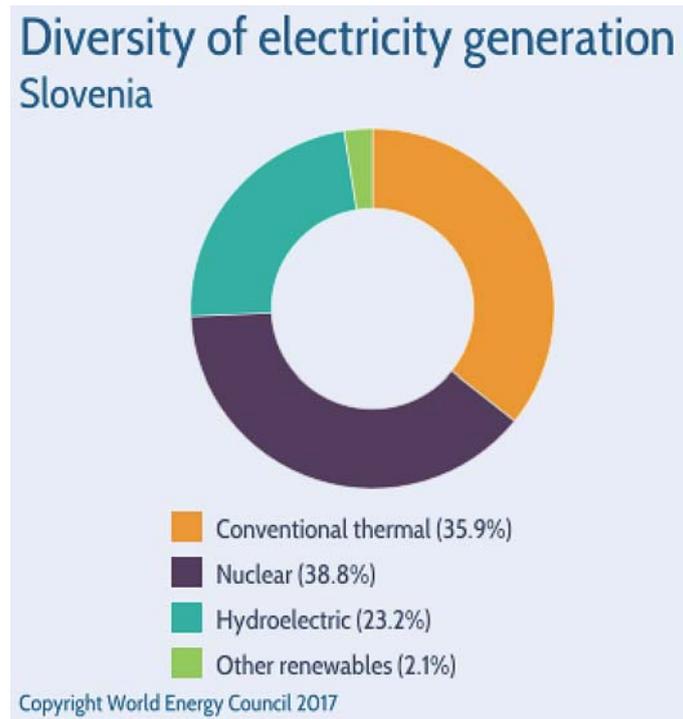


Fig. 5 Energy mix of Slovenia. Source: World Energy Council.

A. Nuclear energy

As mentioned above, in Slovenia, around 40% of electric power generation comes from nuclear energy, in principle, nuclear energy can be categorized as a sustainable energy resource [27]. However, the only one nuclear power plant in Slovenia, named Krško Nuclear Power Plant, is co-owned with Croatia and was built in 1981 when they were both part of Yugoslavia. From this reason, half of the energy production from the power plant must be transferred to Croatia (as shown in Fig. 3 for high-voltage transmission) [28]. Furthermore, due to nuclear waste and issues of cleaning facilities, Slovenia is facing difficulty in operating the nuclear power plant [29]. Slovenia is scheduled to stop operating the nuclear power plant in 2023; moreover, there is no further plan to build a new nuclear power plant afterward and future decisions are under discussion [30].

B. Thermal energy

Another main resource comes from a thermal power plant using solid fuel to generate electric energy that serves the country amounting to 32.9%. The main solid fuels in Slovenia are low-quality brown coal and lignite, which amount to 199 million tonnes [25]. However, some solid fuel mines are co-owned with Croatia whose production is shared equally by both countries [31]. Wood resource is very important for the country to be used for space and water heating in households, especially in rural

areas [32]. From the data, Slovenia has high enough reserves of solid fuel (80% of domestic production); yet, it is vice versa in the case of oil, where there is 100% dependency on imported oil [33]. In addition, the thermal power plant produces a high rate of GHG (greenhouse gas) and pollution, which directly affects the environment [34]. To resolve the issues of global warming and environment impacts, the usage of thermal energy should be reduced by using renewable energy, which will be discussed further.

C. Hydro energy

Slovenia is rich in hydro energy due to its terrain [35], in which hydro power plants generating electric energy for 30.2% of primary energy consumption are located nationwide. Slovenia has very high potential for developing hydro power plants [36]. However, there have been no further plans for new development of hydro power plants since 2009 [37]. The reason may be conflict between cost and benefit, as well as the effect on tourism [38]. Anyhow, small-scale hydro power plants have been promoted in fighting climate change and improving the energy security of the country [39].

V. Renewable energy resources

Slovenia plans to increase electric power generation from renewable energy resources to 25% (including hydro power) in its gross final energy consumption by 2020 [40]. To achieve the goal, renewable energy resources such as wind, solar, and geothermal are promoted.

A. Wind energy

Slovenia has a wind turbine (since 2013), which generates an electric energy capacity of 2.3 MWe [41]. The power generated from the wind turbine is classified as clean energy compared with other resources [42]. Figure 6 shows the wind speed distribution of Slovenia [43], and it can be seen that Slovenia has potential to develop wind turbines in the northwestern and southwestern areas of the country, which have low population density as well (referred to in Fig. 2). By the way, the safety factor of wind turbines has to be taken into account [44].

B. Solar energy

For solar energy, Slovenia has no PV (photovoltaic) solar farms installed in the country but PV solar cells are established and used in households [45]. Solar cells are non-green renewable energy because of the chemical pollution in the manufacturing process and the recycling problem [46]; however, the use of PV solar cells to generate electric energy can be considered as the easiest way to increase the electric energy

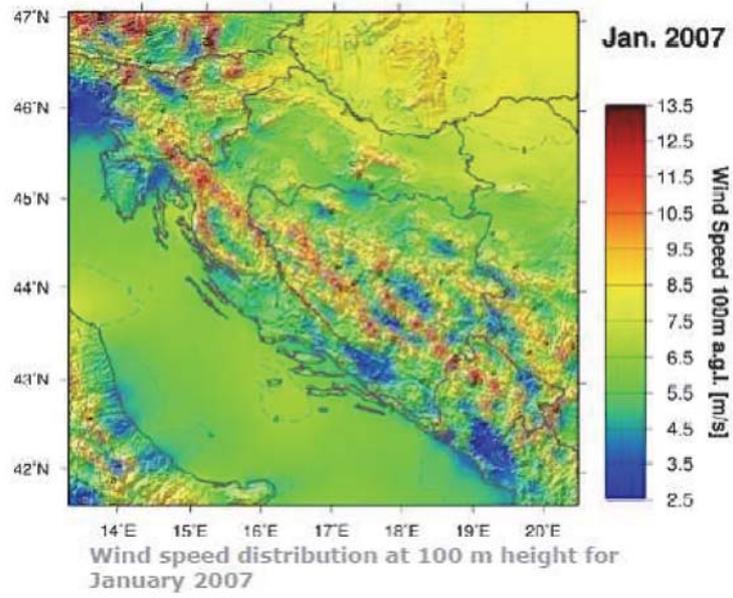


Fig. 6 Map of wind resources at 100 meters above ground level. Source: anemos 2010.

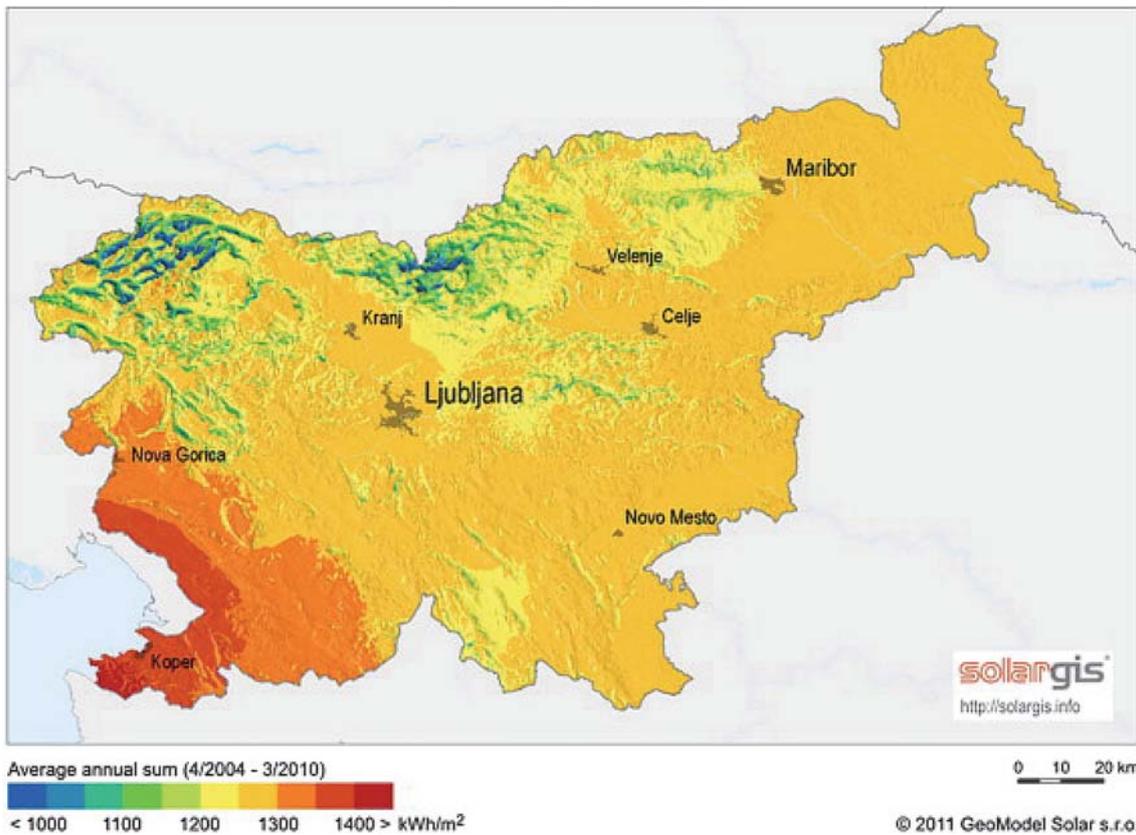


Fig. 7 Yearly sum of global horizontal irradiation in Slovenia [48].

potential from renewable energy in the country [47].

A map of solar irradiation in Slovenia is shown in Fig. 7 [48], indicating that Slovenia has potential to install solar farms in the western area due to the high solar irradiation. Some studies on the potential of solar energy showing the high significance of development have been carried out [49]. However, currently, there is no plan to develop solar farms in Slovenia.

C. Geothermal energy

Geothermal energy has been used in Slovenia for a long time for space heating purposes. There was a project of geothermal electric power generation development in 1994; unfortunately, it has not yet been realized [50]. A map of geothermal temperature distribution with isotherms at a depth of 100 m in Slovenia (Fig. 8) shows that the geothermal temperature is not very high [51], not enough to generate electric energy in ordinary geothermal power plants (usually higher than 200°C). A technology for generating electric energy from low-temperature geothermal heat sources should be introduced to increase the energy security of the country [52]. In any case, the increased use of geothermal energy for heating facilities should be promoted to replace the usage of wood for environmental reasons [53].

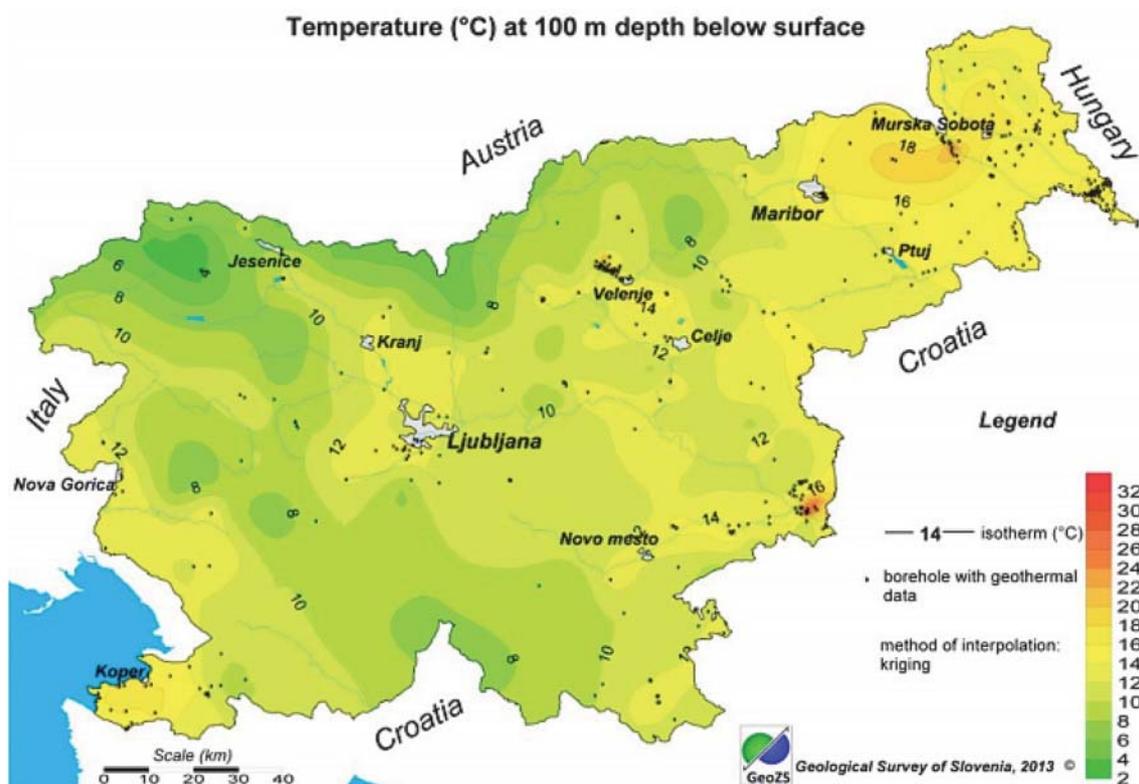


Fig. 8 Temperature distribution at a depth of 100 m below the surface in Slovenia. Source: GeoZS.

VI. Issue of the migrant crisis

Another issue the author would like to consider in this report is the migrant crisis in Slovenia in 2015, when more than 700,000 refugees from war-torn countries entered the Schengen Area at Slovenia and passed through to other countries [54]. Even though the refugees did not stay permanently in Slovenia, providing hospitality to the refugees costs Slovenia much, in terms of energy consumption, too. However, there is no related report about this issue yet, and the statistics on energy usage in 2015-2016 will be reported this year (2017), which will show that the trend of energy is significantly related to the migrant crisis, as well as having an impact on the infrastructure and environment. Slovenia is strongly recommended to prepare for these kinds of emergency issues such as conflict or war, which also cause the country to be congested. Energy self-dependence is the first priority to be considered.

VII. Conclusion

Slovenia's primary energy consumption consists of three main resources (hydro, thermal, and nuclear) and other renewable energy and waste resources. The country is able to serve the energy usage demand, which includes various sectors such as household, infrastructure, and industry. Nevertheless, Slovenia depends on oil and gas net imported from other countries both inside and outside the EU, which leads the country to low suitability in terms of energy.

In order to be sustainable in terms of energy, Slovenia has to increase its energy generation potential along with resolving environmental issues. Moreover, the target of a 20% GHG reduction is considered to be achievable by the development of renewable energy usage such as wind, solar, and geothermal both in electric and heat energy generation. Renewable energy is the key to successful development, which would also help Slovenia increase its strength in policy and economy.

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The Hurdles Refugees are Facing in The Process of Integration into The Host Countries' Labor Markets -Based on The Case of Germany -

YanShuang Chen

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I. Introduction

Integration is a slow-moving process. Economic integration of refugees into their host country is important and benefits both parties. Labor market integration of newcomers from another country play a key role in achieving the economic integration into the host country society. According to experts, participation in the labor market is the most significant factor that contributing to a long-term integration into society. Labor market integration is also central to fiscal contributions newcomers would make to the host society¹.

Related to the labor market integration of refugees², although a large body of literature is available on the economic integration of immigrants in host countries, very few studies have been conducted specifically on the economic integration of refugees³(p.2).

The study about the integration of refugees which has been conducted by the IZA and published in 2016 argues that, existing studies show that refugees have a lower employment rate and income level than the family reunion migrants and labor migrants, but that over time

this income and employment gap diminishes or disappears altogether. One reason for this slower adaptation process is the depreciation of human capital and credentials due to the asylum and skill accreditation processes. The study proposals that policies should improve these processes to reduce both individual and societal costs⁴.

Another study about the employment situation of refugees who arrived at EU countries before 2014 conducted by EU LFS ad hoc module on migrants shows a result as below would be the good evidence for the study results above⁵.

“Refugees represent one of the most vulnerable groups of migrants on the labor market. Their employment rate is 56%, just 3 percentage points higher than family migrants and 9 percentage points lower than native-born persons. In addition, one in five economically active refugees is unemployed and one in eight is unemployed for 12 months or longer and about one in fourteen was unemployed for 2 years or longer, suggesting that once unemployed, refugees have difficulties to return to employment. On average, it takes refugees up to 20 years to have a similar employment rate as the native- born. In the first 5 years after arrival, only one in four refugees is employed, the lowest of all migrant groups. After 10 years, their employment rate reaches 56% but it remains below the employment rate of native-born persons in most countries. A significant part of the difference in the employment rates between refugees and other migrants can be explained by differences in their education level, i.e. that refugees are more often found among the low-educated whose employment rate is far below average”⁶.

Over the last three to four decades, EU countries have had to deal with increasing numbers of refugees from around the globe and some of the countries had some success in this refugees issues.

But at the same time, as we all know, in the last two years, more than 1 million refugees and migrants have arrived in the European Union. The large majority of them fleeing from war and terror in Syria and other troubled countries. One question is what is the present

1 Georg, Bolits. 2016. “Labor Market Integration of Refugees: Strategies and good practices” Policy Department: Economic and Scientific Policy, Institute for Employment Research (IAB).

2 Refugee: A person who, owing to well-founded fear of persecution for reasons of race, religion, nationality, political opinion, or membership of a particular social group, is outside the country of nationality (or, in the case of stateless persons, the country of former habitual residence) and is unable or, owing to such fear, unwilling to avail themselves of the protection of that country.

Source: European Migration Network.2014. Asylum and Migration Glossary 3.0. Brussels: European Commission.

3 IZA. 2016. “Integrating Refugees into Labor Markets”, World of Labor.

4 Ibid., p.3.

5 Jean-Christophe Dumont, Thomas Liebig, and Jörg Peschner, Filip Tanay, Theodora Xenogiani. 2014. “How are refugees faring on the labor market in Europe-A first evaluation based on the 2014 EU labor Force Survey ad hoc module”. OECD Secretariat and the DG Employment, Social Affairs and Inclusion of the European Commission.

6 Ibid., p.6-7.

situation after the refugee crisis occurred from 2015? And what's the biggest hurdle refugees are facing in the process of Integration into the host countries' Labor Markets?

I'd like to consider about the hurdles based on the present situation through the field work which had been holding during March 7 to March 16 in Germany and Slovenia and some news reports has been published on the WEB.

II. The present situation of the refugees' economic integration in EU countries-Case of Germany-

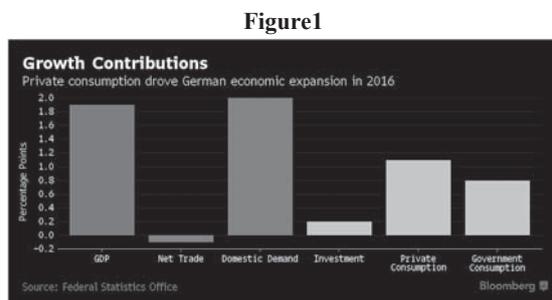
A) Number of refugees

Some 1.1 million migrants have arrived in Germany, Europe's largest economy, since the start of 2015. Syrians make up the largest group of arrivals, followed by Afghans, Iraqis, Iranians, Eritreans and Albanians, and most of whom were Muslims fleeing Syria's civil war. Nearly 4 million Muslims – about 5 percent of the population – live in Germany.

The number of refugees arriving in Europe dropped dramatically last year after the EU struck a controversial deal with Turkey aiming to prevent crossings over the Aegean Sea, by detaining anyone arriving on Greek islands under the threat of deportation. That had been the main route for the vast majority of migrants reaching Germany after journeying through Balkans countries to reach Western Europe. After the EU-Turkey deal made the main route revert to the far wider and more treacherous Central Mediterranean Sea. More than 5,000 asylum seekers died in sea crossings, either by drowning, fuel inhalation or suffocation in overcrowded and unseaworthy boats.

B) The current economic situation in Germany

According the report of Bloomberg markets (Jan, 2017), Germany's economic expansion last quarter at the end of 2016 may have accelerated more than analysts predicted as 2016 growth climbed to the fastest pace in five years⁷.

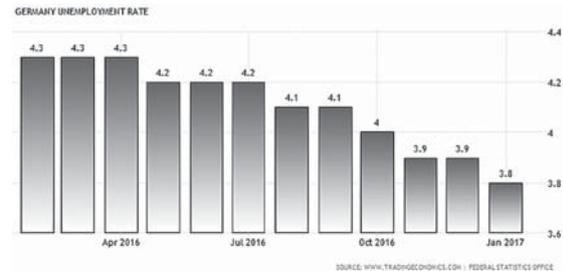


Source: Bloomberg markets, <https://www.bloomberg.com/news/articles/2017-01-12/>

7 Piotr Skolimowski. 2017. "German Economic Growth at End of 2016 Probably Beat Forecast" Bloomberg markets. <https://www.bloomberg.com/news/articles/2017-01-12/>

Household consumption benefited from a drop in the unemployment rate (3.9 percent, figure1 and figure2) to the lowest level since the country's reunification more than a quarter of a century ago. At the same time, government spending was boosted by costs related to the provision of assistance and shelter for more than 1 million refugees.

Figure2



Source: Federal Statistics office, www.Tradingeconomics.com.

German unemployment fell more than expected in October, pushing down the jobless rate in Europe's biggest economy to 6.0 percent, the lowest level since German reunification in 1990, and the number of job vacancies to a record high of 691,000.

Under the context of the economic situation, the Social Democratic Party of Germany (SPD), a partner in Chancellor Angela Merkel's ruling coalition which we visited showed their thought about the employment rate of the huge numbers of refugees which arrived Germany after 2015. The speaker said that the employment rate 13% which has been reported in 2016 is good figure for the refugees have arrived in Germany just for 2 years. They seem like have not much worried about and have confidants with the economic integration issue even though the employment rate is depending on the needs of the German labor market which related to the changing economy situation.

C) Islamophobia⁸ and Populism⁹ sentiment

Germany is seeing in a sentiment of Islamophobia and populism.

According to a new study which highlights the

8 Definition of Islamophobia: An exaggerated fear, hatred, and hostility toward Islam and Muslims that is perpetuated by negative stereotypes resulting in bias, discrimination, and the marginalization and exclusion of Muslims from social, political, and civic life.

Source: "Islamophobia: Understanding Anti-Muslim Sentiment in the West"

<http://www.gallup.com/poll/157082/islamophobia-understanding-anti-muslim-sentiment-west.aspx>

9 In politics, the term populism can have different meanings depending on who is using it and what their political goals are. At its root, populism is a belief in the power of regular people, and in their right to have control over their government rather than a small group of political insiders or a wealthy elite. The word populism comes from the Latin word for "people,".

tensions surrounding the recent inflow of refugees. More than 40 percent of residents said they believe Muslims should be forbidden from coming to Germany¹⁰. The study – conducted by researchers at the University of Leipzig in co-operation with the Heinrich Boell Foundation, the Rosa-Luxemburg Foundation, and the Otto-Brenner foundation – surveyed a total of 2,420 Germans.

Meanwhile, a study published in May found that 60 percent of citizens agreed with the idea that there is “no place for Islam in Germany.”

Unsurprisingly, members of the far-right Alternative for Germany (AfD) party were most likely to favor stopping Muslims from coming to Germany. The anti-immigration party, which supports a full ban on minarets and the burqa, has described Islam as incompatible with the German constitution. Security concerns and worries about how the record numbers will integrate have boosted support for the Anti-immigrants Alternative for Germany (AfD) party.

Chancellor Angela Merkel has passionately disagreed with such statements, championing an open-door policy for those fleeing war and persecution. That policy has led to widespread criticism from many, with an April poll by FG Wahlen showing public support for Merkel at the lowest of her third term, which began in 2013.

D) Labor market system and regulations to refugees

The dual VET-system is an integral part of the general education and training system in Germany. Germany’s dual system of vocational education and training (VET) is highly acknowledged and highly recognized abroad with the lowest youth unemployment rate in Europe. The majority of Germany’s workforce received its high qualification through the dual VET-system for about 5 years.

The German apprenticeship system is called a “Dual System” because training takes place both in firms and public training schools. With dual education, German companies turn apprentices into customized specialists at low net costs through in-house training. Germany’s apprenticeship system provides 344 certified trained occupations, designed by the government and industry.

This means that all of the immigrants include refugees who want to regular work in Germany, also

have no skills and work experience or can not prove that they have skills, should take the dual VET-system. But, whether asylum seekers are allowed to start a vocational training or not, depends on their residence permit. If refugees have “Duldung” status then they can start training straight away. But if asylum seekers have only been granted a temporary stay then they have to wait three months until receive residence permit. In other words, the employment prospects for immigrants who has got the permit in Germany would be a not bad system, particularly if they are well-qualified and have a basic command of the German language. But, for the refugees seek asylum who has no qualification and cannot speak German language, it is a hard hurdle for them.

Also, there are another regulation for refugees. It is called priority check. An asylum seeker who arrived in Germany may not work during the first three months upon arrival. And then they only stand a chance if no German or European Union citizen is in the running for the job. This is called the priority check.

July 2016, Germany passed a new law that suspended for three years the requirement that firms must offer jobs to EU residents first. Yet even so, the suspension will only apply in areas with low unemployment, and states and localities can still require discrimination against the asylum job seekers. They can also tell asylums where they must live—which could prevent them from following economic demand¹¹.

It is no surprise that this system has produced extremely high unemployment among the asylums in Germany—now almost a year after the bulk of the arrivals. Naturally, Syrians face many hurdles beyond bureaucracy in finding work, especially language and skill acquisition. It’s clear that the regulations play an important role in preventing employment.

III. Conclusion

Integration of refugees into the Germany society will take a long time based on the experience that the labor market integration of refugee who arrived in Germany before 2014. But under the Islamophobia and Populism sentiment which is rising in Germany society, Germany government should recognize that the hurdles for the integration of refugees into the Germany society is not just about the economy issues. The attitude to the different ethnic, religion particularly to the Muslims, that do not want to have any conversation and have no try to understand about Muslims is the biggest problem currently. How to solve this kind of problem and what’s the solution? It is the left problem for all of us to think in depth in the future.

Other key characteristics include: Politics are based on emotion to generate a feeling of affective identification; Intellectuals and experts are viewed with suspicion because of their ties with the elite. Their words are perceived as skewed and biased.

IESE business school. 2017. “Why Populism Is Rising and How To Combat it”

<https://www.forbes.com/sites/iese/2017/01/24/why-populism-is-rising-and-how-to-combat-it/#2fd9874b1d44>

¹⁰ “Islamophobia rising in Germany following influx of Muslim refugees – study”

<https://www.rt.com/news/346930-islamophobia-germany-refugees-study/>, Jun, 2016.

¹¹ David, B. 2016. “Why Refugees Find Jobs Faster in the U.S. Than Germany”, CATO institute. <https://www.cato.org/blog/why-refugees-find-jobs-faster-us-germany>

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Individual Report for GRM On-site Research Tour 2017 The Refugee Crisis in Germany¹

CHEN Yan

This report is aimed at summarizing the findings in the research tour to Slovenia and Germany from March 7th to March 16th, 2017. The main purpose is as follows.

1. To give a brief summary of the refugee crisis that originated in Syria because of the civil war,
2. To illustrate the challenges Germany is facing while dealing with the refugee crisis, as well as the influence on the German society,
3. To discuss the possibility of integration of the refugees to European society.

In regards to the European refugee crisis, which broke out in 2015, the GRM leading program organized an on-site research tour to Slovenia and Germany in order to investigate the conditions of the refugee crisis. With the assistance of the Embassy of Slovenia in Tokyo, the Embassy of Japan in Slovenia and some other organizations and institutes, a meaningful and beneficial program was accomplished. This report is written based on the interviews, meetings and site observations conducted in this program.

In addition, previous experience in other Balkan countries including Serbia and Bosnia- Herzegovina, which was visited last September in another program², was helpful to understand the “Balkan Route³” for the refugees and the overall background.

I. Introduction

Triggered by the “Arab Spring” in 2011, the conflict between the Syria government, the Rebel groups, and other armed forces has killed 450,000 Syrians and displaced more than 12 million, which is half the country’s prewar population, from their homes⁴. Most of the latter chose to seek asylum in European countries.

On August 25, 2015, Germany decided to suspend the Dublin Procedure for Syrians. According to the Dublin Procedure, refugees have to seek for protection in the first EU country that they entered. Germany’s decision facilitated the Syrian refugees to pass through other EU member countries to seek asylum in Germany. This action was welcomed by the refugees. The decision itself, and images of Chancellor Angela Merkel, spread among the refugees through the social network.

Some other European countries, particularly the countries located on the “Balkan Route”, worked together to cooperate with Germany. From October 2015 to March 2016, Macedonia, Serbia, Croatia, Slovenia, and Austria built up a well-organized system that can transfer the refugees who had traveled all the way from Syria to their destination Germany in three days⁵. As the result, the number of asylum seekers that arrived in Germany totaled 1.17 million during 2015 and 2016, make it the biggest host country for Syrian refugees in Europe⁶.

Soon repercussions occurred. The influx of refugees into Germany in this short period brought a variety of issues to German society. On the administration side, registration, identity clarification, asylum application, and the repatriation of rejected asylum seekers calls for a lot of administrators, as well as financial support and time. On the other hand, the asylum seekers need shelter, accommodation, and health care. Their children also need access to schooling. The German government had to spend a large amount of their budget and manpower resources to deal with the refugee flow, which gradually

1 In this refugee crisis, another term that was frequently mentioned was migrant. This report will focus on the asylum seekers and refugees, which refers to the ones who had been displaced by war, persecution, or natural disaster, in this case mainly Syrian refugees, while migrant refers to the ones who move abroad voluntarily for other reasons. For instance, along with the influx of Syrian refugees, a large amount of migrant with other nationalities from neighboring countries such as Afghanistan and Iraq mixed in and pretend to be Syrians to take advantage of the regulation. All of them come without proper identifications, makes it difficult to distinguish the migrant from the refugees.

2 Global Career Development Program, organized by GRM leading program, was carried out from September 3rd to September 16th, 2016.

3 The “Balkan Route” mentioned in this report refers to the one mainly taken by the refugees in the period October 2015 to March 2016, which starts from Syria and passes Turkey, Greece, Macedonia, Serbia, Croatia, Slovenia, Austria and end at Germany. This route had been recorded by the Japanese journalist Sakaguchi from the Mainichi Daily.
坂口裕彦『ルポ 難民追跡 バルカンルートを行く』岩波新書、2016年10月。

4 <http://www.aljazeera.com/news/2016/05/syria-civil-war-explained-160505084119966.html>
<http://www.asylumineurope.org/reports/country/Germany/statistics> (29.03.2017)

5 坂口 op. cit., pp58-pp114.

6 UNHCR statistics, data updated to the end of 2016. (16.10.2017)
http://popstats.unhcr.org/en/overview#_ga=2.198060710.804408955.1508159935-636285073.1508159935
Interior Ministry of Germany, data updated to 11.01.2017. (29.03.2017)
<http://www.dw.com/en/sharp-drop-in-migrant-arrivals-in-germany/a-37087543>

Table 1. Statistics of asylum seekers arrived in Germany from 2012 to 2016

Year	Applicants	Pending applications	Refugee status	Subsidiary protection	Humanitarian protection	Rejection	Refugee rate	Subs. Prot. rate	Hum. Prot. rate	Rejection rate	Refugees of all nationalities	% of Syrian refugees
2012	-	-	1987	5480	0	19	27.0%	73.0%	0.0%	0.0%	17140	43.6%
2013	-	-	-	-	-	-	-	-	-	-	-	-
2014	26703	-	20507	3246	106	19	85.9%	13.6%	0.4%	0.1%	40563	58.8%
2015	103,708	-	57,036	55	164	11	99.5%	0.1%	0.3%	0.0%	84503	67.8%
2016	268,866	58,399	166,520	121,562	910	167	57.6%	42.0%	0.3%	0.1%	433920	66.6%

Notes:

(1) “-” means data is not available.

(2) For the year of 2012, statistics are only available for the period of January to November.

(3) All the data in Table 1. except “Refugees of all nationalities” refers to Syrian refugees only.

Source: Michael Kalkmann, National Country Report of Germany (2013-2016), *Asylum Information Database*, edited by European Council on Refugees and Exiles.

led to instability in their society.

II. Refugee crisis in Germany, with evidence from the on-site research tour

2.1 Refugees settling down in Germany

In the area around Kottbusser Tor, Berlin, the trail of refugees and migrations from the Middle East can be found everywhere. There are supermarkets, restaurants, cafes, and groceries with signboards written in Arabic, Turkish and sometimes also in German. On the balcony or windows where refugees and migrants live, satellite television receiving equipment is set to the TV channels of their home countries. Sometimes national flags can be seen outside the windows.

The refugee people can be easily distinguished by their appearance and language. Women in chadors are seen walking crossing the street with baby carriages or taking buses to the center of the city. Middle-aged Muslim men are seen sitting in the Arabic coffee shops with a water pipe in their hands. It appears that the refugees are the majority in this area, while European-looking teenagers can be seen in the crowd, walking into the kebab restaurant and take seats next to a Muslim couple.

The migration area is quiet in the daytime. It's hard to tell if there is any difference between the neighborhood with and without refugee due to a lack of experience with this city during that time period.

2.2 The impact on the German society from multiple perspectives

2.2.1 Impact on national finance

The peaceful street scene in Kottbusser Tor and all the other residential areas for refugee was supported by Germany and some other international organizations. The German government provides free shelter and food to the refugees, while UNCHR and NGOs provide them clothes, other daily necessities, and sometimes medical or mental care. Immediate support to asylum seekers, as well as education and training costs for refugees in the long term, require significant investments.

Sakaguchi recorded the income of an Afghanistan

family that arrived in Germany in 2015⁷. At that time, the middle-aged couple was living with their four-year-old daughter in an apartment, and the rent and electric bill were paid by the German government. Besides that, they received a monthly subsidy from the government, of which totaled 800 Euros per month, and it was enough to cover their living expenses and transportation fees. Furthermore, they can attend free German classes to prepare for job hunting in Germany.

The explosive increase in refugee population can be read from Table 1.

Almost all the applicants from Syria had received some kind of protection in Germany. The federal government provides a fixed sum of 670 Euros per asylum seeker per month⁸. In the case of pending applicants, the subsidy per month is 300 Euros for adults and 200 Euros for kids⁹.

In 2015, Germany spent 16 billion Euros (0.5% of GDP) on its migrants¹⁰. Since they received more asylum applications in 2016 (745,545 in total, more than 36% of which claimed to be Syrians), corresponding increases in expense for refugees were seen. 42.1% of all the applicants are identified as refugees, at the same time the percentage of subsidiary protection and humanitarian protection are 25.3% and 4% respectively¹¹.

The refugee identification procedures can last for a two-year period. The expenditure on resettling the refugees, asylum seekers, and the legal and illegal migrations flowing into Germany is a heavy burden to the financial and social welfare system, which thought to be overwhelmed even before the refugee crisis happened, though the ruling coalition has denied that is the case¹².

2.2.2 Impact on domestic labor market

Those who have been granted a refugee status needs access to the labor market so as to foster their integration

7 坂口, op. cit.

8 OECD, Migration policy debates, Jan 2017.

9 <http://www.asylumineurope.org/reports/country/germany/statistics> (29.03.2017) 坂口, op. cit.

10 OECD, op. cit.

11 <http://www.asylumineurope.org/reports/country/Germany/statistics> (29.03.2017)

12 Interview with Mr. Klaus Mindrup at the MPs' office building in the Paul-Löbe-Haus, Berlin. March 13th 2017.

and contribution to the host country economy. At the beginning of the refugee crisis, the influx of refugees and migrations had been viewed positively in Germany. They were expected to make up for what the young labor force could not replace in the aging German workforce. However, this turned out to be paradoxical. There are at least two aspects to explain why this is the issue.

First, it is not easy for refugees without skills and language ability, which turns out to be the majority, to search for a job in Germany. Rietig pointed out five sectors that influence the labor market integration, which includes language, education and skill levels, qualification recognition, legal right to work, and employer openness¹³.

The former two factors had been mentioned by the representatives of the AfD in Berlin, who use a simple data presentation to illustrate the relatively low level of education of the refugees from Syria¹⁴. According to the data he introduced, the percentage of students mastering basic skills by countries of origin is 84% (Germany), 47% (Albania) and 35% (Syria), but he didn't give a clear definition to "students" and "basic skills", and the data resource is unclear. In a conversation with WEFA, the representatives confirmed that the refugees with certain professional skills such as teaching or medical expertise can find a job easier in Germany¹⁵.

Meanwhile, the representatives of the Social Democratic Party of Germany¹⁶ advocates that they are trying their best to help the refugees to get a job by improving their language and professional skills. This is partly proved to be the case by Sakaguchi in his reports.

Another side of the paradox is that the skilled refugees who join in the local labor market are seen as taking away the limited employment opportunities from the native Germans. At least their presence had made the labor market more competitive.

Now the situation is quite clear: the skilled refugees are threatening the local labor force, while the ones who are not employed in the labor market taking away taxes paid by the other German citizens.

The latest data that Federal Bureau of Statistics released footnoted this predicament¹⁷. In 2015, with nearly 26% of the total population, the people with migration backgrounds are taking away 39% of the

unemployment benefit by headcount. Though this figure cannot represent the reality in Germany at the present time since the influx and settling down of refugees in Germany after 2015, this data can be easily used by anti-migration groups and individuals, to claim that people with migrant backgrounds are working less and taking more. That is what is currently happening in German society. It is not a preferable trend in the integration of migrations and refugees.

2.2.3 Impact on social stability

Refugees were welcomed in most of the European countries at first partly because of the spirit of humanitarianism. Gradually the trend has changed to other opinions. The friction between local residents and the newly-arrived refugees can easily be pictured. The information collected from the WEFA showed that the barrier of language does exist, which makes the refugees and the local residents have difficulty understanding each other. In addition, the language and culture difference is attributing to the Islamophobia.

As time goes on, the local population's patience dampens and conflicts are escalating. Contradictions exist in daily life, labor market and so on. The refugee camps receive claims from the nearby communities, for reasons such as the children are too noisy, their living environment had been changed by the outsiders, and they are told they have to tolerant it. For the asylum seekers, usually they have to wait for a certain time until they get the refugee status. Before that, they have to endure a living condition which usually lacks private space, and they are not permitted to work. The dilemma of the refugees' employment problem had been discussed in the former section.

The well-being of the refugees could be the origin of friction too. For most of the refugees, their expenditures come from the federal tax. In other words, the refugees are consuming the wealth of the country without contributing to the national economy, thus they are not supposed to live a better life compared to their German counterpart. But, some of the refugees entered the country with their own assets, especially the Syrians, and they are observed to be relatively better off than the ones from Afghanistan and Iraq. A hidden fact is that poor ones cannot afford the traveling expense to Germany. If the refugees are in possession of some kind of property, they are no longer weak, hence the sympathy for them is replaced by resentment.

The terrorist event in European countries has made the condition worse. People's anger exploded after the 2016 New Year's Eve sexual assaults in Germany¹⁸, more and more people chose to join demonstrations to express their dissatisfaction toward the refugees. Although most of the perpetrators of the terror attacks turned out to be second-generation migrants that had been born and brought up in Europe, the resentment still remains.

13 <http://www.aicgs.org/publication/burden-or-blessing-the-impact-of-refugees-on-germanys-labor-market/> (29.03.2017)

14 Interview with Mr. Jörg Sobolewski and Mr. Hugh Bronson, the representatives of AfD at the Abgeordnetenhaus of Berlin. March 13th 2017.

15 Interview with Mr. İsmet Mısırlıoğlu at the Berlin Office of WEFA. March 14th 2017.

16 SPD, Sozialdemokratische Partei Deutschlands in German, which is the ruling coalition with CDU, the party Chancellor Angela Merkel belongs to.

17 https://www.destatis.de/EN/FactsFigures/SocietyState/Population/MigrationIntegration/Tables_PersonsMigrationBackground/MigrantStatusMainSourceOfLivelihood.html (29.03.2017)

18 墓田桂『難民問題 イスラム圏の動揺、EUの苦悩、日本の課題』中公新書、2016年9月。

The opinions toward refugees experienced an evolution from sympathy to resistance, fear and finally repulsion. Social media and conservative politicians accelerated this process, the former spreading negative feelings towards refugees and the latter take advantage of it, resulting in the growth of populism.

2.2.4 Impact on infrastructure

The AfD representatives also mentioned about the pressure on the existing infrastructure system in Germany¹⁹. For instance, shelter. There are more than 40 gyms being used as temporary shelters for the asylum applicants, but they need to be relocated to other accommodations in the long run. Public transportation such as subways and buses, educational facilities from kindergarten to university, hospitals, energy supply systems such as water, electricity, gas, and others, might become strained. The capacity of each city may not be able to support the influx of refugees. Closer inspection is needed for this argument.

III. Integration of refugees to Germany

Regarding the future of the refugees, the opinion of different parties is divided. In the conversation with the AfD Berlin, the WEFA and the SPD, the AfD representatives implied that the refugees will stay in Germany for a long time, while the WEFA representative said that the refugees are eager to go back to their home countries, because of the lack of a sense of belonging.

The SPD has shown their confidence in integrating refugees into society. They took the refugees who came via the Balkan areas in past conflicts as a previous example to prove that German society is lenient enough to take in a different culture. However, the crucial factor in these two situations is fundamentally different. The Balkan region is part of the Europe, and although it retains its Islamic culture, it is still culturally and linguistically linked to Europe. The current migrant crisis stems from the culturally and linguistically different regions of Syria, Iraq, and Afghanistan, leading to more difficulties in integration.

The testimony given by one of the entrepreneurs with a Turkish migration background in Berlin indicated that even though he achieved certain social status in Germany after decades of living there, he is still an outsider who is not respected because of his original nationality, and his son has had the same experience²⁰.

The term “integration” implies that part of the identity has to be sacrificed. The co-existence of different cultures requires the ability to accept differences and live with them.

IV. Closing remarks

On the day Chancellor Angela Merkel declared Germany would accept Syrian refugees, the rest of the world showed respect to the decision and the country. But there is a long way to go for both Germany and the EU. Facing the unprecedented challenge, the regulations formulated decades ago, such as the Dublin Regulations and the Schengen Regulations, were cast aside because of their inefficiency²¹. The agenda to build a temporary order to cope with the situation was interrupted by terror and violent activities and protest against them.

The EU made a refugee deal with Turkey, temporarily stopping the influx of refugee to Germany. Recently, the diplomatic friction between Turkey and some of the EU member states is escalating, and Turkey is threatening to cancel the refugee deal with the EU. Again, the refugees remaining in Syria are likely to be at a dead end. European countries, especially Germany, are in a humanitarian crisis as well as political crisis, which could be told from the result of presidential elections in 2017, witnessing the AfD gaining presence. The future is unclear, just like the future of the refugees who had settled down in Germany.

Integration of refugees to the European society won't be easy. Turkey spent decades on the process to join the European Union, and it is still ongoing. The influence of their Islamic cultural background cannot be ignored²². It is a mirror for the integration of Muslim refugees.

In history, Christian culture and Islamic culture both have assimilated a lot of other minor cultures as they expanded. These two cultures are not likely to merge or assimilate each other in the near future. Trends of globalization and integration are ongoing but are threatened by populism and calls for de-globalization. Insecurity drives hostility towards refugees and migrants. It is vital to work towards integration in order to prevent the future crisis. What's more, a light should be shed on the root cause of the refugee crisis, i.e. the Syrian civil war. Further studies and policies need to be formed in order to work toward global stability.

19 Interview with Mr. Jörg Sobolewski and Mr. Hugh Bronson, the representatives of AfD at the Abgeordnetenhaus of Berlin. March 13th 2017.

20 Interview with Mr. Kaya Tığhoğlu, the founder of ISOGON company in Berlin. One of his sons joined the interview, too. March 14th 2017.

21 <http://www.telegraph.co.uk/news/worldnews/europe/germany/11821822/Germany-drops-EU-rules-to-allow-in-Syrian-refugees.html> (29.03.2017)

22 <http://finance.sina.com.cn/roll/2016-07-16/doc-ixuaiwa7033719.shtml> (29.03.2017)

Energy Efficiency and Sustainable Development: An Assessment of Slovenia's Energy Policy

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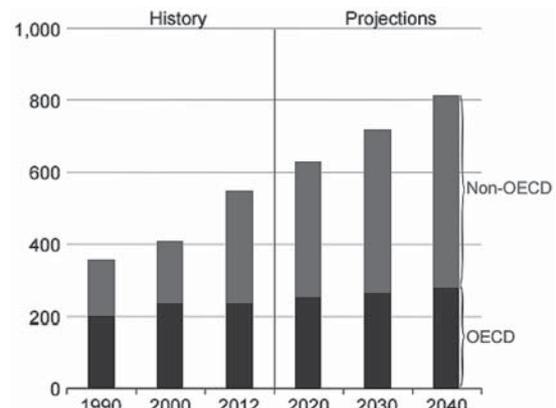
Abstract

This paper looks into the energy situation and energy policy of Slovenia in terms of its energy efficiency (EE) and development of sustainable renewable energy sources (RES). Currently, Slovenia's energy import dependence is at 48%. Its energy strategies, guided by European Union's (EU) targets, are anchored on the concepts of energy efficiency and sustainable development of renewable energy sources (RES). Along with EU's policies and directives, the country crafted the National Energy Efficiency Action Plan and the National Renewable Energy Action Plan. In addition, since 2016, Slovenia has reduced its energy end-use by 9%. In addition, its total energy source comprises of 22% of RES in 2014, just 3% shy from their 2020's RES goals. Ongoing projects like smart grid and further diversification of energy sources are expected to provide more sustainable developments to Slovenia's energy needs.

I. Introduction

Much of the world's energy problems arise from the ever-increasing demand for energy while dealing with a determinate supply of natural resources and technological challenges on renewable energy resources. The International Energy Outlook 2016 (IEO2016) (EIA, 2016) Reference case estimates that the world's energy demand will continuously increase in the next twenty-five years. From 1990 to 2040, it is projected that the world consumption will increase by up to 48%, as shown in Figure 1. This estimated rise in total energy consumption is consistent with the continuous increase since 1990. While this trend incorporates current technologies and developmental trends as well as existing energy policies, it does not take into account new or future policies that will be put in place. As such, this projection may change with future energy proposals. In 2014, 66% of the total global electricity production used fossil fuel such as coal, natural gas and oil. As many countries lack these natural resources or renewable energy sources, their energy production must rely heavily on imports from neighboring countries. Faced with this challenge, most nations, along with international organizations, are constantly exploring an array of technology- and policy-based solutions that will bring about long-term solutions to energy. The need for a more sustainable energy source and more efficient energy consumption is becoming more and more relevant. For small nations with limited natural energy resources

like Slovenia, the demand for energy importation is high. In 2015, Slovenia's energy dependence accounts to about 48% of its total energy consumption. However, this is already 8.8% lower than the EU-28 average. If left unchanged, this level of dependence will increasingly pose economic, political and social vulnerability within Slovenia and even the EU. This remains a great challenge but provides an opportunity to improve on policies that foster sustainable development.



**Figure 1: World energy consumption, 1990-2040
(quadrillion Btu) (EIA, 2016)**

This paper examines existing energy policies of Slovenia relative to efficiency and sustainability while also understanding the changing energy production and consumption landscape of the country. These aspects were considered by Chang and Fang (2017) while examining Singapore's energy policy. They aim to understand the current state of Singapore's energy consumption and the resulting impact of its energy policies in the economy and its people. This paper applies the same concepts to Slovenia as was done in Singapore.

II. Energy Consumption and Energy Policy in Slovenia

Slovenia is located in Central Europe between Austria on the north, Hungary on the east, Croatia on the south and Italy on the west as depicted in Figure 2. With Ljubljana as capital, it is situated in the heart of Europe serving as a crossroad route on all directions around the continent. It is home to two million people and has a land area of 20,000 sq. km.

Like most EU member countries, Slovenia has a

developed economy owing to its highly-educated and skilled population and a robust manufacturing industry. It is known for its export production in automotive, chemical and pharmaceuticals, electrical and electronics, ICT, metalworking and machining and wood-processing. It also fosters more traditional industries like agriculture and forestry.



Figure 2: Map of Slovenia surrounded by neighboring countries (Operation World)

In 2015, Slovenia's total energy consumption sums up to almost 199,000TJ, with households consuming 23% of the total. An increase in geothermal and solar energy consumption was observed in this year (14%). The establishment new small power producers accounts for this. A little less than half of the total consumption was in the form of petroleum products (46%), followed by electricity (23%), renewables (14%), natural gas (12%), heat (4%) and solid fuels (1%), as shown in Figure 3.

Among the various energy sources consumed within households, 42% of the energy consumed in households were from solid fuels. Among solid fuels, wood remains to be one of the most prevailing natural product used due to its immediate abundance throughout Slovenia. (SURS, 2016). Slovenia produced 16.3 TWh of energy mainly from hydroelectric power plants, nuclear power plants, thermal power plants and other renewable sources in 2015. Almost 70% of which is consumed by business consumers while the rest is distributed among households. From the total power generation, 5.3TWh was produced by a single nuclear plant which is jointly co-owned by Croatia since 1981. This is 23% of the total supply comprising almost half of the total domestic energy source together with almost the whole of the renewable energy source (RES) (17%) which has considerably increased since the previous year marked by the emergence of a few small local producers. Imported sources account for less than half of the total supply with all of the petroleum products (34%) and natural gas (10%) being fully imported (SURS, 2016). Figure 4 shows the corresponding total power supply.

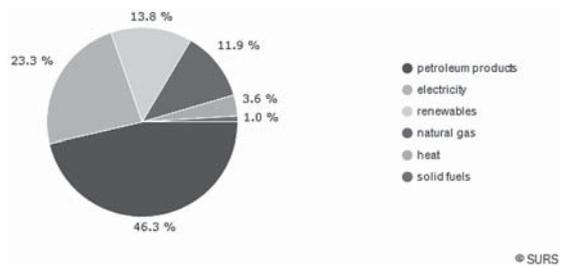


Figure 3: Final energy consumption of Slovenia in 2015 (SURS, 2016).

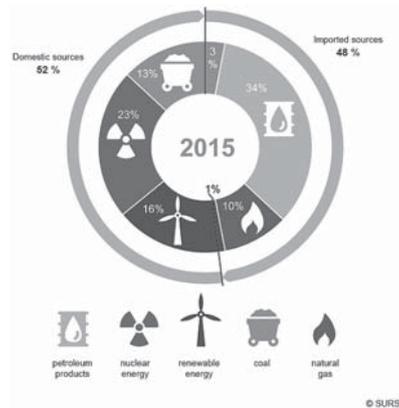


Figure 4: Total primary energy supply of Slovenia in 2015 (SURS, 2016)

1. Current energy policies in Slovenia

At present, two leading policy concepts around the world are energy efficiency (EE) and sustainable development of renewable energy sources (RES). Since a huge sum of investment is needed for energy production, consumption efficiency is central in all aspects of the world economy. Various research and development activities are in place to create next generation technologies that can either produce cleaner and cheaper energy or consume energy at a rate that produces higher product output for every unit of energy. The two concepts are pervasive in all aspects of energy management. So to speak, these two concepts are so tightly related that the full realization of policies addressing the world's energy will not exist without one or the other.

EU Policy and Strategy

Since its integration into the EU in 2004, Slovenia is mandated to fulfill all of EU policies and directives. At present, EU's energy policy has three main goals: supply security, competitiveness and sustainability. EU currently achieved more than half of its energy by importing from countries in Central Asia, Russia and the Caucasus countries. These imports comprise of traditional energy sources like fossil fuels or natural gas. These consumptions are huge contributors of greenhouse gases. The strategy aims to secure competitive and secure energy source by promoting private investments on

energy infrastructures like pipelines, electricity networks and technologies with less carbon footprint.

The goals are attained through the 2030 Energy Strategy framework. To tackle climate and energy issues, EU set policy objectives for the period between 2020 and 2030. These aims are ultimately geared towards attaining the 2050 greenhouse gas reduction target. For 2030, EU is expected to cut its greenhouse gas emission by 40% using baseline level in 1990. The union is also expected to provide for 27% of its energy consumption from renewable sources while increasing its EE by 27%.

A. Efficiency: Slovenia's energy consumption

In general, EE can be achieved either by reducing energy consumption or by increasing the output per unit of energy consumed. However, the increasing economic activities of a growing industrialized nation such as Slovenia demand for higher energy use to attain production targets. Therefore, to marginally improve EE, efficient technologies that improve and sustain production needs and services is highlighted.

The EU Directive introduction of policies on efficient energy use in the household level have marked an increase in patented energy-efficient inventions (Girod, Stucki & Woerter, 2017). Even in energy production, policies that promote efficient production are very common with aims of increasing energy production sustainably while decreasing dependence on energy imported from other countries. However, much is yet to be achieved in improving the efficiency of power transmissions linking marketed energy sources to street-level consumption.

For the period of 2008-2016, Slovenia was able to achieve a 9% end-use energy savings target which is based on the National Energy Efficiency Action Plan 2008-2016 (AN URE 1).

National Energy Efficiency Action Plan

Slovenia targets to attain a 20% improvement in energy efficiency by 2020. This corresponds to EU's Directive 2012/27/EU or the Energy Efficiency Directive. In detail, the target says that primary energy consumption must not go beyond 7.125 million toe by 2020. Energy efficiency can be achieved by improving the general infrastructures of the country. This means that existing structures of around 22 million sq. meter floor space must undergo renovations. They are divided into three sectors, that is, households, public, and commerce and transport. Renovations are being implemented with 3% of the total renovations being done on central government buildings. The resulting upgrade will amount to a 10% reduction in energy consumption. This undertaking is expected to deliver economic growth amounting to EUR 500 million of possible investment yearly. In the meantime, funds for this project are expected to come from EE contribution, Rural Development Programme, and Climate Fund. (Ministry of Infrastructure, Slovenia, 2016)

B. Sustainable development: Slovenia's renewable energy source (RES) goals

Sustainability of energy source can be attained by efficient energy consumption and development of RES. Since Slovenia heavily relies on the import of raw materials to feed its conventional power production, it realizes the need to support the development of its RES. This not only reduces energy dependence but also pollution compared to the more popular fossil fuels. A second nuclear reactor was proposed by GEN Energija in January 2010 and is currently under consideration taking into account the power needs, financing and popular sentiments among Slovenes on safety.

By 2020, EU aims to lower CO₂eqv emissions by 20% while increasing RES by 20%. These goals, also known as the 20/20/20, are incorporated in EU's REC Directive 2009/28/EC. The target is set arbitrarily for each member depending on their current situation and infrastructure capabilities. As for Slovenia, it targets to achieve 25% of its gross final energy consumption energy from renewable sources by 2020. It includes further introduction of RES to various sectors such as households, transport, and manufacturing. This is not far from its 22% energy consumption from renewables since 2014.

Biomass, hydroenergy, solar and biogas encompass Slovenia's current RES. While still in stages of development, these RES can potentially be further diversified by wind and geothermal energy. However, especially in the case of wind, they put little attention on its development as its potential is not very significant as compared to the others.

Key players in sustainable development in the fields of policy, research, and public are important actors in this energy transition. Although EU's objectives are clear, there is a lack of concrete strategy plan in the EU level. As such, each member is expected to plan for and carry out their respective strategy and organize their own implementation within their jurisdiction. This allows for a more attuned approach to each country's specific requirements relative to their existing infrastructures and network systems as well as current potentials.

National Renewable Energy Action Plan

For Slovenia, the national strategy is covered by the National Renewable Energy Action Plan (Ministry of Economy) and National Energy Programme (IJS). However, it has been pointed out that there are no detailed implementation measures to attain the set goals and no consideration on the increase in number of RES and EE with respect to the long-term energy industry development.

Smart Grid and Smart Community

The goal towards sustainable development in energy production and consumption has long been realized since the conception of energy policies. An increasing demand for power across all industries means that the current grid system is overburdened. In fact, it has not evolved

significantly since its initial stages of development. Blackouts and brownouts are a result of the slow response of the grid system to changing power demands. These result in delays of economic activities and services and potential wastage of resources.

Among the existing energy infrastructures and facilities, the grid system is the most outdated section in terms of technology advancement. According to the European Wind Energy Association, grid operation will require an upgrade when wind and solar power are to be integrated further by as much as 20% of the total power handled. That is, energy management techniques need upgrade to handle a diversified energy source. This prospective improvement will not require major efforts on the side of research and development as the upgrade taps into existing technologies already in use.

Present grids, though deemed smart enough, are at risk of security, climate change threats and rising costs. In addition, data on potential revenue losses are often incalculable with the present grid system. Because of these, it is ineffective to couple EE and RES measures to existing grids.

The introduction of a smart grid will provide a more flexible response to all consumer needs while providing more accessibility into the network. It is also deemed more cost-efficient and more reliable as the system constantly analyzes the power demands and dynamically manages all power sources connected to the grid.

The smart grid project also invests into new infrastructures including advanced metering systems. On the consumer level, it provides information that will give power users the freedom to choose when to subscribe to the grid. During peak hours when pricing is high, consumers can adjust their power usage to lower costs and help decongest the power network.

To circumvent further potential losses, on November 2016, the Ministry of Economic Development and Technology of Slovenia and New Energy and Industrial Technology Development Organization (NEDO) of Japan made an agreement and signed a memorandum of cooperation (MOC) to conduct a research and pilot demonstration on smart grid and smart community system. NEDO also made agreements with Slovenia's Ministry of Infrastructure and ELES, d.o.o., a state-owned transmission system company of Slovenia. The demonstration project is expected to be completed by October 2019 (NEDO, 2016).

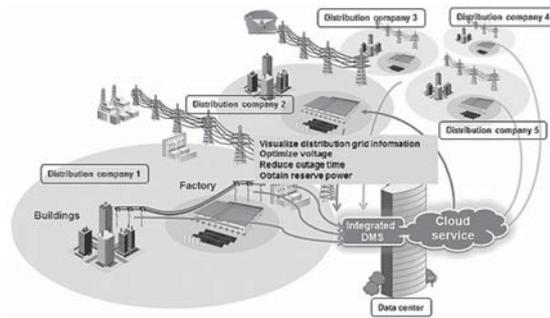


Figure 5: Overview of smart grid in a smart community (NEDO, 2016)

Cost analysis made by University of Ljubljana, Faculty of Electrical Engineering and Milan Vidmar Electronic Power Institute on the development of the smart grid projects that EUR 320 million worth of investment is needed to fully support the success of all operations. In Figure 6, this is lower than if investments are poured into the maintenance of current grid networks (KC SURE, 2016).

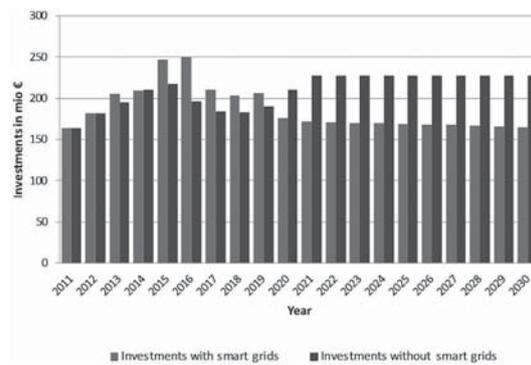


Figure 6: Investment projections for smart grid versus without grids. (KC SURE, 2016)

III. Conclusion

As examined in this report, the energy policy of Slovenia was discussed through the concepts of energy efficiency and sustainable development of renewable energy sources. The major existing policies are derived from EU's strategies on energy. These EU policies do not provide implementation plans such that each member state is free to provide their own implementation and action plans. Slovenia's implementations are encompassed in the National Energy Efficiency Action Plan and National Renewable Energy Action Plan. So far, EE target goals have been met until 2016 at end-use energy savings of 9% while the development of RES is at 22% of the total energy sources since 2014.

In addition to these action plans, a demonstration project on smart grid is being conducted and is expected to be completed by last quarter of 2019. This project promotes further enhancement of the action plans as energy management is expected to be handled more efficiently with the introduction of grid network systems.

These findings reflect the current efforts of Slovenia not only in complying with EU's directives but also in looking for long-term solutions to energy challenges of countries with inadequate locally-sourced energy supply. Current projections reveal that the long-term gain of investing in energy infrastructures will lead to eventual savings and a more secure, competitive and sustainability.

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The Integration of Refugees and Migrants in EU —On-site Practice Study in Slovenia and Germany—

Lirong Chi

I Introduction

In 2015, more than one million refugees flowed into Europe, raising various reaction and tangles in European society. It is called 2015 the European Migrant Crisis or 2015 European Refugee Crisis. European Union (EU) countries struggled to cope with the influx, and created division in the EU over how best to deal with the resettlement of migrants and refugees. Understanding the situation of the refugee crisis, and making a proposal to face it is necessary. Although Japan and China have not accepted one refugee till now, it doesn't mean there are no issues of refugees (and migrants) at all in the near future. In this sense, gaining the suggestions from European countries also has momentous significance.

From March 7th to March 16th, we had an On-site Practice Study Tour in Ljubljana (Slovenia) and Berlin (Germany), focusing on the conditions and issues of the refugee crisis, integration of Europe and the smart city design. We visited Ljubljana University, Faculty of Social Sciences, President Office, Ministry of Foreign Affairs, Ministry of Infrastructure, the refugee facilities on the border in Ljubljana (Slovenia), and also visited AFD · SPD political party, WEFA (NGO), and a company founded by a Turkish immigrant in Berlin (Germany). Based on the conversation with these different stakeholders, this article tries to clarify the conditions of refugees in Slovenia and Germany, make recommendations to manage refugees and migrants better, and strengthen integration of refugees and migrants in EU.

II Background of the Refugee Crisis

1. The definition of refugee

The UN 1951 Refugee Convention adopted the following definition of "refugee" to apply to any person who is : "owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it."¹

2. The situation of the 2015 European refugee crisis

The European migrant crisis or the European

refugee crisis began in 2015, when rising numbers of people arrived undocumented into the EU, travelling across the Mediterranean Sea or overland through Southeast Europe. These people included not only asylums seeking to apply for a refugee status and the right of asylum in claims to be individually determined as genuine or not, but also encompassed various others such as economic migrants, and a small number of hostile agents including "Islamic State militants". According to the United Nations High Commissioner for Refugees, the top three nationalities of entrants of the over one million Mediterranean Sea arrivals between January 2015 and March 2016 were Syrian (46.7%), Afghan (20.9%) and Iraqi (9.4%).²

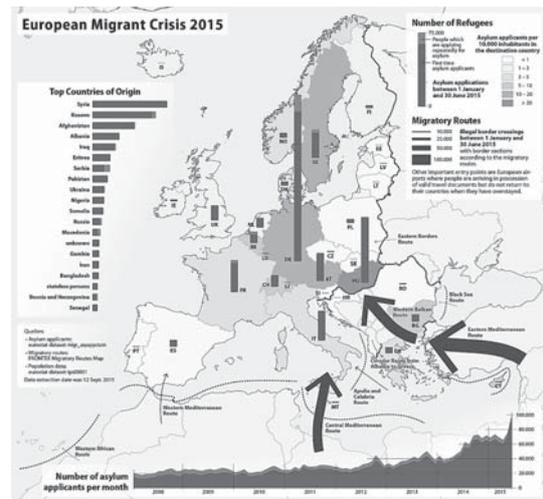


Fig. 1: Asylum applications in EU and EFTA states between 1 January and 30 June 2015 according to Eurostat data.

Source: European migrant crisis, Wikipedia

III Conditions of refugees in Slovenia and Germany

1. Slovenia

Slovenia is a nation state in southern Central Europe, located at the crossroads of main European cultural and trade routes. It is bordered by Italy to the west, Austria to the north, Hungary to the northeast, Croatia to the south and southeast, and the Adriatic Sea to the southwest. It covers 20,273 square kilometers and has a population of 2.06 million. It is a parliamentary republic and a member of the United Nations, European

1 Convention and Protocol relating to the Status of Refugees, Geneva, Switzerland: Office of the United Nations High Commissioner for Refugees (UNHCR), Communications and Public Information Service, 1967

2 Monthly Arrivals by Nationality to Greece, Italy and Spain. Refugees/Migrants Emergency Response - Mediterranean. 31 March 2016. Retrieved 14 May 2016

Union, and NATO. The capital and largest city is Ljubljana.³

Even though Slovenia is a small and “young” (independence in 1991) country, it plays an important role in Europe. Slovenia is very sensitive to changes for globalization and emergency problems. After Hungary sealed the border, Slovenia strived to have 500,000 refugees passing by smoothly. However, in order to maintain this sustainably safe and secure life, enhancing the potential capacity of the country is necessary.

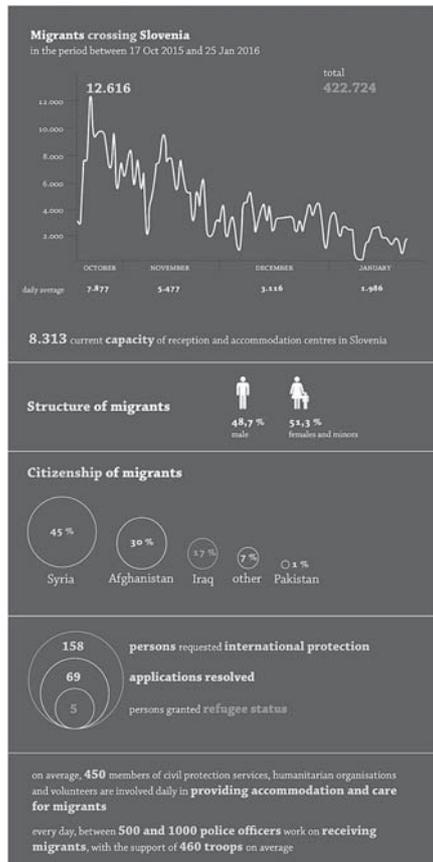


Fig. 2: The statistic data of the Migrants crossing Slovenia.

Source: www.vlada.si / Helping refugees (Government of the Republic of Slovenia)

Slovenia economy having enjoyed robust growth since its 1 May 2004 accession to the EU, Slovenia’s GDP per capita has already reached about 80 percent of the EU-27 average, ahead of Portugal and all other new members from Central and Eastern Europe⁴. Nevertheless Slovenian citizens’ satisfaction of being a member of EU has decreased over the years. People feel free to use Euro to travel or study in other EU countries,

3 About Slovenia: Republic of Slovenia. Vlada.si. Government of Slovenia, Republic of Slovenia. Retrieved 25 November 2012.
4 Slovenia’s road to the EU - Slovenia - ESI

but at the same time they feel their as Voice is not counted in EU. Dr Miro Haček, a full professor of political science at the Faculty of Social Sciences gave both positive and negative consequences of Europeanization processes. Positive consequences include drawing of the EU funds (especially during and after the economic crisis seeking important financial resource, even more important for local communities), and the fight against corruption (adoption of highest international standards and procedures but lack of full implementation). About negative aspects, he mentioned four points. The first is the former authoritarian political culture being largely unaffected since nostalgia towards former political and especially social system still remain. The second is a lack of big, uniting goals after the accession to the EU and NATO. The third is the lack of sovereignty, especially over fiscal matters. And the fourth is politicians often using EU as an excuse for certain procedures.

2. Germany

Germany is a federal parliamentary republic in central-western Europe. It includes 16 constituent states, covers an area of 357,021 square kilometers, and has a largely temperate seasonal climate. With about 82 million inhabitants, Germany is the most populous member state of the European Union. After the United States, it is the second most popular immigration destination in the world.⁵ Germany’s capital and largest metropolis is Berlin.

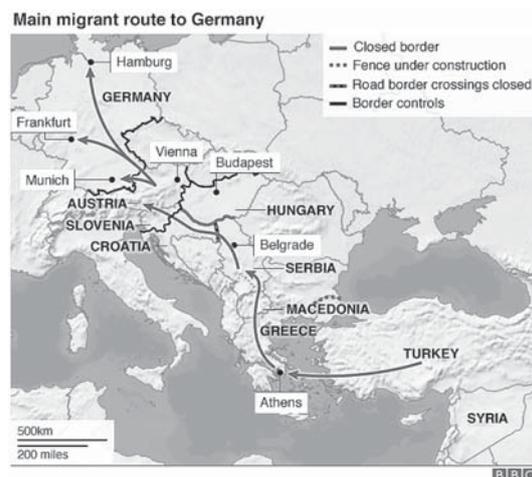


Fig. 3: Main migrant route to Germany

Source: BBC.com

5 Trends in International Migrant Stock: The 2015 Revision. United Nations Department of Economic and Social Affairs, Population Division. 2015.

In the 21st century, Germany is a great power and has the world's fourth-largest economy by nominal GDP, as well as the fifth-largest by PPP (Purchasing Power Parity). As a global leader in several industrial and technological sectors, it is both the world's third-largest exporter and importer of goods. Germany is a developed country with a very high standard of living sustained by a skilled and productive society. It upholds a social security and universal health care system, environmental protection and a tuition-free university education⁶. However, various complicated problems surround this large welfare state. One of these problems is refugee crisis. From the Fig.3 we could notice that most of the migrants passed by Turkey, Slovenia, Austria, and finally settled in Germany.

One of the right-wing political parties, Alternative for Germany (AFD) rejects refugees. The AFD's Berlin regional manager mentioned, due to the low basic skill (reading, writing, and mathematical skills), refugees will never be able to find a job within the city. This is the core reason of the migrants and refugees depend on welfare in Germany. He also repeatedly brought up the phrase "Put Germany First"; migrants cannot solve Germany's problems but increase them, so building refugee camps outside Germany and in their own home country could be better.

On the other hand, the Social Democratic Party of Germany (SPD) political party accepts refugees. One German politician of the SPD said that making a system to support the migrants to work would be beneficial for integration. They plan to assess immigration applications based on age, education, work experience, language skills and ability to integrate into the German society.

Besides the political parties, we also visited independent organizations. Weltweiter Einsatz für Arme (WEFA) is an International Humanitarian Aid Organization reaching out to all regardless of their religion, spoken language, ethnicity, race, and region; and to help those around the world in hardship, hungry, or left wounded, homeless or disabled due to natural disasters or war. WEFA was founded in 2006, and has reached out to 70 different countries and regions with humanitarian aid in a short amount of time, to lessen the emotions of humility for the recipients. A woman who is playing an important role as a volunteer worker for the organization mentioned that the refugee children need love, hug, and family more than food. They want to be a part of this society.

IV Four recommendations to manage refugees and migrants better

1. Policy making

European politicians need to start seeing migrants and refugees as a resource rather than as a problem. In order to do this, European countries need to improve the governance for human mobility and make policy changes to support the refugees or migrants to benefit the host

communities.

It is necessary to increase the opportunities for language lessons and work skills training so that refugees and migrants can participate in the labor market. This not only helps them ease the transition for new arrivals, increase their capacity to support themselves, but also help EU countries to ensure the security and stability of societies as a whole.

At the same time, new strategies about refugee acceptance, integration of refugees into society, and illegal migrant's issues are required.

2. Seeking Cooperation

Cooperation includes the cooperation inside of the country as well as outside of the country.

Inside of the country, the government needs to work with other stakeholders to deal with the refugees and migrants' issue, such as, university, NGO, and enterprise.

Outside of the country, cooperation with other countries is important, especially, the EU countries. Making dialogue could be the core to build good relationships. EU countries should know and trust each other, understand the EU's joint value, and clarify each other's characteristics and responsibilities. For EU units, the refugee (migration) issue is a matter that the EU countries need to settle jointly and it is unexpected to rely on only a few countries. Besides the EU countries, cooperation with African countries is also important, in the hope of reducing the reasons to migrate to Europe.

3. Integration community building

The key is to integrate the refugees and migrants into the community as a whole. Try to understand each other's culture and respect diversity. It is important to change the ideological perception of refugees (migrants), give them humanitarian support, and to recognize them as a member of the community.

4. Smart city design

Humankind must address the issues in the years ahead, including those relating to the environment, energy, food and health.

Smart City is a city that can efficiently manage and operate basic infrastructure services by using high technology, enhancing the quality of people's lives while considering the environmental sustainability. Although it is a concept where we can solve social problems (such as aging and environmental pollution problems) more efficiently, the high cost and life security still remains to be unsettled.

V Conclusion

Facing the 2015 European refugee crisis, both Slovenia and Germany had great effect on transferring and accepting refugees. However, there are still uncountable complex problems that need to be considered. Challenges bring chance. Through this refugee crisis, Slovenia and Germany gained a chance to make the change to be a more sustainable country,

⁶ From Wikipedia, Germany

including the integration of refugees and migrants.

“Integration” has various definitions. It is generally defined as the process of mutual adaptation between host society and migrants. Integration not only means to be the same, but on the contrary, it is about retaining the differences based on the sense of obligation and respect of common value and common purpose that bind migrants and their host communities together. Integration becomes more essential these days because of globalization.

Globalization brings economic growth and population flow; which brings challenges to every country. Some EU countries are not ready for the migration and are afraid due to unpredictable terrorism upon their citizens. Refugees have already suffered war, sorrow, and fear through their dangerous journeys to Europe; relying on the hopes of improving the lives of their families. However, after they arrive in Europe most of them have received discriminatory treatment; they can't work, and they can't earn money to keep for the sake of their lives. No matter how many refugees the EU has accepted, resettlement of refugees could not be more important. As the spokesperson for Amnesty International said, “We need to see better risk assessments, more protection at certain locations and prosecutions of these appalling racist crimes”⁷. This is not only an effort to help the refugees, but also an opportunity to improve the society for all.

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⁷ Germany: Thousands of migrants targeted in attacks last year. Simon Cullen and Susannah Cullinane, CNN. February 27, 2017.

Report of On-Site Practice II

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Our On-Site Practice II's topics are (1) Refugees, (2) EU, and (3) Smart City this time.

First, the situations in Slovenia and Germany are different in receiving refugees. Although over 700,000 refugees came to Slovenia, most of them just passed through and went to Germany or Austria. According to a professor from University of Ljubljana, only 300 refugees are accepted by Slovenia whose population is around 2,000,000, which means the ratio of refugees is just 0.015%. On the other hand, Germany has received over 1,000,000 refugees. The population of Germany is around 80,000,000, the ratio of refugees is beyond 1%. However, German political parties, AfD and SPD showed different opinions on receiving refugees. AfD pointed out that the education skill of refugees is not high. The priority should be increasing the birthrate of German, rather than receiving refugees. SPD argued that German government is providing language and education programs for refugees, which means SPD is trying to transfer refugees to labor force. SPD also mentioned the favorable business climate in Germany these days.

Second, in the background of Brexit and some European countries' antiforeignism, we can learn a lot from Slovenia's efforts and attitude. Just as Professor Naito from Doshisha University said that although Slovenia is a small country, Slovenia did not threaten other countries or take the direction of nationalism. Slovenia is trying to keep the unity of EU. Besides, the professor from University of Ljubljana shared the data of satisfaction of Slovenians with EU membership and life in the EU. When Slovenians were asked 'What the EU means to Slovene citizens personally' (July 2014), 48% answered 'freedom to travel, study and work', 35% 'the Euro', 33% 'peace'. Only 8% of participants answered loss of national identity, 7% with not enough control at external borders and only 8% with social protection.

Third, there are both advantages and disadvantages on Smart City. Smart City integrates multiple information and communication technology and Internet of things solutions to manage a city's assets. It enables a better quality of life and reduces the waste of energy. However, the security of Smart City should be paid attention to. Besides, it would be a kind of policy game because of the unequal distribution, which means the phenomenon of 'more businessmen, less engineers' would exacerbate.

The core question of our On-Site Practice II is 'why refugees are moving to Europe'. We cannot deny that the existence of economic migrant among refugees. However, it seems that there would be a gap between refugees' need and German government's activities on

transferring refugees to labor force. We heard the voices that refugees would like to go back home when the war is over. They have to seek safety in Europe, not for a job. What's more, there is also a wall between Muslim and German society. For example, Mr. Kesici comes from Islamrat, a Muslim supporting organization in Germany told us German do not listen to their voice, the relationship is worsening compared to 10 years ago.

Through this On-Site Practice, I have learned not only the professional knowledge, but also (1) trying to listen and ask different parties directly, (2) trying to attract people's attention and draw their words during the interview, and (3) avoiding the dividing line. Actually, the line of 'refugees' is complicated. If we divide the line of refugees related to crime, economic migrant, global talent and labor force, we may not understand the refugees' situation clearly.

Behind the Scenes of Emerging Syrian Refugee Crisis in Europe -In Central and Northern European Countries

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Final Paper of GRM On-site Program II Submit to the GRM Journal

1. Activity Outline of GRM On-site Practice II

Doshisha University Advanced Doctoral Program in Global Resource Management (GRM) is consisted by several selected graduate schools in Doshisha University from both social science and natural science courses to tackle on emerging global issues (e.g. natural disaster, regional conflict, environmental destruction etc.). The class titled “GRM On-site Practice II” is prepared to every doctoral students in GRM to provide them opportunities to have practical on-site field research in several selected countries where those issues occurring. Based on previous experiences in Turkey and the Philippines, this year GRM prepared the class in the Republic of Slovenia and the Federal Republic of Germany for a baseline research fieldwork about following topics; (1) Refugee Crisis and its Danger for Integration of Europe (2) Islamophobia and Populism (3) Small Country’s Dilemma for Integrated Europe (4) Energy Policies in a Small Country.

Based on outcomes from the field research in these countries, in this article, the author will clarify present situation in these two countries. From the interview to several government officials, researchers, civil society organizations, and business companies, we were noticed the risks of collapse of European Societies.

2. Grass-roots Effort for Supporting Refugees in Slovenia

After the Syrian Refugee Crisis had occurred between the Syrian Government and the Anti-Regime Groups, enormous numbers of Syrian people have tried to evacuate to European countries as refugees. Since the Chancellor Angela Merkel had stated that her country will accept millions of refugees based on their clause in the German Constitution, countless numbers of people have aimed to evacuate to Germany through the other southern and central European countries. Mostly, refugees have tried to move to Germany through the national borders between Turkey, Greece, Macedonia, Serbia, Croatia, Hungary, Slovenia, and Austria. Slovenia is one of countries which was counted as an available country for refugees to move to Austria. Currently, national borders in these countries are rapidly closed for their diplomatic positions and limited capacity for acceptance of refugees, however, at first countries and the people supported refugees actively in terms of protection of human security.

In this field research, in Slovenia, in addition to the

Ljubljana University, the president Office and the National Council, we have visited to the refugee facilities and police station in Dobova city where close to the national border between Croatia. Dobova was a first place for refugees who moved from neighbor countries Croatia to Slovenia. In Dobova Police Station, we had interview survey to a police inspector and a city officer who belongs to the bureau of disaster risk reduction in Dobova City. This police inspector and city officer were first two public officers who worked on flows of refugee people in Dobova City. Needless to say, the risks and facing issues of the Syrian Refugee Crisis was known to the Government officials and people in Slovenia, however, in Dobova City, people and the city government did not expect that such huge numbers of people flows into Slovenia at once through Dobova City. Because of more than expected flows of the Syrian refugees to Dobova City, the capacity of acceptance of refugees in Dobova city was immediately filled. Since the city government was not given enough time for preparation, at first, only these two officers were placed into the situation for supporting refugees. The police inspector had told us that he faced much of difficulties when they started his work on registration of refugees and negotiation with the central government of Slovenia. And the city officer mentioned that she has tried to support the refugees based on her experiences as a officers to disaster risk reduction, however, there was many difficulties in her support to their livelihood and mental health care. Until the situation calmed, these people have tried to support refugees within cooperation with their central government, some civil society organizations, and international organizations. This situation and their work on the crisis was unusual event for them, however, people in Slovenia have tried active support for refugees with no frightened. The city officer mentioned us that perhaps because Slovenia had experienced the Yugoslav Wars before, people could recognize refugee’s situation rapidly and made their efforts to acceptance quickly.

3. The Issues in Integration of European Countries

Based on our activities in GRM On-site Practice II, including author, several GRM students were invited to an international conference which was held in Bled City in Slovenia on September 2017. The conference “Bled Strategic Forum” and “Young Bled Strategic Forum” were created by Slovenian Government to provide

opportunities for discuss international and global issues between government officials, staffs in civil society organization, people from private business companies, and researchers from all over the world. As a first delegate from Japanese University, thanks to the Embassy of Japan in Slovenia and Ministry of Foreign Affairs in Slovenia, we have attended the conference. In this year, in addition to the ministers of the government of Slovenia, Serbia, Turkey, Russia, Hungary and the European Union, Director General of International Atomic Energy Agency were attended to the conference.

Because the conference mainly aims to discuss issues of human rights and environmental protection between European countries, main topic of this year was how to solve and take practical action to the issues of the Syrian Refugee Crisis and emerging populism with Islamophobia. Based on the topic and a chairperson from BBC, all ministers are required to clarify their statement and opinion with communicate to the audiences. One of outcomes from the conference is that we noticed danger and risks of collapse of European Unions based on their facing situation in the crisis. Since Germany, Turkey and Slovenia required more support for refugees, on the other hand, the Minister of Foreign Affairs of Hungary, for example, he mentioned that the refugees are not counted as “refugee” but they are “illegal migrants”. Hungary is one of countries who closed their national borders from flows of refugees into their country. The statement of the minister clarified the difference of governmental attitude toward acceptance of refugees. These difference the existence of national borders brought emerging issues and danger of collapse of integrated European Unions. Because of straggle between countries facing refugee crisis, out of disorder is currently occupying European societies and their peaceful long history which was created after the World War II is now facing its collapse. Presently still numerous numbers of refugees are moving into European countries and some of them were stopped because of closed national borders. The Bled Strategic Forum is one of limited opportunities to seek possibility for solving issues.

4. Emerging Populism and Islamophobia in Germany

In this course, GRM students and professors have visited to the Berlin House of Representatives, the house of the councilors and federal council of Germany. In addition, we have interview to several civil organizations and private business companies about the issues of emerging populism and islamophobia against refugees and migrants from countries which are facing humanitarian crisis. In the Berlin House of Representatives, the House of the Councilors, and the Federal Council, we could meet with several politicians and officers of some political parties in Germany. “Alternative für Deutschland (AfD)” is one of parties who known for their radical populism in German Society and have strong opinion to stop acceptance of refugees in the country. Before we have visited to politicians and staffs of AfD in the Berlin House of Representatives, I

could not understand the causes of their strong negative attitude and principles against acceptance of the Syrian Refugee Crisis. In our interview, one of representatives from AfD mentioned us that they are truly understand that the Syrian Civil War made numerous numbers of refugees and they are facing in complex humanitarian crisis. People in AfD understood that the refugees are now in serious situation of in terms of human security. The politician continued that on the other hand, German society is already filled with numerous numbers of immigrants and they are taking opportunities of jobs from “Alternative German People”. Strong negative attitude of AfD to acceptance of refugees is deeply rooted in the labor situation and historical issues in social welfare in Germany Society.

5. Creating Livelihood in Germany as an Immigrants

In this field research program, professors and students could meet one of president of private business companies in their factory office in city of Berlin. The president told us his story as an immigrant from Turkey, and how he has developed his own business company. In addition, he mentioned us current situation of migrants, immigrants, and refugees in city of Berlin. When he was young, he moved from Turkey for various reasons, and started his life in Germany. It was for him for truly twists and turns with trial and error. Before he started his glass factory business, he studies hard in several engineering schools for taking a license as a professional engineer. Simultaneously, he mentioned and experienced that starting new life and seeking job is now considered truly difficulty especially for refugees who evacuated to Germany from mid-east countries. As one of representatives who started his business in Germany, now he started his support activity for refugees, however, because of rapidly emerging issues of populism movement and radical islamophobia, he continuously told us that immigrants and refugees will face more difficulty and danger even their population is now dramatically increasing in German society.

6. Emerging Populism and Issues of Radical Islamophobia

In city of Berlin, the delegate from GRM have visited to several international non-governmental organizations for having interview survey about the issues of emerging populism movement and radical islamophobia against migrants, immigrants, and refugees from the other countries to German society. WEFA funded by IHH and the Islamische Föderation in Berlin are two famous international non-governmental organizations who supports dairy life and livelihood of Muslim immigrants and refugees mainly in Berlin. Especially after the Syrian Refugee Crisis have occurred and influenced in European countries and the society, they started to support those refugees based on grass-roots efforts. However, in present society in Germany, now they are facing newly challenges.

As author mentioned continuously, emerging

populism movement and issues of radical Islamophobia brought newly difficult situation to all staffs of these organizations and numerous people who evacuated from countries where complex humanitarian emergencies are undergoing. Not only in Germany, however currently populism and radical Islamophobia movement are now gradually occupying European societies and its divided people in the country for two parts. Like country of Germany was divided almost half a century after the World War Second from the Soviet Union (Communism countries) and the Western countries (Democratic countries), now the Federal Republic of Germany and the people are gradually divided whether they will accept refugees or not. Even the Chancellor Merkel opened her statement for acceptance and support to refugees, on the other hand several parties and people strongly disagreed her policies and required their federal government to not accept refugees in German society. Historically speaking, divided societies always made internal conflict and straggle within the society and social relationships inside people in the countries. In this case, especially for refugees who had evacuated from Syria, their situation is becoming worth and worth day by day. Numerous numbers of persecution are reported to us.

WEFA and the Islamische Föderation are organizations we have visited in this field trip. In our interview to officers in these organizations, both officers reported us that numerous numbers of serious persecution are now occurring against the Syrian Refugees in German society. These persecution incidents are not occurring between adult, also occurring in children in both situation of their education and their daily public life. In some cases, women were robbed their hijab, and injured by sexual assault. In sports event which held at community place for Muslim refugee people, the heads of the pigs were imperceptibly displayed as for persecution for them. In addition to their experience in the Wars, now people who evacuated to Germany is currently suffering from the post-traumatic stress disorder (PTSD) since they were persecuted from some radical anti-refugee groups. Officers in the Islamische Föderation mentioned us that, previously persecution was existed in German society especially against Muslim immigrants and migrants from the other countries, however, especially after the Syrian refugee Crisis occurred and refugees flowed into Germany, in these years, persecution incidents are rapidly and dramatically increased and numerous numbers of atrocious incidents were reported (From WEFA's cases, the numbers of those incidents in Berlin are reported already several thousands in a year especially against refugee children).

After the World War II, German society and the people has been sought a multi-cultural co-existence in their country. After once the Syrian Refugee Crisis had occurred between the mid-east countries and whole European countries, their society is now divided for two groups again, and complex humanitarian emergencies with serious risks of human security are now occupying

the society with bringing radical populism and serious Islamophobia against Muslim people and the society. However, these issues are not occurring inside of Germany and several European countries. The Syrian Refugee Crisis already brought countless influence to all European countries and the issues are now spread over the whole world.

7. Seeking Grass-roots Effort or Supporting Refugees

Historically speaking, once wars or conflicts occurred, until diplomatic negotiation for settlement and ceasefire between parties in the incidents took countless time and efforts. Therefore, especially from the late of the 20th century, the role of civil society organizations was considered important for supporting citizens in their primary stage for survive from the complex humanitarian emergency. WEFA is known for one of famous international non-governmental organizations who support refugees in wars and conflicts. Historically, this non-governmental organization had their aid projects in all over the world (e.g.in the Yugoslav Wars, several humanitarian emergencies in Asian and Mid-east countries). In this case, GRM and several private business companies (these companies are publishers) started their new project for supporting refugees (especially targeted refugee children of the Syrian Civil War) under the cooperation with WEFA and IHH (WEFA is one of auxiliary organizations of IHH).

GRM and the private companies had asked cooperation to several foreign students who can use Arabic to translate one of Japanese famous and popular comics "Captain Tsubasa" in Arabic. Not only in people in Japan, this comic (topic of the comic is football) has long history in the world, and influenced numerous numbers people including huge numbers of famous football players. Since the comic is also famous for children in Mid-east countries, in this case GRM and WEFA prepared Arabic version of "Captain Tsubasa" and have tried to distribute it to children who evacuated as refugees to Germany. In the class of On-site Practice II, in an office of WEFA, after the explanation of activities of their organization, GRM professors and students handed hundreds of comics (from version one to two of "Captain Tsubasa") for staffs of WEFA. In addition, including author, several students of GRM again visited WEFA in Berlin on September 2017, and prepared, provided version three of "Captain Tsubasa" for people of the office and children in Berlin who evacuated to Germany. Currently, the private companies and GRM decided to publish and continue the aid project until version eight of the comic. Efforts and practical activity projects of WEFA, and our aid project are reported in several media press and TV including BBC, Turkish Newspaper, and several other medias. In case of the Syrian Civil War and the Syrian Refugee Crisis, the settlement and its ceasefire should take long time and numerous efforts of people in the world, however, these kinds of grass-roots efforts will support people in complex humanitarian emergency under the surface of

the water in the crisis which we had never experienced and influence us as unprecedented incidents.

8. Conclusion of GRM On-site Practice II in 2017

In this year, students, and professors of GRM were noticed that long peaceful history of European societies after the World War II is now facing danger of its collapse since the Syrian Civil War and the Syrian Refugee Crisis occurred and influenced seriously in not only in Mid-east countries also in all European countries and the world. In southern and central European societies, their governments and people are now required to make decision whether they will open or close their borders and society to the people who evacuated from serious and terrible wars in Syria. In Germany, unfortunately their society is now divided to two societies in the issues of the Syrian Refugee Crisis. Even after the World War II, people and the society had been sought multi-cultural and co-existence environment inside their country, gradually their society is now facing new crisis because of emerging radical populism and serious persecution in the movement of Islamophobia. As one of researchers in an advanced doctoral program, we will try to seek more grass-roots efforts and possibility for supporting people in the complex humanitarian emergency from the point of view of humanitarian aid.

The 2015 Migrant Crisis as the Turn Point of the EU -Based on the On-site Practice II Study Tour in Slovenia and Germany-

Yu Sumi

I. The Goal of the Excursion

In November of 2016, Germany had reached the new monthly record of 206,101 migrants entering its country making it the top European nation for people escaping conflict in the Middle East, Asia, and Africa. Upon there migrants most were asylum seekers fleeing from Syria when Germany had implemented the open-door policy. Although this policy seemed like a god send, two years after the implementation, the doors are slowly starting to close as reports of high crime rates within and outside refugee camps have risen due to disputes between refugees and host communities.

In this report, we examine the views of both governmental bodies and (academic) citizen bodies in Slovenia and Germany, based on the On-Site Practice Tour of the Global Resource Management which was executed from March 7th to March 16th, 2017 and cope to clarify the issues in the discourse of refugees and asylum seekers in these countries. In this excursion, the delegates of Doshisha had visited the Ljubljana University, Faculty of Social Sciences, President Office, Ministry of Foreign Affairs, Ministry of Infrastructure, the refugee facilities on the border in Ljubljana (Slovenia), and also visited AFD · SPD political party, WEFA (NGO), and a company founded by a Turkish immigrant in Berlin (Germany) to understand the situation and future issues..

II. The “Migrant” Crisis

1. Who are the refugees and asylum seekers?

In dependence upon the The 1951 Geneva Refugee Convention where refugees were first brought to discussion, refugees are defined as a person *owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it...* Adding to this, later in the Protocol Relating to the Status of Refugees of 1967 defined the terms of the 1951 protocol by including individuals from outside the European States¹. Given the

discourse of refugees and set terms, the refugee status must obtain these three essential elements:

- ① there must be a form of harm rising to the level of persecution, inflicted by a government or by individuals or a group that the government cannot or will not control²;
- ② the person’s fear of such harm must be well-founded — e.g. the U.S. Supreme Court has ruled that a fear can be well-founded if there is a one-in-ten likelihood of its occurring;
- ③ the harm, or persecution, must be inflicted upon the person for reasons related to the person’s race, religion, nationality, political opinion or membership in a particular social group (the nexus).

In association to the term *refugees*, asylum seekers are people who haven’t been accepted by the host country or have strictly not fulfilled the terms mentioned in the 1951 Convention. Many of which are migrating from country to country in seek of a protection status by the local authorities. In the current international discourse, although the divide of definition mainly depends on the laws of the hosting community, refugees usually are those who have been granted permission to enter and be protected before entering the host community, whereas asylum seekers are those applying on the border, waiting for their protection status to be granted.

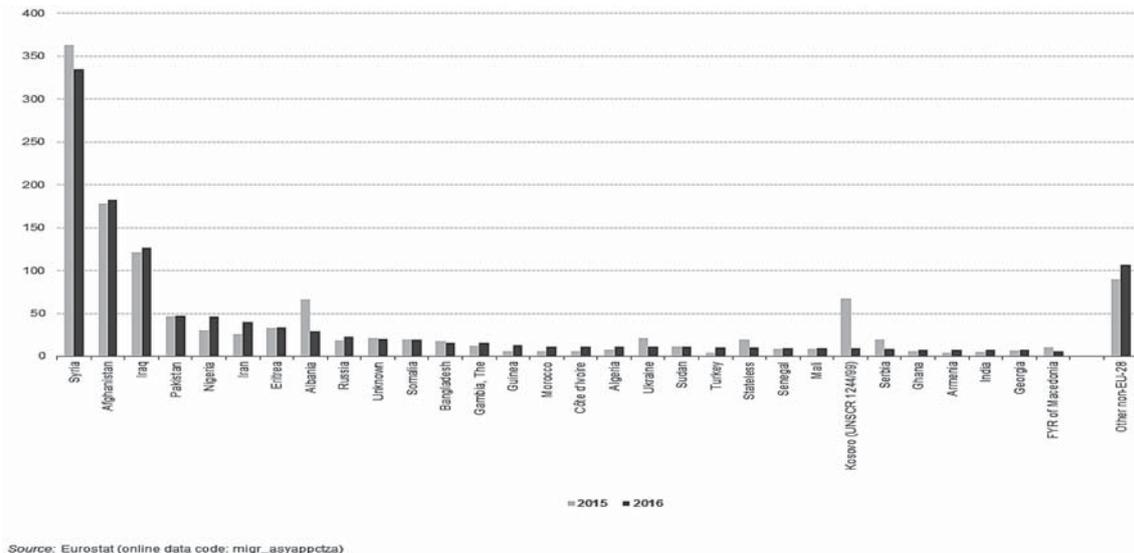
2. The Driver of Migrants

Although the issues of migrants and asylum seekers have been a topic on the table since the 70s, the European Migrant Crisis of 2015 had taken EU countries by surprise when over twice the numbers of migrants have travelled across the Mediterranean Sea or by land through Southeast Europe. The largest body of migrants was asylum seekers desiring protection from persecution of the conflict in Syria. Next to come are refugees fleeing from the disorder in Afghanistan and Iraq, and economic migrants from Kosovo and African Nations (as seen in the graph1).

¹ Although some countries abide by the geographical restrictions of the 1951 definition, since those countries are members of the high committee such as the UNHCR’s Executive committee, and with the pressure of the international voice and watch, they are now in the midst of a turn point of reviewing their definition of refugees or

asylum seekers.

² The definition of refugees stated under UNESCO’s term of international migration



Source: Eurostat (online data code: migr_asyappctza)
Graph1: Countries of origin of (non-EU) asylum seekers in the EU-28 Member States, 2015 and 2016 (Eurostat, 2017)

III. The Comprehension of the Crisis in Slovenia and Germany

1. Slovenia

With the population of 2.06 million, the nation state of Slovenia and its citizens are at the crossroads of how to paint their view on international relations, given the still occurring migrant crisis. From September 17th, 2015 to March 6th, 2016, over 750,000 migrants and asylum seekers have passed through the Southern border on trains, petrifying the 11,000 members (5,000 police officials and 6,000 militant officials) of defense with no president or manual to look back to. The officials, primarily through the confusion, set a former route to lead the migrants to the hastily made camps as most have crossed rivers between the borders under frigid circumstances. Under the Dublin III Regulation, without humanitarian reasons, the responsibility of (in this case, “illegal”) migrants are set upon the first EU country they enter. This is to prevent asylum orbiting and multiple registrations for refuge by a single individual. Referring to the regulations this may be true, but local authorities aiding the illegal migrants and the citizens of Slovenia have now come to realize that wasn’t the case on the ground. Later, to cope with future possibilities of such an incident and to continue its aid for asylum seekers crossing the border, the Slovenian government had set foot in constructing Asylum home near the Southern borders where nearly 300 refugees have already registered (at March of 2017). This was also administered by the fear for future migrants being tied down between the borders of Slovenia and Croatia in case Austria had closed their borders. This act had opened a new set of mindsets for Slovenian Citizens, which also led to the growing distrust in the European Union itself.

Joining the EU in 2003, they hoped of fighting

domestic corruption and gaining citizen involvement, and gaining financial aid for development in exchange of the authoritarian political culture that come from their former socialist systems. Although this was on its way, with the concern of Slovenia’s loss of voice in the EU and the fear of France, a one of the founding members of the EU, leaving the EU (before the French Presidential Election of 2017), the opinion of the Slovenian citizen to leave the EU had overcome the ones in favor of remaining. Within those leaning towards withdrawal from the EU, still in the fear of another migrant crisis where the aid towards Slovenia by the EU isn’t at play, are also leaning towards the populist views proposed by many politicians such as the Netherlands’ politician Geert Wilders. To counter such tendencies and assure Slovenian citizens of their national security, the government had put up a fence around the national borders. This is solely to assure the citizen the comfort of security, and the risk of unpreparedness against another migrant crisis is yet to be solved.

2. Germany

The welfare state of Germany, being the most popular destination of immigration among other EU countries, is now facing the aftermath of “opening the doors” to migrants. With the coming election of September, 2017, the delegation had visited the Sozialdemokratische Partei Deutschlands (SPD) and the Alternative für Deutschland (AfD) to take in their input on the current crisis and the future of Germany. The SPD pushed forward on their support of possible increase in the work force and was against restricting the numbers entering. With the question of where the asylum seekers are to travel to after rejection, let alone their departing country of conflict, still in the air, they are proposing a smoother process of immigration for the refugees and

gain a stronger economical basis. This refers to the Canadian migration regulations where migrants' abilities (degrees, job experience, and language skills) are put into consideration. They seek a system of better immigration for the accepted refugees and a smoother process of integration for law-abiding residents from conflict nations.

The AfD on the other hand, aspire to a stop on "unregulated mass migration" and close all borders. Adding to their views on lowering the limit of asylum seekers entering Germany soil, they fear a threat on their national security as many of the asylum seekers and refugees are from Muslim countries and Africa. Adding to this, they propose an increase of deportation of the rejected, and an immigration system that is stricter to lesser the number of refugees. This is based on the fact that many of the asylum seekers were unregistered illegal migrants and that many were not refugees but economic migrants seeking asylum and better social welfare. Upon interviewing the AfD office in Berlin, one member gave an example for how the 2015 crisis was not a "refugee" crisis but a "migrant" crisis, as many coming in from Turkey were those who weren't able to carry on with their lives under the current social welfare system and fled through Greece, and finally to Germany. Furthermore, they had presented three crucial arguments on the "migrant" issue:

- ① The issues of cost management in Berlin being at stake due to the burden of increasing social welfare costs, and as increased revenues from further heightened property taxes are all poured into the sharpening of the immigration policy, the AfD party of Berlin now highly questions the course of action by the city council;
- ② The literacy rate of the incoming refugees (mainly Syrian Refugees) is far below the German standards to include them as the new economic workforce. The cost of integration will override the economy and leave only few to maintain and improve the current society
- ③ The location of refugee camps should not be in the hosting country but the refugee's home country. Germany can provide aid and protection outside its own without over pressuring the domestic economy.

With their concerns on the cost of coping with the migrant issues, and the new obtained un-skilled workforce not being enough to exceed the costs of the immigration policy, their position of keeping the citizens of Germany their first priority and putting a stop to the concept of "Once you enter the EU, you never leave," will continue to be their policy as "German citizens."

Having seen the point of view of two political parties, the same cannot be heard from citizen groups and NGOs as their first concern is not only of the system. Many of the opinions united when visiting the Islamic Federation of Berlin and Weltweiter Einsatz für Arme (WEFA), Berlin office. As organization of aid, their concern circled around the safety of the refugees and the

increasing Muslim community. Numerous refugees going missing as a result of non-registration, kidnapping, and countless changes of residences, the security of refugees outside the camps are threatened. Furthermore, the scarcity of the exchange of opinions between the host country and the Muslim community has let to citizens of host communities to alter their attitude towards local Muslim communities. The shifted attitude and labeling of the Muslim community has overshadowed the people inside. Now, the heightening of nationalism and ethnocentrism that was manageable a decade ago is getting out of hand. Whenever the policy of integration comes to topic, the question is not of the process but of integration itself. In other words, integration being the definition of the host country and an authoritarian concept for the recipients (mainly for the refugees from Muslim homelands), the system itself gives out the sense of "Aliens integrating to Germany." For Muslim migrants and refugees, the process of integration in Germany is not only changing their home address, but also changing their essential profiles such as their social language and religion.

IV. Conclusion

The 2015 migrant crisis had shed light on the unsolved resolution of the immigration policies and its response within the EU countries, as well as the future development of the EU. EU countries are now placed with the decision between further integration under the Schengen Agreement or remaining with the current policies, allowing each country to create their own role-model policies towards increasing migrants. Although the likelihood of policies promoting aid and support for the migrants have been and are continuing to come through, the rise of popularity of the populist discourse and the citizens support for far-right political parties protecting their personal or national security has come as far as to question the functions of the EU itself. Therefore, with the fear of the separation of physical and financial union by smaller countries such as Slovenia, defining its identity within the EU has become more important than ever. EU countries are now in an important period where they have to review their relation with neighboring countries and their donors of aid, as well as reexamine the terms, both conditions in policy and verbal relations among local communities, of their "national citizens" and their "newcomers."

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Group A: Decreasing School Dropout Rate in Lower Secondary Educational Level in Rural Cambodia

Tomoyuki MUKAYAMA

Introduction

Cambodia is a country located in the southern part of the Indochina Peninsula located in the Southeast Asia. Having over 16 million population, Cambodia has \$1,159 GDP per Capita (7.1% annual change) which is considered as a lower middle-income country by the World Bank. As the main income for many Cambodians is agriculture, a significantly big number of 79% percent live in the rural areas. Electrification rate is about 97% in urban area, about 18% in rural area. This rate is the lowest in Southeast Asia as in Table 1 by the IEA World Energy Outlook.

The System of General Education in Cambodia consists of Primary (Grades 1-6): 6 years, Lower secondary (Grades 7-9): 3 years and Upper secondary (Grade 10-12): 3 years of education. In total, the 12 years of schooling is free nationwide. In spite of free education, the completion ratio in lower secondary school remains low compared with other countries in the same region. While about 95% of the children complete the primary school education, only less than half of them continue their studies up to the end of lower secondary education. While lower secondary education completion rate is 48% as of 2015, the regional average is 92 percent which shows a wide gap in comparison to the neighboring countries.

There are a few key influential factors of school dropout from macro level in Cambodia. From a financial point of view, total government expenditure for all levels of education by the percent of GDP, Cambodia is ranked 4th lowest country in the world as illustrated in figure 1. According from World Bank calculation, the rate is 1.9 percent in 2015 and regional average is 2.7 percent. According to the study done by the world bank in 2012, the main reasons for the high school dropout rate consist of many factors like: poverty, late school entry, inequality, low availability of schools, poor school management skills, teachers' low monetary incentives, low degree of community participation, inadequate school facilities and low quality of the teachers.

The problem seems to lie in the fact that child labor

and accessibility to lower secondary education. The former is more serious situation in rural area than urban area, over 10 percent of children (5-14 years old) work for at least 21 hours per week. The roots of child labor are low income in the agricultural sectors. Most of Cambodian family in rural area is engaged in agriculture, for instance the share of total employment in agriculture sector is 54%, and however the share of total GDP in agriculture is only 28% by ADB. Low income and productivity are big issues in rural area. From an economical point of view, GDP per capita is correlated with lower secondary completion rate. As Ide points out, the higher income country is, the better completion ratio achieves.

The latter is also the serious situation in the rural area, the number and location of the secondary school are limited. The far distance between home and school is playing a role in the increase of dropout rate. In general, the number of lower secondary school is half of the primary. Besides, the number of teachers is limited as well. Many rural schools do not have access to the electricity grid to benefit from modern educational equipment. Figure 2 displays national electric grid in Cambodia. As can be seen from this figure, electricity transmission network is found except in and around Phnom Penh. In other areas, import shortage of demand from Thailand, Vietnam, etc. This is serious problem with energy security. Recently, the government promotes hydropower as a renewable energy, but there is no plan for large-scale power generation in other renewable energy. Looking at the current power generation ratio in Cambodia, Hydropower is 57.1%, Diesel / Heavy oil power is 32.5%, Thermal power is 9.5%, Biomass is only 0.6%.

Focusing on the poverty reduction and using ICT facilities in schools, we tried to come up with some practical suggestions for the countries improvement of

Table 1 Electrification rate in Southeast Asia

Region	Population without electricity millions	National electrification	Urban	Rural
		rate %	electrification rate %	electrification rate %
Southeast Asia	102	84%	94%	74%
Brunei	0	100%	100%	99%
Cambodia	10	34%	97%	18%
Indonesia	41	84%	96%	71%
Laos	1	87%	97%	82%
Malaysia	0	100%	100%	99%
Myanmar	36	32%	59%	18%
Philippines	11	89%	94%	85%
Singapore	0	100%	100%	100%
Thailand	1	99%	100%	98%
Vietnam	2	98%	100%	97%

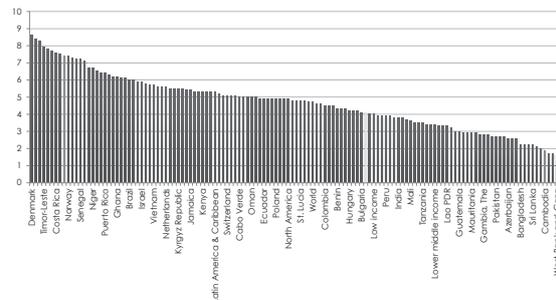


Figure 1 Government expenditure on education, total (% of GDP)

Table 2 Effects of CD, CS and SRI on irrigation reduction compared with CT over 3-year experimental period

Treatment year and index		CT	CD	CS	SRI
2010	Irrigated volume (m ³)	36	–	–	16
	Reduction (%)				55.6
2011	Irrigated volume (m ³)	46.6	39.5	24.5	23.6
	Reduction (%)		15.2	47.4	49.4
2012	Irrigated volume (m ³)	52.1	44.6	28.9	28.4
	Reduction (%)		14.4	44.5	45.5
Average reduction (%)			14.8	46.0	50.2

experiments). Then we suggested to implement the SRI method of teaching for students from 6th grade and asking the students to help their family in the adaptation of system. Moreover, using some ICT facilities (showing clips and films about SRI) to teach both students and head of households will be helpful. The active cooperation between students and parents might change parent's perception on the use of education to improve the household's economy.

We propose the following strategy of introducing the SRI. It is important to put SRI into public circulation. It is also important to realize the ICT education.

1. Implementing SRI method in teacher's training courses (with experiments)
2. Implementing the SRI method teaching for students from 6th grade
3. Teaching the method to head of households in cooperating with community leaders
4. Providing extra payment for teachers who actively involved in the program
5. Promoting a competition between villages
6. Using ICT facilities to (showing clips and films about SRI) to teach both students and head of households

Reduce school dropout by the ICT education

On the next step, we focused on the improving the teacher's situation as the main role players in the prevention of the school dropout. We focused on the increase of the expenditure on education by 2% per year up to the 8% by 2020 which mainly could be spent on increasing the minimum salary of the teachers up to 3 times until 2020. By introducing ICT education to obtain financial resources for increasing salary, less teacher can give satisfying education to many students. In ICT education, once they launch the facility, there is little cost other than maintenance. Improving the teacher training courses also should be one of the most important priorities of the ministry of education for Cambodia. Our last suggestion is Introducing the early warning system which initially suggested by the USAID. In this system, parents actively are involved in the process of their children's education and in the case of being 3 days absent from the class, the teacher would contact the family directly and school officials will mediate to solve the problem in the very first stage.

In rural area, there is a problem that the number of schools and teachers are not enough for the number of children. However, it is difficult to immediately increase schools and teachers. Therefore, we propose to resolve the shortage of schools and teachers by introducing ICT education. Which kind of ICT education is good in rural area? For example, TV, radio, cell phone, internet and so on. We think that there are many things that will become a problem such as ease of introduction and cost. For example, in the case of television broadcast, it is necessary to build a new base station for areas where television is not widespread, equipment costs will increase. Compared with that, radio is already popular, and it is easy to receive it even in rural areas. Moreover, people can get radio easily and cheaply compared to television. And, the power consumption of radio is low, it will also suit in regions with high electricity bill. But, since the radio is only voice, it is difficult to substitute for school and it suit home study. Therefore, at school we introduce the screen education to solve the shortage of teachers, and think about plan to strengthen self-study at home by radio. Screen education is not broadcast, cost is low by using the DVD that recorded the class. Also, in the case of DVD, you can use it for a long time by shooting once.

Next, we need to think the power generation for introduce the ICT education. Because, in rural area, they don't have enough of electric power. So, when ICT is introduced to rural areas, it is necessary to consider the power generation system as well. Which power source is good in rural areas? Important point of introduction of power generation is energy sources, supply stability, easy to maintain. Generally, there are various power generation systems such as thermal power, hydraulic power, biomass, solar power and so on. Considering that self-sufficient, fossil resource-dependent power generation is not suitable in rural areas. Also, biomass power generation requires special equipment, and initial cost is high. Moreover, it is difficult to maintain because it is the latest equipment. For hydraulic power generation, river or irrigation channel is necessary, and the place will be fixed. For that reason, we are proposing to introduce solar power generation at schools or community center, etc. because rich sunlight falls with any location in Cambodia. Thus, people can use the monitor for the screen education.

We suggest three plan for ICT education method. Plan 1 is screen education at school or community center. We think that the effect of learning is great because students took the class with images instead of teachers. Next, plan 2 is self-study with cell phone at home. Diffusion rate of cell phone is about 93.5%. So, this rate is high in rural area, the amount of new purchase is small, and the cost can be lowered. Last, plan 3 is self-study with radio at home. Cost of radio is lower than cell phone. And, radio waves reach far, so they can take the class with radio in rural area.

<Assumption>

Number of children: ① 40 people, ② 80 people

Capacity of Solar panel: PV 200W, 100W, 50W

Plan 1: Screen education (Monitor) at school or community center

⇒ Monitor (27inch), DVD player, class time: 3hours

① ¥53,000 (PV 50W), ② ¥63,000 (PV 100W)

Plan 1: Screen education (Monitor) at school or community center

⇒ Cell phone (one per person, diffusion rate: 93.5%)

① ¥37,500 (PV 50W), ② ¥54,000 (PV 100W)

Plan 1: Screen education (Monitor) at school or community center

⇒ Radio (one per person, diffusion rate: 38.8%)

① ¥53,000 (PV 50W), ② ¥63,000 (PV 100W)

We calculated the cost of combination of these plans and power generation system. Power generation system is combined PV and Battery system, power generation capacity of solar-panel is changed 200, 100 and 50W. This system consists of solar panel, inverter, controller and battery which match the capacity of solar panel. Efficiency of PV is change by the climate, there are dry season and rainy season in Cambodia. Figure 3 shows the average monthly hours of sunshine in Phnom Penh. We suggest the plan to change class time according to climate. For example, class time is about 3 hours during dry season, about 2 hours during rainy season. And, two shift system is introduced. This system means to divide into the morning section and afternoon section. In class A, students have class by teacher during morning section, and they have class by screen education during afternoon section. Class B is change the morning and afternoon of class A. In this way, it is possible to reduce teacher shortage and cost.

From the above, we calculated the cost of each plan, plan 1 is 53,000 yen, plan 2 is 54,000yen, and plan 3 is 104,440 yen. We propose the plan 1 for reduce school drop rate. Because plan3 is cost is high compared with other plan. And cost of plan 2 is near the plan 1. But, effect of learning with cell-phone is lower than plan 1. So, plan 1 is best for ICT education method. Siem reap Province has 103 communes, and 74 communes are rural areas. The total estimated cost for Siem Reap region is considering 74 schools would be around 35.3 thousand US\$.

National level project

In concoction, we tried to generalize the results coming from our study to the other parts of Cambodia. We proposed implementing SRI system as an experimental study for three years in Siem reap and if we could get a good result, to apply the same policy to the other regions which use rice as their main production. In the next step, we would like to introduce the similar cost-less methods like HVY and other methods mentioned in the NSDP of Cambodia to the other regions based on

their potentials.

Moreover, the cost for generalizing screen education (Monitor-DVD player system) shall be provided for the increase in the portion of countries' expenditure on the agriculture. Cambodia has 1,406 communes, and 1,117 communes are rural areas. We showed that overall cost would be up to the 532 thousand US\$.

Conclusions

We suggest SRI and ICT education for the sustainable development in Cambodia. As a result of estimating the cost for introduction, optimum system selection was made. The main conclusions from the analysis performed can be summarized as follows.

- (1) Introducing SRI system to rural area, income of farmer is increased and the children are released from farm work.
- (2) Power shortages are solved in rural areas by the PV and Battery system.
- (3) Providing Monitor and DVD player to school as screen education system, it is possible to reduce teacher shortage and school dropout.

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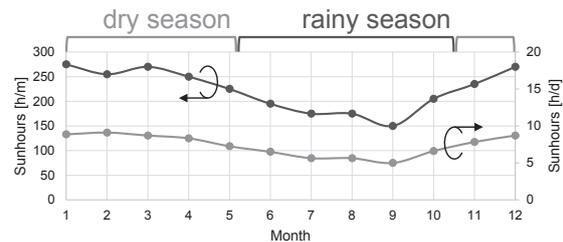


Figure 3 Average monthly hours of sunshine in Phnom Penh

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Decreasing school dropout rate in lower Secondary Educational level in the Rural Cambodia Final Report for GRM Joint Seminar 2

Mostafa KHALILI

Introduction

Cambodia is a country located in the southern part of the Indochina Peninsula located in the Southeast Asia. Having over 16 million population, Cambodia has \$1,159 GDP per Capita (7.1% annual change) which is considered as a lower middle-income country by the World Bank. As the main income for many Cambodians is agriculture, a significantly big number of 79% percent live in the rural areas.

The System of General Education in Cambodia consists of Primary (Grades 1-6): 6 years, Lower secondary (Grades 7-9): 3 years and Upper secondary (Grade 10-12): 3 years of education. In total, the 12 years of schooling is free nationwide.

In spite of free education, the completion ratio in lower secondary school remains low compared with other countries in the same region. While about 95% of the children complete the primary school education, only less than half of them continue their studies up to the end of lower secondary education.

While lower secondary education completion rate is 48% as of 2015, the regional average is 92 percent which shows a wide gap in comparison to the neighboring countries.

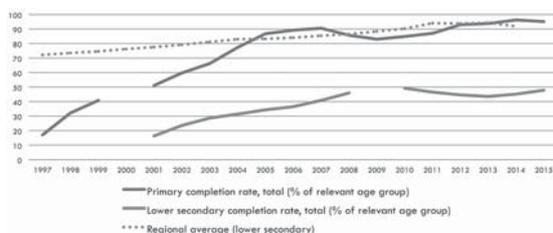


figure1. completion rate, total (% of relevant age group)

Source: ULS stat. UNESCO [accessed 19 Jun 2017]

There are many influential factors of such high dropout rate from micro to the macro level in Cambodia. According to the study done by the world bank in 2012, the main reasons for the high school dropout rate consist of many factors like: poverty, late school entry, inequality, low availability of schools, poor school management skills, teachers' low monetary incentives, low degree of community participation, inadequate school facilities and low quality of the teachers.

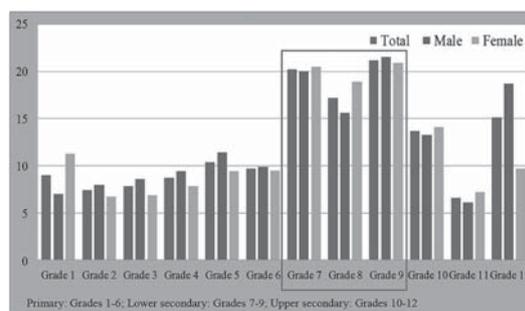


Figure 2. Dropout rate by grade in Cambodia. (UNESCO, 2009)

As we found many reports claiming that the main reason behind this problem lies in the poverty that causes the child labor as well as low accessibility to the lower secondary education. The former plays more significant role in the rural area than the urban area where over 10 percent of children (5-14 years old) work for at least 21 hours per week.¹

The latter is also the serious situation in the rural area, the number and location of the secondary school are limited. The far distance between home and school is playing a role in the increase of dropout rate. In general, the number of lower secondary school is half of the primary. Besides, the number of teachers is limited as well. Many rural schools do not have access to the electricity grid to benefit from modern educational equipment.

Focusing on the poverty reduction and using ICT facilities in schools, this project is an attempt to come up with some practical suggestions for the countries improvement of the educational system. In the first step, we started a pilot project focusing only in *Siem Reap province* as a densely populated poor region. Learning some lessons from this specific region, we suggested some ways to generalize our study nationwide.

Background Information of Siem Reap Province, Cambodia

Siem Reap province covers an area of 10,299 square kilometers. According to the national census 2014, the province has the sixth largest population in the country, consisted of 896,443 people with an average population density of 87 persons per square kilometer, higher than the country's average population density of 75 persons

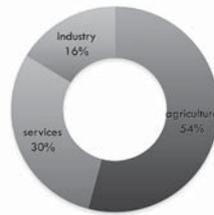
¹ The Understanding Children's Work (UCW) ILO, UNICEF and the World Bank [accessed 20 Jun 2017]

per square kilometer (National Institute of Statistics, 2014). The current population of Siem Reap in 2012 was 972,488 people and the average family members were 5.09 people.

Fifty two percent of population is aged between 18 and 60 years old and 43% are under 17 year-old. Only 5% are 61 years old and over. Households headed by female were 14% about 14% (Provincial Department of Planning, 2015).

Access to education of people in Siem Reap can be overviewed that, the net enrollment of students in upper secondary and lower secondary education is relatively low, showing only at 14.9% and 24.8%, respectively in the 2011 academic year (MoEYS, 2012). This infers that number of people who have access to higher education is even much fewer. Moreover, approximately 14% of the people in the province aged between 15 and 45 years old are illiterate (Provincial department of planning, 2015).

Employment (% of total employment)



Proportion of GDP (% of GDP)



Our suggestion for the Poverty reduction will be to introduce the System of Rice Intensification (SRI). SRI is a methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water, and nutrients while reducing external inputs. It is a low water, labor-intensive, method that uses younger seedlings singly spaced and typically hand weeded with special tools.

System of Rice Intensification (SRI) emerged in the 1980's as a synthesis of locally advantageous rice production practices encountered in Madagascar by Fr Henri de Laulanie, a Jesuit Priest who had been working there since 1961. But, it is Dr. Norman Uphoff from Cornell International Institute for Food and Agriculture, Ithaca, USA, who had brought this method to the notice of outside world in the late 1990s. Today SRI is being adopted in many states in India and the response from farmers has been overwhelming seeing the benefits of the method, notwithstanding the constraints.

SRI is a combination of several practices those include changes in nursery management, time of transplanting, water and weed management. Its different way of cultivating rice crop though the fundamental practices remain more or less same like in the conventional method; it just emphasizes altering of certain agronomic practices of the conventional way of rice cultivation. All these new practices are together known as System of Rice Intensification (SRI). SRI is not a fixed package of technical specifications, but a system of production with four main components, viz., soil fertility management, planting method, weed control and water (irrigation) management. Several field practices have been developed around these components. Of them, the key cultural practices followed in most cases are:

Preparing high-quality land

SRI requires careful leveling and raking, with drainage facilitated by 30 cm wide channels at two-meter intervals across the field.

Preferring compost or farmyard manure to synthetic fertilizers

It is better to use organic nutrients, as they are better at promoting the abundance and diversity of microorganisms, starting with beneficial bacteria and fungi in the soil. This will promote proper microbial activity, thereby improving production.

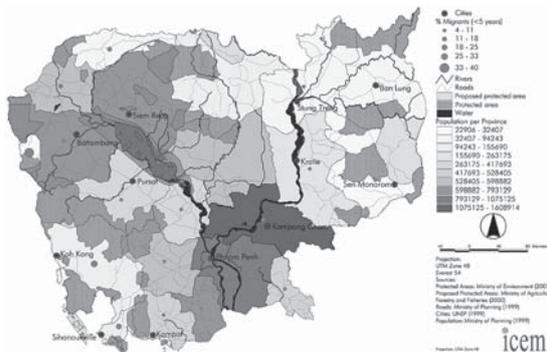


Figure 3. Population density in Cambodia. Source (icem)

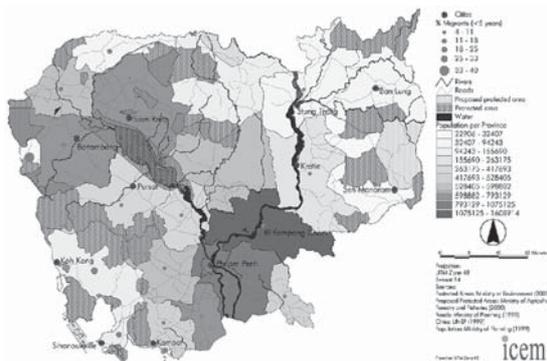


Figure 4. Population density in Cambodia. Source (icem)

Suggested solutions to reduce school dropout rate
1- Poverty reduction by introducing SRI system

As agricultural sector is considered as the biggest portion of employment ratio in Cambodia, there is a vital need to improve the productivity of the farmers. Many workers in this sector still use the traditional methods since they are not skilled and educated farmers. That is why only 28% of the GDP comes from the agriculture.

Developing nutrient-rich and un-flooded nurseries

The seedbeds have to be nutrient-rich and established as close to the main field as possible. This will enable quicker and easier transportation between the nurseries and the fields, minimizing both transport time and costs so that the seedlings are efficiently transplanted.

Using young seedlings for early transplantation

This has to take place when the seedlings are just 8 to 12 days old, soon after they have two leaves, and at least before the 15th day after sowing.

Ensuring wider spacing between seedlings

The seedlings should be planted at precise spacing, usually 25 X 25 cm², about 16 plants per square meter. Rice plant roots and canopies grow better if spaced widely, rather than densely.

Transplanting the seedlings singly

The seedlings must be transplanted singly with their roots intact, while the seed sac is still attached. They must not be plunged too deep into the soil, but placed at 1-2 cm on the ground at the appropriate point on the planting grid.

Managing water carefully so that the plants' root zones moisten, but are not continuously submerged

SRI requires the root zone to be kept moist, not submerged. Water applications can be intermittent, leaving plant roots with sufficiency, rather than surfeit of water. Rice grown under SRI has larger root system, profuse and strong tillers with big panicles and well-filled spikelets with higher grain weight. The rice plants develop about 30 – 80 tillers and the yields are reported to be higher. The secret behind this is that rice plants do best when young seedlings are transplanted carefully at wider spacing; their roots grow larger on soil that is kept well aerated with abundant and diverse soil microorganisms.



Figure 5. Improvement of the rice cultivation using SRI system compared to the traditional methods.

Rice is the main agricultural production of the Siem Reap province. As SRI does not need additional cost, the only obstacle for its implementation is to educate and convince the traditional local people. The previous successful practices in other regions showed that an

illustrated carefully designed education to implement SRI is the key for production improvement.

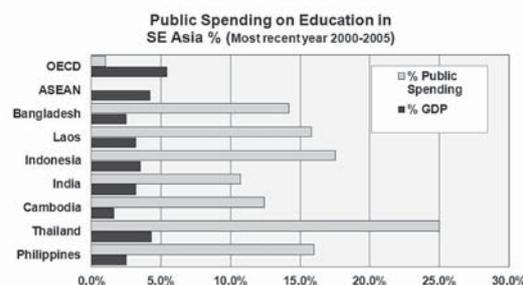
In our suggested strategy, we first will propose to implement SRI method in teacher's training courses (with some practical experiments). Then we suggested to implement the SRI method of teaching for students from 6th grade and asking the students to help their family in the adaptation of system. This will need additional cost to support teachers which should be covered by increasing the government's expenditure on educational system. We suggest to provide a higher salary for teachers who are actively involved in the program.

Moreover, using some ICT facilities (showing clips and films about SRI) to teach both students and head of households will be helpful. The active cooperation between students and parents might change parent's perception on the use of education to improve the household's economy.

2- Improving educational policies

On the next step, we focused on the improving the teacher's situation as the main role players in the prevention of the school dropout. While Having a big number of uneducated population and high rates of school dropout, Cambodia has one of the lowest governmental expenditures on education in the world.

• Cambodia education expenditures are low by regional standards.



Source: World Bank Education at a Glance, Global Monitoring Report 2008

Cambodia needs to implement a quick catch up strategy to reach to the regional standards. This will happen only by gradual increase on the governmental expenditure on education. We focused on the increase of the expenditure on education by 2% per year up to the 8% by 2020 which mainly could be spent on increasing the minimum salary of the teachers up to 3 times until 2020. Improving the teacher training courses also should be one of the most important priorities of the ministry of education for Cambodia.

Early Warning System (to reduce student absenteeism and support at-risk students in school)

Early warning system uses the existing school level data on attendance, performance, behavior etc. to identify students at-risk of dropping out of school. This program aims in enhancing the capacity of schools to address the needs of at-risk students and strengthening

Radio	1.44 Wh	⇒ 100W :	¥197,060
		min.173people	
		⇒ 50W :	
		min.86people	¥104,440
		⇒ 40people	¥67,720

As we discovered many plans, the most economical and convenient suggestion could be using a set of a TV and DVD player in schools. As the ministry of education already produced some programs broadcasting from TV to support students off-school education at different levels, we suggested that showing this programs to the students would increase their educational capacity and motivations to stay in the school.

To supply the electricity for running the TV-DVD player set, we suggested using a 50W solar-panel. The usage time for such system would be about 3h during the dry season, about 2h during the rainy season. In such case, we introduced a two-shift system in which a group of students have class by the teacher during the morning section, and use the class by screen education in the afternoon. The total estimated cost for Siem Reap region is considering 74 schools would be around 4 million yen.

Generalizing to the National Level

In concoction, we tried to generalize the results coming from our study to the other parts of Cambodia. We proposed implementing SRI system as an experimental study for three years in Siem reap and if we could get a good result, to apply the same policy to the other regions which use rice as their main production.

In the next step, we would like to introduce the similar cost-less methods like HVY and other methods mentioned in the NSDP of Cambodia to the other regions based on their potentials.

Regarding the educational policies and the vital need for increasing the portion of national expenditure on education, the suggested solutions could be generalized to the national level. Other than significant increase on teacher’s salary, establishment of some independent institutions is necessary to prevent teachers who charge some informal fees from students.

In the next step, the suggested solution to improve ICT by providing TV and DVD player to all schools could be suggested as a national plan. The cost for generalizing TV-DVD player system shall be provided from the increase in the portion of countries’ expenditure on the agriculture. We showed that overall cost would be up to the 60 million Japanese yen.

$$53,000 \times (1,406 - 289) = 59,201,000 \text{ JPN} \approx (532,862 \text{ US\$})$$

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Final Report: Education Issues in Cambodia

Kanako TAKIMOTO

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QUICK FACTS OF CAMBODIA

Capital: Phnom Penh
 Land Size: 176,520 sq. km
 GDP/capita: \$1,159 (7.1% annual change)
 Income Group: Lower Middle Income Country
 Language: Khmer (official) 96.3%, others 3.7%
 Population: 16m (1.5% annual change), 21% Urban, 79% Rural

I. OUR ISSUE IN EDUCATION

The system of general education in Cambodia consists of Primary (Grades 1-6): 6 years, Lower secondary (Grades 7-9): 3 years and Upper secondary (Grade 10, 11 and 12): 3 years education. The total (6 + 3 + 3) 12 years of schooling are free. In spite of free schooling, the completion ratio in lower secondary school remains a low level compared with other countries in the same region. Figure 1 shows that the completion rate each levels in Cambodia and regional average since 1997. While about 95% of the children complete the primary school education, only less than half of them continue their studies up to the end of lower secondary school. According to Figure.1, lower secondary completion rate is 48 percent in 2015, on the other hand the regional average is 92 percent, the gap between Cambodia and regional average is 44 percent.

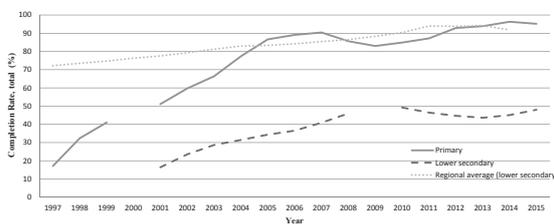


Figure 1. Completion Rate

Data source: World Development Indicators (WDI), World Bank

Why does the dropout ratio remain high level in the secondary education?

There are a lot of key influential factors of the school dropout from micro level in Cambodia. According to the study done by Asian Development Bank (2014), many students in Cambodia face the situation such as, poverty,

late school entry, inequality, low availability of schools, poor school management skills, teachers' low monetary incentives, low degree of community participation, inadequate school facilities and low quality of the teachers. There are a few key influential factors of school drop out from the macro level in Cambodia.

From a financial point of view, the total government expenditure for all levels of education in the percent of GDP, Cambodia is ranked 4th lowest country in the world. According from World Bank calculation, the rate is 1.9 percent in 2015 and regional average is 2.7 percent. The World Bank estimated the expenditure on primary education (% of government expenditure on education) is 48% and Expenditure on lower secondary education is 44%, the difference is only 4% (Figure2). The budget for education in Cambodia is regardless limited, however the gap of completion ratio between primary and secondary might not come from the budget. From an economical point of view, GDP per capita coorelates with the lower secondary completion rate (Ide 2014: 9). As Ide points out, the higher income country is, the better completion ratio acheived.

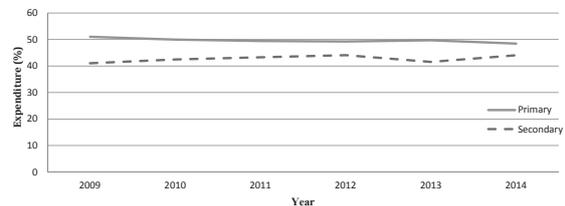


Figure 2. Government Expenditure on Education

Data source: WDI, World Bank

The problem seems to lie in the fact that child labor and accessibility to lower secondary education. The former is a serious situation in rural areas, over 10 percent of children (5-14 years old) work at least for 21 hours per week (The Understanding Children's Work). The roots of child labour are low income in the agricultural sectors. Most of a Cambodian family in a rural area is engaged in agriculture, for instance the share of total employment in the agriculture sector is 54%, however the share of total GDP in agriculture is only 28% (Asian Development Bank). Low income and low productivity are big issues in rural area.

The latter is also a serious situation in rural areas, the number and location of secondary school are limited. Far distance between home and school is playing a role in the increase of the dropout rate. There are 6,910 primary schools, on the other hand only 1,622 lower secondary schools (Royal Government of Cambodia 2014). In general, the number of lower secondary schools is half of

the primary. In addition, not only the number of schools, but also teachers is limited. Many rural schools do not have access to the electricity grid to benefit from modern educational equipments. As I mentioned above, 1. low income and 2. accessibility are key issues for the lower secondary education.

II. BACK GROUND: PILOT PROJECT IN SIEM REAP

A) Why We Choose SiemReap?

The focus of Camnodia’s province is agriculture and young population. Population in Siem Reap has rapidly increasing annual growth is 3%, the population in the province is 946,656 persons and the share of total population is 7%. In addition, the share of young generation (6-17 years old) is 30%, and families whose primary occupation is rice farming are 76% in the province. The province is also high poverty rate 21.3% national average level. The reason why we focus on the Siem Reap province is poor area with high population and typical rural area in Cambodia.

B) Agriculture

Market

Most of the agricultural products such as rice and vegetables are gathered in Phnom Penh, after that these products distribute back to the regional market. The main transportation is via truck transportation (Japan Development Institute, 2010). Some parts of Siem Reap are the high quality of soil, so it could be famous for Fragrant Rice such as Jasmine rice (Cambodia Rice Federation). If the productivity became high, they could export to Thailand and other countries in the future (Figure 3).



Figure 3. Map in Siem Reap Province
Source: USAID (2010)

The rice export does not have big share of export in Cambodia, thus there are only 3% of the total export. However, it has great possibility to export to other countries. The rice export value is rapidly increasing from 139 million US\$ in 2012 to 305 million US\$ in 2016.

EXPORT

The main partner in the rice export is France, China,

Poland and Malaysia. These big four partners shared over 50% in 2015 and 2016. The share of rice export in 2015 is France (18%; 51 million US\$), China (15%; 42 million US\$), Malaysia (13%; 37 million US\$) and Poland (8%; 23 million US\$). The role of china is rapidly increasing in 2016; the share of rice export is China (23%; 71 million US\$), France (16%; 50 million US\$), Poland (9%; 26 million US\$) and Malaysia (8%; 25 million US\$) (Figure 4).

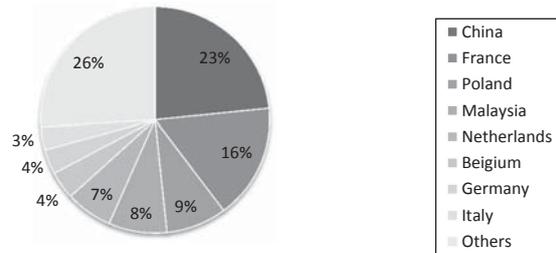


Figure 4. Rice Export (2016)
Data source: UN Comtrade

IMPORT

Figure 5 shows that the main partner in the rice import is Vietnam, Thailand and USA. These big three partners shared over 80% in 2015 and 2016. It is notable that the main role in rice import is Vietnam; the share of rice import in 2015 is Vietnam (78%; 8 million US\$), Thailand (9%; 0.9 million US\$), and USA (8%; 0.8 million US\$). The role of Vietnam is decreasing in 2016; the share of rice import in 2016 is Vietnam (48%; 4 million US\$), USA (27%; 2 million US\$), and Thailand (14%; 1 million US\$). Siem Reap will able to substitute rice supplier for foreign countries.

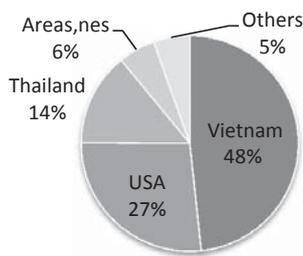


Figure 5. Rice Import (2016)
Data source: UN Comtrade

C) Electrification

According to the Asia Foundation, the electrification rate of rural area in Cambodia is only 18 percent. They have always bought electricity from battery shops where sells the electricity using diesel engine power generation. Each family has a battery to use charging cell phone and light in the nighttime.

Siem Reap is imported electricity in urban area from Thailand that is why electricity is one of the highest prices in the region. The electrification rate in Siem Reap province is less than 20 percent exclude Seam Reap commune and the average is only 8% and more, some commune have no electricity (Figure 6).

from the national level to the local, each domestic products.

ICT

One of the main issues in Cambodia is to improve the accessibility for lower secondary schools. There are no schools in remote areas. Cambodian government makes one of the policy priorities to access the education:

Increasing equitable access to education through further promoting the construction of elementary schools to reach remote villages, locating at least one secondary school in each commune subject to geographic conditions, and at least one university or its branch in each province subject to capacity constraints and specific circumstances in deploying teachers to all those establishments (Royal Government of Cambodia 2014: 173).

Our pilot project in Siem Reap is based on the regional characteristics. It is important for generalizing the national plan to make some steps. The first step is poverty reduction, to analyze the each regional characteristic and the market situation, and then using other methods similar to SRI based on potentials of each region such as HYI methods (as well as other methods mentioned in NSDP).

The second step is an improvement of the teacher's situation, to increase the expenditure on education by 2 percent per year up to the 8 percent by 2020. Our suggestion is increasing the minimum salary of the teachers up to 3 times until 2020, increasing the number of teachers in lower secondary school, using ICT methods in remote areas to reduce the over-working hours for teachers and improving teacher's skills.

The final step is a reform of school facilities, to supply all schools nationwide with remote school system include TV, DVD player and PV system. All students will learn using ICT facilities. The total number of communes is 1,406 and 289 communes are urban area; 1,406-289 = 1,117 communes as rural areas. The minimum cost for using remote school system in national level is; $53,000 * (1,406-289) = 59,201,000$ JPN¥ (532,862US\$.) The total cost is only 0.002% in GDP ratio¹. It should be mentioned that our plan is limited, however, the higher education is becoming more important to sustainable development in Cambodia. A further study of how the difficulty of education is solved should be conducted.

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¹ GDP 19,398million US\$ (2016: IMF)

Appendix -Districts and Communes in Siem Reap Province-



Decreasing school dropout rate in lower Secondary Educational level in the Rural Cambodia

YanShuang CHEN

1. Introduction

The purpose of this paper is to examine NSDP2014-2018 and study current status of Cambodia to find a problem that prevents or slows down the development. Then construct a solution plan to improve the situation. We focus on the education part. Education is a fundamental survival necessity for each individual in any society. It is widely recognized that education helps boosting the economic growth of a nation.

Problem about the education part in the NSDP (2014-2018) is that the high dropout rate is not considered as a big hindrance to accomplish the country vision which is called 'education for all'.

About the secondary education mentioned in the NSDP is as below. we can know that the challenge and the response is not so strong and not specific. *Challenge 3- Access and quality of secondary education. Response 2: Expand secondary education, a focus on reducing gender gap and ensuring completion of lower-secondary education; increase the number of scholarships for students from poorer families (especially girls); expand the number of lower-secondary schools through upgrading some primary schools.*

The Royal Government of Cambodia (RGC), has placed a great emphasis on education as a major tool for social and economic development of the country. In 2010, the gross enrolment rates for primary school (grades 1-6) and lower-secondary school (grades 7-9) were 117.9% and 59.1% respectively, whereas the net enrolment rates were 95.8 % for primary school level and 33.0% for lower-secondary school (Cambodian Ministry of Education, Youth and Sport MoEYS, 2011).

As we can see, school dropout remains an unsolved problem in the Cambodian education system, which has hindered the realization of 'education for all' goals. For instance, the average dropout rate for each grade in primary school level was 8.7% and it jumped up to 19.6% in lower-secondary school level (MoEYS, 2011). It was estimated that only 36.1% of Cambodian students who enrolled in schooling could reach grade nine.

In order to accomplish the vision (or country strategy), solving the problem about the high dropout of the lower-secondary school should be taken as an important objective. Decreasing the high dropout should be seen as a big objective in Cambodia.

2. Significance of the Study

Cambodia is a country located in the southern part of the Indochina Peninsula located in the Southeast Asia. Having over 16 million population, Cambodia has \$1,159 GDP per Capita (7.1% annual change) which is

considered as a lower middle-income country by the World Bank. As the main income for many Cambodians is agriculture, a significantly big number of 79% percent live in the rural areas.

The System of General Education in Cambodia consists of Primary (Grades 1-6): 6 years, Lower secondary (Grades 7-9): 3 years and Upper secondary (Grade 10-12): 3 years of education. In total, the 12 years of schooling is free nationwide.

In spite of free education, the completion ratio in lower secondary school remains low compared with other countries in the same region. While about 95% of the children complete the primary school education, only less than half of them continue their studies up to the end of lower secondary education.

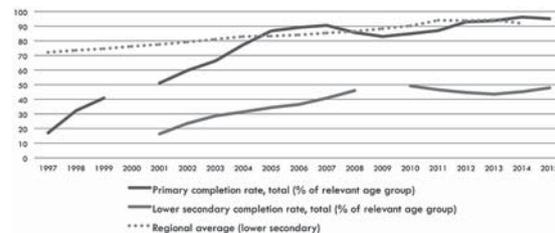


figure1. completion rate, total (% of relevant age group)

Source : ULS stat. UNESCO [accessed 19 Jun 2017]

While lower secondary education completion rate is 48% as of 2015, the regional average is 92 percent which shows a wide gap in comparison to the neighboring countries.

2. Influential Factors of high dropout rate

There are many influential factors of such high dropout rate from micro to the macro level in Cambodia. There are a few studies conducted in Cambodia. Among them, a large-scale 34 study by the World Bank (2012) is the most prominent. Using data from a household survey and the annual school census, the study found that poverty, late school entry, inequality, low availability of schools, poor school management skills, teachers' low monetary incentives, low degree of community participation, inadequate school facilities, and low quality of the teachers were the main challenges leading the students to make early school departures.

Poverty did not exert a direct influence on dropout, but it had an adverse effect on the children's ages of school entry and child labor, which negatively affected children's school retention. Besides, there are a few more studies on the dropout of Cambodian girls. In her focus-group-discussion study, Valesco (2001) stated that the

predominant reasons why Cambodian girls did not attend or dropped out of school were the high level of housework and income-generating work. The work exhausted them and distracted their schooling with frequent absenteeism.

The other factors were inaccessible distance of schools, security risks, late school entry, and early marriage. At the school level, three strong determinants were poor school facilities, low quality of teacher-student and student-student interaction, and poor quality of teaching and curriculum.

As we found many reports claiming that the main reason behind this problem lies behind the poverty that causes in the child labor as well as low accessibility to the lower secondary education. The former plays more significant role serious situation in the rural area than the urban area where over 10 percent of children (5-14 years old) work for at least 21 hours per week.¹The problem seems to lie in the fact that child labor and accessibility to lower secondary education.

The former is more serious situation in rural area than urban area, over 10 percent of children (5-14 years old) work for at least 21 hours per week (The Understanding of Children's Work (UCW), 2017). The roots of child labor are low income in the agricultural sectors. Most of Cambodian family in rural area is engaged in agriculture, for instance the share of total employment in agriculture sector is 54%, however the share of total GDP in agriculture is only 28% (Asian Development Bank). Low income and productivity are big issues in rural area. From an economical point of view, GDP per capita is correlated with lower secondary completion rate (Ide.2014, p.9). As Ide points out, the higher income country is, the better completion ratio achieves.

The latter is also serious situation in rural area, the number and location of secondary school is limited. Far distance between home and school is playing role in increase of dropout rate. There are 6,910 primary

schools, on the other hand only 1,622 lower secondary schools (National Strategic Development Plan, Royal Government of Cambodia, 2014). In general, the number of lower secondary school is half of the primary. In addition, not only the number of schools but also the number of teachers is limited. Many rural schools have disadvantage in infrastructure; they do not have access to the electricity grid to benefit from modern educational equipment.

Focusing on the poverty reduction and using ICT facilities in schools, we tried to come up with some practical suggestions for the countries improvement of the educational system. In the first step, we started a pilot project focusing only in Siem Reap province as a densely populated poor region. Then we tried to generalize our study nationwide.

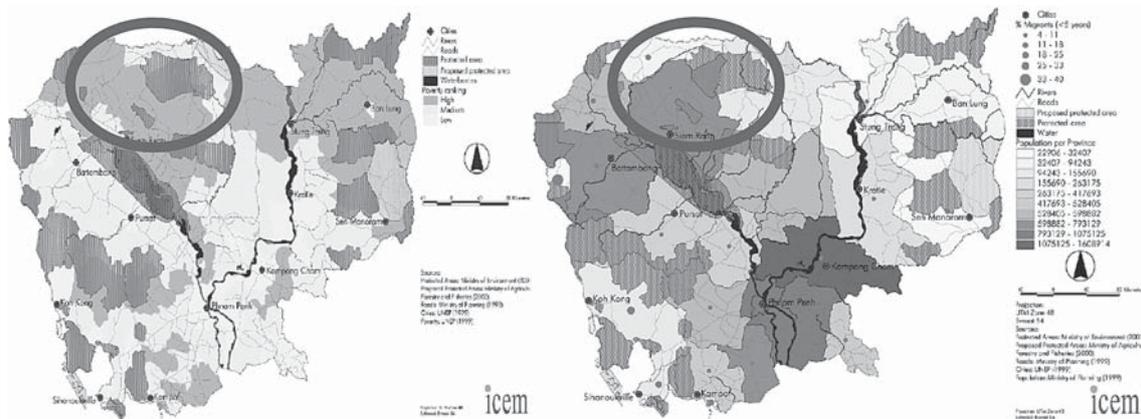
3. Suggestion

1) SRI

Our suggestion for the Poverty reduction will be to introduce the System of Rice Intensification (SRI). SRI is a methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water, and nutrients while reducing external inputs. It is a low water, labor-intensive, method that uses younger seedlings singly spaced and typically hand weeded with special tools.

SRI was developed initially to benefit households that are poor, resource-limited, and food-insecure-households needing to get the most production attainable from the small amounts of land that they have access to; and from available household labor, and if possible by using less water and without having to spend money to buy inputs (new seeds, fertilizer, agrochemicals) or to take out loans for buying inputs that would push them (further) into debt.

By raising the productivity of the land, labor, water and capital invested in the production of rice without



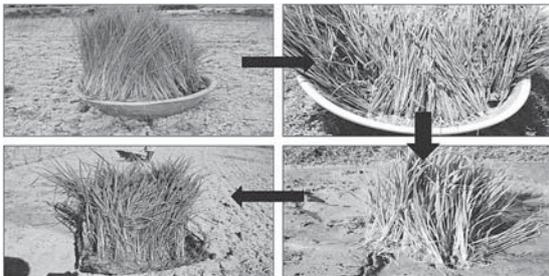
1 The Understanding Children's Work (UCW) ILO, UNICEF and the World Bank[accessed 20 Jun 2017]

requiring the purchase of certain inputs, SRI is unique among contemporary agricultural innovations. Poor households can take up SRI simply by changing their thinking and by modifying familiar practices.

In 2006-07, a Family Food Production project of the NGO LDS Charities got 146 rainfed farmers in Kampong Chhnang province of Cambodia, whose paddy yields had averaged 1.06 ton/ha in the previous year, to try out the new SRI methods. With these practices, their average yield that year was 4.02 tons/ha, and all exceeded their previous yield with lower costs (Lyman et al. 2007). Such increases could transform the life chances of these poor households.

As SRI does not need additional cost, the only obstacle for its implementation is to educate and convince the traditional local people. In our suggested strategy, we first will propose to implement SRI method in teacher's training courses (with some practical experiments). Then we suggested to implement the SRI method of teaching for students from 6th grade and asking the students to help their family in the adaptation of system. Moreover, using some ICT facilities (showing clips and films about SRI) to teach both students and head of households will be helpful. The active cooperation between students and parents might change parent's perception on the use of education to improve the household's economy.

SRI method does not need any technology or the cost to implement, it only needs educating the farmers using the land and planting the seeds in different way. As we read about some previous implementation of SRI in India, the main issue is how to convince the traditional farmers to change their life-time traditional practices.



Source: Mr.Ngin Chhay (2010) Overview of SRI application and adoption in Cambodia, workshop on consolidation of SRI experiences, lessons and networking.

This is the point that we want to use as our main strategy to find some ways to introduce SRI to the community from school by educating the method to children and using teachers as the information provider for the local people. Here is our suggestion in 4 steps:

1, Teachers in rural area will be well-taught about the implementation of SRI method in their training curriculum. They will practice the method as an experiment in their training process.

They will be given an extra paid provided by the ministry of education to teach the method to villagers.

2, We will propose a competition among teachers to do their best in teaching the method in villages. The more their village would improve the rice productivity, the more they will be paid.

3, Teachers will be asked to engage students in the 6th grade of elementary school in teaching SRI method to their family. 6th grade is the crucial level since many of them usually drop out before starting the secondary level. This will help families to believe in the importance of education.

4, We watched some documentaries and educational clips about SRI system on the internet. We believe that if ICT improves in schools, the volunteers and teachers could use these facilities both to teach SRI and to convince the farmers to use the method.

2) Teacher situation improvement

On the next step, we focused on the improving the teacher's situation as the main role players in the prevention of the school dropout. We focused on the increase of the expenditure on education by 2% per year up to the 8% by 2020 which mainly could be spent on increasing the minimum salary of the teachers up to 3 times until 2020.

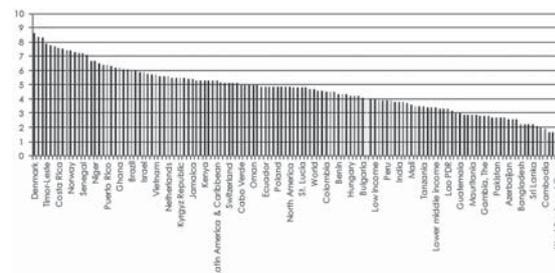


figure2. Government expenditure on education, total (% of GDP)

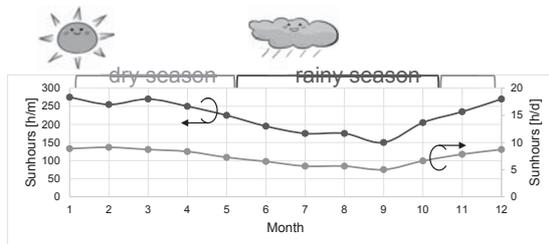
Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.

Improving the teacher training courses also should be one of the most important priorities of the ministry of education for Cambodia. Our last suggestion is Introducing the early warning system which initially suggested by the USAID. In this system, parents actively are involved in the process of their children's education and in the case of being 3 days absent from the class, the teacher would contact the family directly and school officials will mediate to solve the problem in the very first stage.

2) ICT

We suggest three plan for ICT education method. Plan 1 is screen education at school or community center. We think that the effect of learning is great because students took the class with images instead of teachers. Next, plan 2 is self-study with cell phone at home. Diffusion rate of cell phone is about 93.5%. So, this rate is high in rural area, the amount of new purchase is small, and the cost can be lowered. Last, plan 3 is self-

study with radio at home. Cost of radio is lower than cell phone. And, radio waves reach far, so they can take the class with radio in rural area. We calculated the cost of combination of these plans and power generation system. Power generation system is combined PV and Battery system, power generation capacity of solar-panel is changed 200, 100 and 50W. Efficiency of PV is change by the climate, there are dry season and rainy season in Cambodia. We suggest the plan to change class time according to climate. For example, class time is about 3 hours during dry season, about 2 hours during rainy season. And, two shift system is introduced. This system means to divide into the morning section and afternoon section. In this way, it is possible to reduce teacher shortage and cost. From the above, we propose the plan 1 for reduce school drop rate. Because plan3 is cost is high compared with other plan. And cost of plan 2 is near the plan 1. But, effect of learning with cell-phone is lower than plan 1. So, plan 1 is best for ICT education method.



Average monthly hours of sunshine in Siem Reap
Ref. World Weather & Climate Information (2016)

Our last suggestion focused on using the ICT rural area, where the number of schools and teachers are limited compared to the students. While the immediate increase in the number of schools is not possible, we propose to resolve the shortage of schools and teachers by introducing ICT education. There are many ways to benefit from ICT facilities, from the internet to smartphone application, TV, and Radio. As we discovered many plans, the most economical and convenient suggestion could be using a set of a TV and DVD player in schools. As the ministry of education already produced some programs broadcasting from TV to support students off-school education at different levels, we suggested that showing this programs to the students would increase their educational capacity and motivations to stay in the school.

To supply the electricity for running the TV-DVD player set, we suggested using a 50W solar-panel. The usage time for such system would be about 3h during the dry season, about 2h during the rainy season. In such case, we introduced a two-shift system in which a group of students have class by the teacher during the morning section, and use the class by screen education in the afternoon. The total estimated cost for Siem Reap region is considering 74 schools would be around 4 million yen.

In concoction, we tried to generalize the results coming from our study to the other parts of Cambodia.

We proposed implementing SRI system as an experimental study for three years in Siem Reap and if we could get a good result, to apply the same policy to the other regions which use rice as their main production. In the next step, we would like to introduce the similar cost-less methods like HVY and other methods mentioned in the NSDP of Cambodia to the other regions based on their potentials.

Moreover, the cost for generalizing TV-DVD player system shall be provided for the increase in the portion of countries' expenditure on the agriculture. We showed that overall cost would be up to the 60 million Japanese yen.

4. Conclusion

Education is a fundamental survival necessity for each individual in any society. Problem about the education part in the NSDP (2014-2018) is that the high dropout rate is not considered as a big hindrance to accomplish the country vision which is called 'education for all'.

Focusing on the poverty reduction and using ICT facilities in schools, we tried to come up with SRI and ICT suggestions for the countries improvement of the educational system. We indeed should note that Cambodia is a poor country and it is difficult to suggest the increase the national income, however, we believe that if policy makers would increase the portion of education and agriculture as two basic elements for the sustainable development for Cambodia, they would catch the main aim which is overcoming poverty and increasing the national and individual income.

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Reducing Child Mortality in Cambodia: A case for Lower Respiratory Infection (LRI)

Arnold Rey B. Gines

I. Introduction

Cambodia has achieved milestones in the health sector in the last 25 years despite the lack of a comprehensive health infrastructure brought about by insufficient government support. These successes are due, in part, to the influx of foreign support through Cambodian and international non-governmental organizations (NGOs). In the last 15 years, the government has introduced various schemes to provide basic health care especially to those who cannot afford basic health services. Some of which are in the form of Health Equity Funds, Community-based Health Insurance, Voucher for Reproductive Health and more recently a National Health Care Policy. However, the lack of sustainable human development for the whole nation prevents those people truly in need of basic services to acquire the care they need. In fact, most health cases list higher incidence in rural areas than in major Cambodian metropolis. In addition, the lack of awareness among rural folks on certain diseases prevent them from taking proper actions.

National Trend of Child Mortality

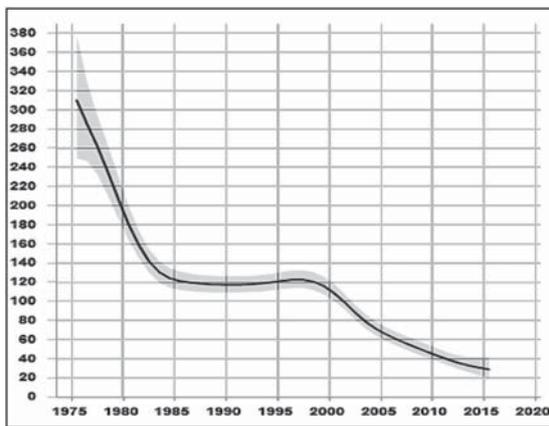


Figure 1: Child (under five) Mortality Estimation in Cambodia (UN IGME, 2016)

Figure 1 shows the graph of the national trend in total child mortality for Cambodia since 1975. The trend illustrates a significant reduction of death of children under five. However, in other reports, one in every eight children still dies before reaching 5 years old. This is almost twice higher as that reported in Figure 1.

High mortality rate in rural areas

According to Population Reference Bureau (PRB) in 2002, the number of child mortality caused by

common illnesses such as malaria, diarrheal disease and LRI and poor nutrition is highest in rural areas (e.g., Kiri/Rotanak Kiri, 170 deaths per thousand live births) whereas lowest in the urban such as Phnom Penh (38 deaths per thousand births). Having been the leading cause of child mortality, LRI affects children between 6 months to 11 months the most compared to other age group. Similarly, Prey Veang has the lowest case of LRI while Kandal has the highest at 32% LRI prevalence among children under 5. Both are located near the capital of Phnom Penh but are both reliant on agricultural and fishing activities by majority of the locals.

Among the most common causes of deaths are listed in Table 1 (Institute for Health Metrics and Evaluation, 2015). These conditions are common in many developing nations and are classic problems experienced by many. Since 1990, lower respiratory infection has been the leading cause of death among children, followed by neonatal preterm birth, diarrheal diseases and so on. While the country has reached its target in reducing the mortality rates in some cases, the reduction of case of lower respiratory infection has not been enough to be considered at a safe level. This is not surprising, however. Despite advances in medical services, children remain at high risk of acquiring LRI because they have lower immunity to such illnesses. The factors affecting it are easily contracted in underdeveloped areas and easily get worse compounded by poor sanitation.

Table 1: List of most common causes of child death in Cambodia

Rank	1990	1995	2000	2005	2010	2015
1	Lower respiratory infection	Neonatal preterm birth				
2	Neonatal preterm birth	Lower respiratory infection				
3	Diarrheal diseases	Diarrheal diseases	Diarrheal diseases	Diarrheal diseases	Neonatal encephalopathy	Neonatal encephalopathy
4	Measles	Measles	Neonatal encephalopathy	Neonatal encephalopathy	Diarrheal diseases	Congenital heart
5	Other neonatal	Syphilis	Measles	Other neonatal	Congenital heart	Other neonatal
6	Syphilis	Other neonatal	Syphilis	Congenital heart	Other neonatal	Neonatal sepsis
7	Neonatal encephalopathy	Neonatal encephalopathy	Other neonatal	Syphilis	Neonatal sepsis	Diarrheal diseases
8	Congenital heart	Congenital heart	Congenital heart	Neonatal sepsis	Syphilis	Other congenital
9	Congenital heart	Malaria	Malaria	Malaria	Other congenital	Neural tube defects
10	Whooping cough	Whooping cough	Neonatal sepsis	Drowning	Neural tube defects	Drowning

Lower Respiratory Infection

Lower respiratory infection is a generic term for an acute infection of the tracheas, airways and lungs, which make up the lower respiratory system. It is a general term for infections of the air passage which are commonly

characterized by the presence of symptoms like cough, fever, shortness of breath and fatigue. It is a communicable disease but is easily preventable. The most common causes of LRI are viruses, pneumonia and bronchitis among others. In addition, the conditions are easily triggered by irritants like pollution in the air.

A major trigger of respiratory infection is air pollution. Taking into consideration Cambodia's technological capability, the emissions produced by transportation vehicles and infrastructures that use conventional energy fuels are higher than those that use cleaner energy. However, a significant part of this pollution is attributed to domestically-produced pollutions such as those produced by cooking using solid fuels like wood and coals and lighting fuels such as kerosene, oil, etc. It is therefore not surprising that a high percentage on cases are among children and women because they are the one who remain at home. Especially in rural areas, traditional lighting and cooking sources are unsafe and pose high risks on the health of children.

Medical Treatment/Prevention of LRI in Cambodia

Seeing this as a global phenomenon especially in many developing nations and not a unique case to Cambodia, the issue can be solved with universally acceptable interventions available.

According to WHO (Roth, et al., 2017), who conducted literature studies on respiratory infections on children below five, various intervention studies points to the following as the leading factors to effectively reduce childhood morbidity due to respiratory infections.

- **Breastfeeding promotion**- maternal-infant transfer of innate immune effectors
- **Complementary food supplementation or counselling**-literature points out the link between malnutrition, immune dysfunction and infectious diseases. In addition to breastfeeding, the quality of complimentary foods may reduce risk of RI or mortality.
- **Single micronutrient interventions**-Vitamin A, iron, folic acid, vitamin D, calcium, zinc
- **Multiple micronutrient interventions**- works well with proper supplementation to further improve the child's health.

In the studies evaluated, evidence suggests that inadequate growth and risks from acquiring infections or diseases are linked which further suggests that respiratory infection morbidity and mortality can be addressed with nutritional interventions.

II. Policy Suggestions

Although treatable, the lack of existing comprehensive infrastructure to monitor, prevent and treat LRI cripples Cambodia's youth. To address this issue, a set of policy suggestions are presented to provide

alternative solutions to the still significant number of deaths among children.

A. Carbon Tax and Subsidy

Although lower than its neighboring countries, Cambodia's economy continues to grow. Its main industries are on textiles, tourism and agriculture. To cater to the increasing economic activity, small motorized vehicles called *tuktuks* and motorcycles are a common means of transportation around the country. In addition, larger vehicles are increasingly used in the last decade. From the graph in Figure 2 (Department of Vehicle Registration of MPWT, 2014), the numbers of different vehicles are constantly increasing until 2014. These transport vehicles consume motor fuels which are traditional energy sources for any typical machineries. Thus, in urban areas, pollution from cars is becoming a serious issue related to health. If not addressed, this issue could continue to build and affect urban dwellers, a case typical to many highly industrialized metropolitan areas around the world.

To prevent air pollution from reaching an alarming level, localizing carbon emission tax and/or subsidy may be proposed. This policy has been introduced to many nations such as in Finland, Ireland, France, Portugal and in British Columbia in Canada and more recently in Asian countries such as Vietnam, Thailand, Taiwan and Singapore. This promotes an efficient way of consumption of carbon-emitting fuels and/or consumption of fuels with lower emission levels. Alternatively, the consumption of clean fuels may be promoted through tax subsidy. The balance between taxes and subsidy on fuels enables users to transition from the more commonly used fossil fuels to more energy efficient alternatives.

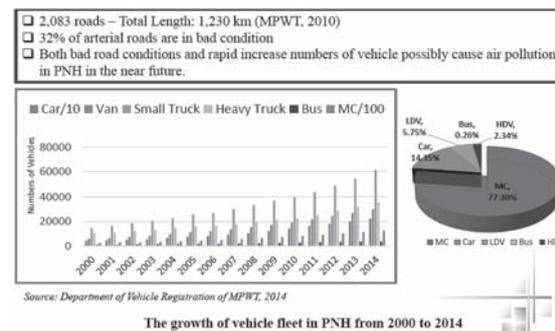


Figure 2: Data showing the growth of vehicle fleet in Phnom Penh

This scheme can balance the use of fuels by promoting better fuel alternatives. At present, cleaner fuels such as liquefied petroleum gas in Cambodia are higher compared to its neighbor Thailand. As such, promotion of these fuels is not fully realized. In addition, taxes collected from conventional fossil fuels may be used to fund better transport infrastructures and other

modernization plans. This scheme will not only improve carbon dioxide emission, which will help improve air quality, but will also generate more income for the government which may be used to foster more efficient energy consumptions through modernization plans.

In Vietnam, A National Green Growth Strategy (2012-) was crafted to

“Use financial, credit and market-based instruments to promote and support the development of the green economy and green products. Moving towards the establishment of a management system and trading of certified greenhouse gas emissions, carbon tax and fees and levies”.

In Thailand, the Eleventh National Economic and Social Development Plan (2012-2016) was enacted to

“Conduct market research to identify revenue opportunities through selling carbon credits, including standards that link to international markets on both a voluntary and a regulated basis. In addition, studies should be made of the emission quota system, the efficiency of greenhouse gas reduction, a break-even analysis comparing management costs of mitigation vs. carbon taxes”.

In Singapore, the government intends to introduce carbon tax as part of its efforts to reduce greenhouse gas emissions. Given the high pollutive nature of diesel, diesel tax will be restructured, by permanently reducing the annual tax paid by diesel vehicles and introducing a volume-based duty on diesel. Some rebates will be provided. Meanwhile, Taiwan plans to implement a tax mechanism on imported fossil fuels based on carbon dioxide equivalent to respond to the impact of climate change which is based on the Greenhouse Gas Reduction and Management Act. These policies serve to help reduce carbon emission as a response to climate change initiatives. In effect, it is expected to significantly reduce total carbon emissions which will promote better air quality especially in metropolitan areas with high economic activities that require high amounts of energy consumptions.

These policies and initiatives have far-reaching effects on the environment, people, economy and technological advancements. It is not surprising that across all spectrum, a poor energy infrastructure greatly affects the country’s ability to maintain a healthy environment and people.

B. Improved Cook Stoves and Alternative Energy Sources

Another leading cause of LRI among young people in Cambodia is indoor pollution caused by smokes and dust particles. Around 95% of households in rural areas consume biomass which comprise of wood fuels such as

firewood, charcoal which are readily available for domestic use. The pollutants disperse inside the households and are inhaled by its inhabitants, mostly women and children who stay at home most of the time. Due to economic reasons and lack of access to more efficient resources, the persistence of biomass consumption exists.

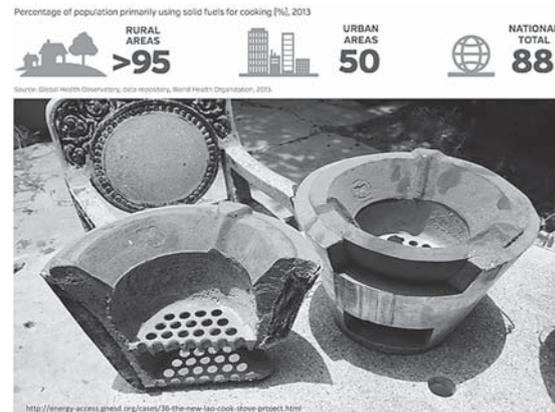


Figure 3: A large number of the population uses traditional solid fuels for cooking on a cook stove (GNESD, n. d.).

To decrease indoor pollution, conventional cooking methods using solid fuels must be improved. Projects on improved cook stove have been started, like in Figure 3, but are mainly focused on improving the efficiency of fuel consumption. The design does little to contain smoke and dusts from the burning fuels. To address the containment of these pollutants, a similar project that was started in Bangladesh, shown in Figure 4, may be adapted by Cambodian households. A cook stove set-up may be installed in homes using traditional materials. The design involves a contained stove top with small openings for fuel inlet and dust. Smoke is contained in the burning cavity and is equipped with a pipe that leads to the outdoor for smoke exhaust. The idea not only makes for more energy efficient cooking but also significantly decreases the smoke. Alternatively, further promotion of alternative energy sources such as liquefied petroleum gas (LPG) and/or biogas will be helpful. These sources produce little to no pollutants and are more efficient than biomass. They are already in use but not as widely popular as biomass. As initial capital investments are necessary, they may be promoted through local cooperatives with the funding of Cambodian-based private financiers.



Figure 4: Improved cook stoves (ICS) project in Bangladesh that contains and redirects smoke and heat, keeping the homes smoke-free (Niclas, 2016).

As an example, a project called Cambodia National Biodigester Program, in Figure 5, was initiated to build biodigesters for qualified households in Cambodia. Biodigesters can be installed in homes that have sources of animal dung or organic wastes. They are converted to biogas which can be consumed in LPG stoves and can also provide energy for lighting. From 2006 to 2016, 24,000 biodigesters were constructed through 69 micro-enterprises in 15 provinces. A single household biodigester costs \$500 excluding and investment subsidy of \$150. An important success factor of this story is the special biogas loan that is made available through three nationally operating micro-finance institutions in Cambodia. Qualified applicants are given financial assistance to develop their biodigesters using funding from private sectors.

However, its implementation has limits. For one, farmers list the main downside is the substantial amount of animal manure needed to kick-start biodigestion initially. About 1,500 kilograms are needed for the smallest four cubic-meter tank while about 20 kilograms are needed daily which requires about two to three cows.

This scheme may still be implemented for other energy sources. More recently, the availability of cheaper power generating technologies like solar panels has become more popular in some developing countries. Loans through micro-financing may be implemented with initial capital coming from private investors. As a market-based model, this sector can be developed without direct intervention from the program. This puts less financial pressure on households to invest on a more efficient energy source.

In the long run, these capital investments are more economic as they could last for up to several years without additional major costs. Expenses for maintenance are kept low within the first several years. However, in cases of more technologically advanced setups, aside from capital investments, service centers will

have to be more accessible to some remote villages. As such, trainings for service providers within locales and villages may be possible. This not only creates continuity of service but also gives livelihood opportunities where interested individuals may learn technical skills.



Figure 5: Construction of biodigesters in Cambodia through the National Biodigester Program (NBP, n. d.)

C. Medical Services using ICT

One of the main reasons why common health problems still persist in Cambodia is due to the lack of reliable and accessible health centers that people can visit in times of need. The country lags behind in terms of medical health workers to cater to the entire population. In 2015, the Ministry of Health of Cambodia employs about 20,000 civil servants. 68% of the total workforce is comprised of midwives and nurses, reflecting focus on primary care services. However, if compared to the total need of more than 32,000 personnel by 2020, the current number still lags far behind it. Motions to acquire more personnel has been requested by the health ministry, however, government's fund allocations to the health sector has been short. On top of it, a huge part of medical missions conducted in Cambodia has been aided by foreign donations. With the impending discontinuance of foreign aids in the future, the financial allocations needed from the government will blow up.

As an alternative solution, the accessibility to medical service may be improved by preventive actions. Specifically, Basic consultations and medical programs and treatment may be conducted through information and communications technology (ICT) via mobile phones. According to NGO Open Institute, a study of the technology in Cambodia in 2015 show that 94% of the 15-65 years old labor population has a cellphone, as shown in Figure 6. With the popularity of smartphone applications, it is possible access selected medical needs via smartphone technology.

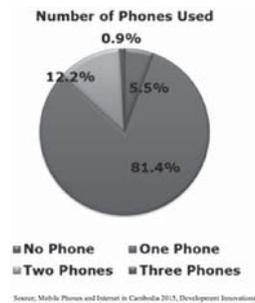


Figure 6: Number of phones used in Cambodia in 2015 (Phong and Solá, 2015)

A similar initiative has been adapted by Bangladesh called *Apojon*, a mobile service for mothers and newborns who have difficulty accessing medical services in rural areas of Bangladesh. The government of Bangladesh, local NGO and mobile companies joined together to provide the first service in 2011, and currently has four hundred thousand mothers who are subscribed to this service. It is offered for free only for the low-income demographic, however, 95% of its current users are registered with charged service. The service includes text messages for mothers with newborns on health-related concerns twice a week. It also includes medical treatment and counseling by phone call, as needed, provided by round-the-clock call center operation centers.

In India, a similar project, shown in Figure 7, called ImTeCHO Project was launched. ASHA (health workers) schedule check-up and give medical advice through ICT. The network is built such that medical centers and hospitals are linked through the mobile application.

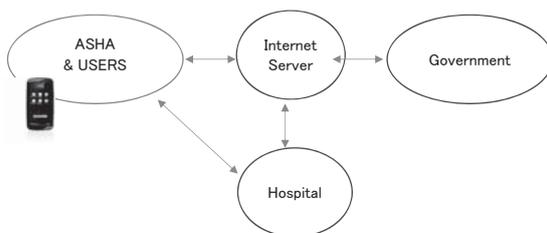


Figure 7: Medical ICT scheme

With mobile applications and online services made available, it is not surprising that the medical sector may use this opportunity to improve its reach to more people in need of healthcare. Aside from better accessibility, it also provides a more efficient platform to promote health advocacies.

III. Conclusion

Since three decades ago, Cambodia has been successful in improving the quality of life of its people. From very high rates of mortality and medical incidences, the country has lowered many cases of illnesses and diseases. However, LRI still tops the chart among the most common causes of deaths. Three factors

have been identified: nutrition and immunization, pollution and access to basic medical treatment.

The health sector has set out programs to improve the health of children by providing nutrition counseling and immunization shots. However, education programs and campaigns have fallen short and have not been able to provide more comprehensive coverage throughout the country. The health ministry has been trying to increase its employed civil servants to be able to provide more service to more people. However, the annual budget provided by the government has not been enough. To better support this cause, more frequent national census on the country's health situation must be conducted. There seems to be a limited data to back the need for a higher ministry budget. In order to understand fully the nation's situation, up-to-date comprehensive studies must be conducted. This will provide a concrete proof of what that country actually needs.

Second, it has been identified that pollution and environmental safety has been one of the most important factors affecting children's health. With no regulation pollution created by traditional cooking fuels and carbon-emitting vehicles, the health of young Cambodians continues to be at risk. Indoor pollution due to smokes and dusts from burning fuels are common in many homes. To improve household environments, several schemes such as improving cooking methods and using alternative energy sources may be adapted. In addition, local policies advocating the use of more efficient and lower carbon emitting fuels may be promoted. This puts premium on the benefits of using cleaner energy sources.

Third, the access to medical services has been a struggle to many rural areas in Cambodia. As accessible health centers with qualified medical practitioners are not enough throughout the country, medical interventions through ICT may be promoted. Several countries have supported this initiative and people have been responsive to it. By only using mobile phones, people may acquire basic healthcare.

As the country's capability to look after all of its people, it would be best at this point to look for alternative solution that may alleviate the persisting health problems. In the long run, it is still paramount that the Cambodian government find a more long-term solution to their health woes. As its economy improves, it is expected that they will also be able to sustain their health needs without relying too much on foreign donations and assistance.

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An Idea of Suggestion for Reducing Child Mortality in Cambodia -Case of Lower Respiratory Infection (LRI)-

Yutaro SATO

ABSTRACT

Between 2000 and 2015, Cambodia has made significant progress in the health of children. Under-five deaths per 1,000 live births were reduced from 124 to 54. However, according to other research data, 1 in 8 children dies before his or her fifth birthday. The trend of top ten causes of under-five child death in Cambodia between 1990 - 2015 shows that Lower Respiratory Infection (hereinafter referred to as LRI) has been the top cause for a long time. So, LRI is one of the most important causes of mortality among under-five children. LRI is a generic term for an acute infection of the trachea, airways, and lungs, which make up the lower respiratory system. There are mainly three types of LRI such as Acute Lower Respiratory Infection (ALRI), Lower Respiratory Tract Infection (LRTI), and Pulmonary Infection (PI). The causes of ALRI are viruses, indoor and outdoor air pollution while cases of LRTI and PI caused by defensive capability have been reduced. So, our suggestion is mainly focused on ALRI. First, to control the outdoor air pollution, we consider introducing carbon tax in Cambodia. Second, to improve the indoor air quality, we suggest promoting alternative energy sources in rural areas. Third, to cope with the poor access to medical service in rural areas, we introduce the Medical service on ICT.

One of three suggestions is the introduction of Carbon Tax and Subsidy. The aim is to reduce air pollution in urban areas. As in the case with other South East Asian countries, air pollution in accordance with urbanization and industrialization is one of the biggest problems in Cambodia, which is also the main reason of LRI. To cope with this issue, there are many technical solutions such as flue gas desulfurization equipment and filter dust collector. In addition, political approaches are also important. Carbon Tax can be one of them. It is true that carbon tax is implemented mainly in European countries and it is not popular in Southeast Asia, but it is also true that the situation is gradually changing. By overviewing the discussion among each leading country such as Thailand and Viet Nam, we consider the advantage and difficulty of carbon tax, and how to localize it in Cambodia, which can be useful for future policy making.

Another leading cause of LRI among young people in Cambodia is indoor pollution caused by smokes and dust particles. Around 95% of households in rural areas consume biomass which comprise of wood fuels such as firewood, charcoal which are readily available for domestic use. The pollutants disperse inside the households and are inhaled by its inhabitants, mostly

women and children who stay at home most of the time. Due to economic reasons and lack of access to more efficient resources, the persistence of biomass consumption exists. To decrease indoor pollution, conventional cooking methods using solid fuels must be improved. Projects on improved cook stove have been started but are mainly focused on improving the efficiency of fuel consumption. The design does little to contain smoke and dusts from the burning fuels. To address the containment of these pollutants, a similar project that was started in Bangladesh may be adapted by Cambodian households. A cook stove set-up may be installed in homes using traditional materials. The design involves a contained stove top with small openings for fuel inlet and dust. Smoke is contained in the burning cavity and is equipped with a pipe that leads to the outdoor for smoke exhaust. The idea not only makes for more energy efficient cooking but also significantly decreases the smoke. Alternatively, further promotion of alternative energy sources such as liquefied petroleum gas (LPG) and/or biogas will be helpful. These produce little to no pollutants and are more efficient than biomass. They are already in use but not as widely popular as biomass. As initial capital investments are necessary, they may be promoted through local cooperatives with the funding of Cambodian-based private financiers.

It is widely known that the problem of public welfare and medical policies in developing countries is related to money and in Cambodia, most of the medical policies are relied on international aids and NGO. Especially in rural areas, benefits of policies are very limited because of its poor access and expensive cost. So, we offer a feasible and low-cost policy, which is the medical service with mobile network. With cellphones and its network, people can share tips of the preventive medicine, simple treatment and medical common sense through the voicemail or SMS. This service will contribute not only to prevent LRI but also to establish the patient tracking system. It is very simple and it has already introduced in other developing countries such as APOJON Project in Bangladesh and ImTeCHO Project in India. The cellphone penetration rate is very high in Cambodia, so these two cases are worth referring for establishing a practical system to increase the public medical service's accessibility and enhance the education of sanitation.

We analyzed the national trend of child mortality in Cambodia and decided to focus on LRI. As in the case of other issues, LRI cannot be solved by just one policy and a multi-disciplinary view is crucially important. Three

ideas we suggest are designed from various perspectives and all of them cover the difference between urban and rural areas as a package. There are still tasks left for making it practical, but it can be useful for future discussion.

Keywords: Cambodia, Lower Respiratory Infection (LRI), Carbon Tax, Liquefied Petroleum Gas (LPG), Information Technology (ICT).

1. Introduction: LRI as the central issue in Cambodia
 2. Suggestion: Carbon Tax
 3. Suggestion: Improved cookstoves and alternative energy sources
 4. Suggestion: Medical Service on ICT
 5. Conclusion:
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1. Introduction: LRI as the central issue in Cambodia

Cambodia is located at the southern part of Indochina and surrounded by Viet Nam, Laos, and Thailand. After the internal war which continued over 20 years and the democratic election supervised by UNTAC (United Nations Transitional Authority in Cambodia), Kingdom of Cambodia was adapted by UN in 1993. One year later, it became a member of ASEAN and still today, Cambodia has developed economically and politically. However, as other developing counties, there are many problems which should be overcome. In terms of child health, as Figure.2 shows, the number of child mortality has decreased especially since 2000, but Figure.4 shows the different perspective. It arranged the cause of death every five years and there are some trends. There are clear improvements of Diarrheal diseases, Measles,



Figure.1 Map of Cambodia

<http://www.worldatlas.com/img/areamap/ad3673ab69e2a422ff7dad8c3095c19.gif>

Syphilis while Lower Respiratory Infection (LRI) and Neonatal Preterm Birth are not the case. Despite of the increasing foreign aids, these two have been top 2 causes of child mortality in Cambodia. In this paper, I focus one of them, LRI, and show an idea of suggestions for coping with this issue from the perspective of policy, energy, and technology.

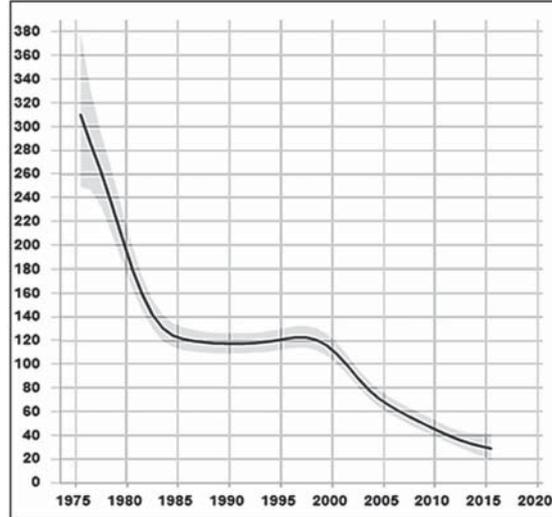


Figure 2 (Left) The Number of Child Mortality

https://www.nis.gov.kh/nis/CDHS/CDHS_2010_Key_Findings.pdf

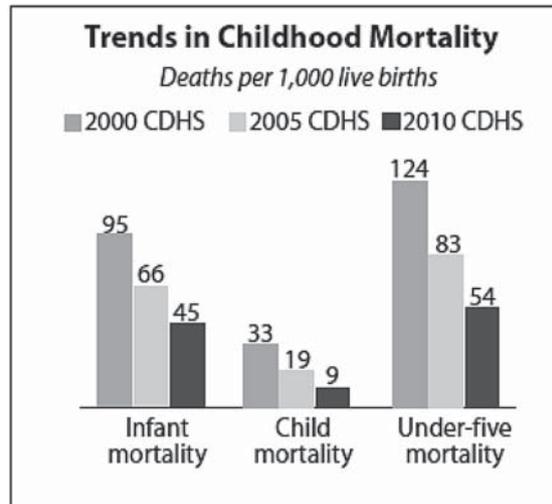


Figure 3 (Right) Child (under-five) Mortality Estimation (CME)

http://www.childmortality.org/index.php?r=site/graph&ID=KHM_Cmbodia

Rank	1990	1995	2000	2005	2010	2015
1	Lower respiratory infection	Neonatal preterm birth				
2	Neonatal preterm birth	Lower respiratory infection				
3	Diarrheal diseases	Diarrheal diseases	Diarrheal diseases	Diarrheal diseases	Neonatal encephalopathy	Neonatal encephalopathy
4	Measles	Measles	Neonatal encephalopathy	Neonatal encephalopathy	Diarrheal diseases	Congenital heart
5	Other neonatal	Syphilis	Measles	Other neonatal	Congenital heart	Other neonatal
6	Syphilis	Other neonatal	Syphilis	Congenital heart	Other neonatal	Neonatal sepsis
7	Neonatal encephalopathy	Neonatal encephalopathy	Other neonatal	Syphilis	Neonatal sepsis	Diarrheal diseases
8	Brain	Congenital heart	Congenital heart	Neonatal sepsis	Syphilis	Other congenital
9	Congenital heart	Malaria	Malaria	Malaria	Other congenital	Neural tube defects
10	Whooping cough	Whooping cough	Neonatal sepsis	Drowning	Neural tube defects	Drowning

Figure 4 Top ten causes of under-five child death in Cambodia Institute for Health Metrics and Evaluation (2015)

LRI can be categorized into three types; Acute Lower Respiratory Infection (ALRI), Lower Respiratory Tract Infection (LRTI), and Pulmonary Infection (PI). As Figure 5 shows, the main cause of LRTI and PI is a reduction of defensive capability and because of increasing foreign aids, it is improving. While, that of ALRI is Viruses, Indoor Air Pollution, and Outdoor Air Pollution. What Figure 6 shows is the possible solutions in accordance with the cause. To cope with virus infection, the early detection and prevention is crucially important. Especially in rural areas, the accessibility of medical services have been a big problem, so medical service on ICT can be a good solution. In terms of indoor air pollution, it is also serious in rural areas since women and children have to do cook by using firewood or coal. So, to improve cookstoves by providing alternative energy sources can contribute to solve this problem. Finally, outdoor air pollution has been one of biggest issues in urban areas such as Phnom Penh. Many solutions have been thought and implemented, but in this paper, I will suggest unimplemented one, which is Carbon Tax. So, in this paper, there are three suggestions and their structure is summarized at Figure 8. Section 2 explains about Carbon Tax, Section 3 provides an alternative energy source, and Section 4 introduced two success cases of medical services on ICT in India and Bangladesh. At the final section, I will point out remaining issues as conclusion.

Type	Cause
ALRI (acute lower respiratory infection)	Viruses(respiratory syncytial, adenovirus, coronavirus, parainfluenza, etc.) Indoor air pollution(household biomass fuels) Outdoor air pollution(solid fuel burning, industry)
LRTI (lower respiratory tract infection)	Defensive capability is reduced
PI (pulmonary infection)	

Figure 5 The Type and Cause of LRI (Made by Author)

Type	Cause	Prevention (method other than vaccine)
ALRI	Viruses	Medical service on ICT (Other methods: Wear mask, The one has respiratory symptoms avoid contact child, etc.)
	Indoor air pollution	Improved cookstoves & promotion of alternative energy sources (Other methods: Improved stoves, Interventions to the living environment, etc.)
	Outdoor air pollution	Carbon Tax & Subsidy (Other methods: Encourage use public transport, Green billboard, etc.)
LRTI		
PI	Defensive capability is reduced	Medical service on ICT (Other methods: Nutrition, Remove bacteria, Exercise, etc.)

Figure 6 The prevention and treatment of LRI (Made by Author)

	Pollution Reduction		Medical Intervention
Target Region	Urban Area	Rural Area	Rural Area
Subject	Ministry	Ministry	NGO/NPO
Object	Industry	Household	Household
Target Problem	Outdoor Air Pollution	Indoor Air Pollution	Poor Accessibility/Malnutrition
Content	Carbon Tax & Subsidy	Efficient Cookstoves and Promotion of Alternative Energy Sources	Health Program on ICT

Figure 7 Structure of suggestion for reducing pollution and improving medical intervention in Cambodia

2. Suggestion: Carbon Tax

Carbon Tax is a fee imposed on the burning of carbon –based fuels (coal, oil, gas). In general, the merit is to internalize the cost of air pollution and encourage the reduction of greenhouse gas while the demerit is its regressivity and to impede economic growth. Because of the demerit, especially of the latter, as Figure 9 shows, carbon tax has been implemented only in parts of developed countries in Europe. Furthermore, even in European countries, the content varies in accordance of each condition (Figure 10).



Figure 8 Carbon Pricing Programs Around the World (<http://www.wri.org/blog/2015/04/carbon-price-would-benefit-more-just-climate>)

State	Year	Rate(yen/tCO ₂)	Purpose
Finland	1990-	7,640-8,170	Reduction of Income Tax
Ireland	2010-	2,630	Deficit Covering
France	2014-	4,020	Transport Infrastructure and Energy Transition
Portugal	2015-	900-	Reduction of Income Tax and Subsidy for Electric Car
British Colombia, Canada	2008-	2,730-	Reduction of Corporation Tax

Figure 9 Carbon Tax in developed countries (made by author)

However, in Southeast Asian countries, it can be found that the situation is changing. In Viet Nam, the National Green Growth Strategy says,

Use financial, credit and market-based instruments to promote and support the development of the green economy and green products. Moving towards the establishment of a management system and trading of certified greenhouse gas emissions, carbon tax and fees and levies

In Thailand, the Eleventh National Economic and Social Development Plan referred to a carbon tax as below. In addition, Thailand has already started V-ETS (Voluntary Emission Trading Scheme).

Conduct market research to identify revenue opportunities through selling carbon credits, including standards that link to international markets on both a voluntary and a regulated basis. In addition, studies should be made of the emission quota system, the efficiency of greenhouse gas reduction, a break-even analysis comparing management costs of mitigation vs. carbon taxes

Singapore is the most developed countries among them in terms of environment taxes. Its budget plan says,

Singapore needs to play its part to protect the living environment. The Government intends to introduce carbon tax as part of efforts to reduce greenhouse gas emissions. Given the highly pollutive nature of diesel, diesel tax will be restructured, by permanently reducing the annual tax paid by diesel vehicles and introducing a volume-based duty on diesel. Some rebates will be provided.

Taiwan also pointed out the necessity of tax mechanisms. According to the Greenhouse Gas Reduction and Management Act,

To respond to the impact of climate change, under the principle of equality and social welfare promotion, the government should implement tax mechanisms on imported fossil fuels based on carbon dioxide equivalent

So, it is clear Southeast Asian countries are beginning to discuss carbon taxes (Figure 11). It is also clear that the biggest problem for implementing it in Cambodia is its regressivity, which can enlarge the inequality between poor and rich. It will remain unsolved for several years, but, it is worth looking at neighbor countries and learning their lessons.

State and Region	Current Situation
Viet Nam	National Green Growth Strategy (2012-)
Thailand	THE ELEVENTH NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT PLAN (2012-2016) Thailand V-ETS(Voluntary Emission Trading Scheme) (2014-)
Taiwan	Greenhouse Gas Reduction and Management Act (2015-)
Singapore	Budget 2017 (2017-)

Figure 10 Carbon Tax in Asia

3. Suggestion: Improved cookstoves and alternative energy sources

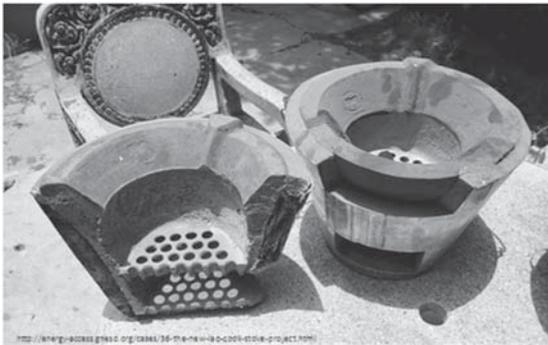
In rural areas in Cambodia, people have used cookstoves as Figure 11 shows, which is said to be a cause of respiratory infections. For solving this issue, the case of Bangladesh may be useful. In Bangladesh, cookingstoves were improved so as to contain and redirect smokes and heat (Figure 12).

Another solution is related to fuels. In cases where household is capable of upgrading their cookstoves that can consume commercial fuels, alternative energy sources can be further promoted by attracting more investors on the distribution of products such as Liquid Petroleum Gas (LPG) and Biogas. In terms of this, National Biodigester Program is a leading case. Biodigesters can be installed in homes that have sources of animal dung or organic wastes. They are converted to biogas which can be consumed in LPG stoves and can also provide energy for lighting. From 2006 to 2016, 24,000 biodigesters were constructed through 69 micro-enterprises in 15 provinces. A single household biodigester costs \$500 excluding an investment subsidy of \$150. An important success factor is the special biogas loan that is made available through three nationally operating micro-finance institutions

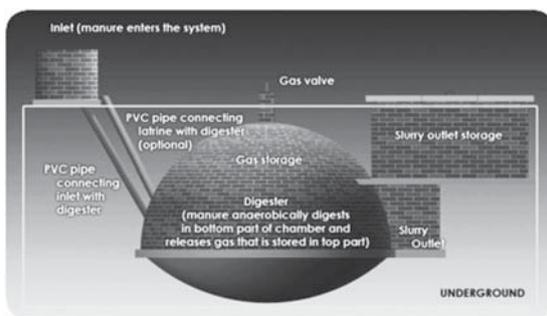


Successful project in Bangladesh: Improved cookstoves (ICS) that contains and redirects smoke and heat.

Figure 11 Successful project in Bangladesh: Improved cookstoves (ICS) that contains and redirects smoke and heat.



Existing cookstoves being promoted in Cambodia

Figure 12 Existing cookstoves in Cambodia**Figure 13 The Explanation of Biodigesters**

4. Suggestion: Medical Service on ICT

The third suggestion is Medical Service on ICT. As written above, the difficulty in rural areas is the poor accessibility to basic medical service because of distance and high cost. The aim of this suggestion is to offer free basic treatment and medical service through the telephone and giving medical information using SMS. There are two successful cases in Bangladesh and India, so it is useful to learn lessons from them.

“Apojon” Project in Bangladesh focuses on maternal and child health. Apojon is the mobile service for mothers and newborns who are difficult to use medical service in Bangladesh rural area. Bangladesh government, local NGO, and mobile companies bind together to initiate first service in 2011, and currently four hundred thousand mothers are using this service. For the poor strata it is free, but it is successfully managed as 95% of users are registered in charged service.

In India, although Indian government set the ASHA (Health Worker) to reduce mother and child death rate in 2000, the result was below the expectation. However, “ImTeCHO” Project in India reinvented the Health application and supported ASHA program with great success. The Function of the Application is;

ASHA : Schedule management, medical advice, medical check-up support in all Indian languages.

Hospital: High risk patient follow-up, ASHA service maintenance, digitalization of medical records

Users: Medical training with mobile video service good access for medical service.

These medical services on ICT can success also in Cambodia. There are two reasons. First, according to a research of the technology NGO Open Institute presented from August 2015, 94% of the 15-65 years old labor population has cell phone. Second, from the research of Development Innovations, 39.5% of Cambodians has more than one smartphone in 2015 and this is double times more than smartphone users in 2013. Cambodia’s medical policy problem is basically the lack of government’s financial fund. Government is trying to increase accessibility of medical service through several policies, but it is not a problem that can be solved within a short period of time. Through installing medical call center, delivering medical common sense and tips through voice message and offering early medical service through phone calls. This service (feasible and possible policy) will earn good effect in case of preventing diseases.

5. Conclusion

I introduce three ideas for coping with LRI in accordance with causes. In urban areas, the main cause can be thought as outdoor air pollution, so the suggestion to implement carbon tax after learning leading cases in neighbor countries such as Thailand and Viet Nam. In rural areas, there are mainly two causes; indoor air pollution and poor access to medical services. To solve the farmer, I suggest to refine cookstoves like in Bangladesh and to introduce biodigesters. To cope with the latter, I show two success cases of medical service on ICT implemented in Bangladesh and India, both of which can be applied to Cambodia because of the high mobile and smartphone penetration rate.

As conclusion, I point out three remaining tasks. First, the problem of the shortage of human resources in rural areas has been left even though it has been one of the biggest issues in Cambodia. Second, to making these three ideas more practical, how to bring budgets should be included. It may be better to use money picked up as carbon tax to biodigesters and ICT medical services, but there is still a big room left for discussing. Third, especially in rural areas, the shortage of medicine itself is also a big issue. So, how to allocate of medicine also should be included to the suggestion. Of course, there are still issues which should be discussed so as to make them practical national strategy. However, I am sure that these perspectives can be a key for improving child health in Cambodia and other developing countries.

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Current Situation and Problems of Health Policy of Cambodia

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This report would like to check Cambodia's health policy based on the medical related issues from team 2 in GRM joint seminar. Especially, we look forward to general medical insurance policy. After checking the process of Cambodia's health policy, we would like to discuss the present's problem and understand further development subjects.

1. The Development Process of Health Policy in Cambodia

Cambodia, under 30 years of civil war and known as the communist regime by "the Killing Fields", gathered all opposite factions with a new history since the Paris peace accords in 1991.

United Nations cooperate with the first general election after two years from the peace accords and led a brand new democratic government. Therefore, this gave them to regain peace and undertake social and economic development. Because it was making something out of nothing, early stage of development plan was largely carried out by the overseas aids. (According to the report of KOICA 2013, ODA to Cambodia was reported as 5 billion US dollars. On the other hand, duty-free or low-tariff economic benefits were applied on Cambodian export products to USA and EU markets to accelerate and sustain economic development to improve the quality of the lives of the people. For these national consent and multi-social development plans, Cambodia economy underwent profound social and economic transformation by reentering the local and global society, demographic change and inter-regional population movement (UN Cambodia, 2009).

Last few years, Cambodia focused on garment, agriculture, tourist and construction industry and enjoyed more than 10% of robust economic growth in 2004-2007 (World Bank, 2009). Cambodia improved its population over 14 million and 14 billion dollars in GDP. Through these impressive developments in the macro-economic economy, Cambodia achieved remarkable results in terms of life quality improvement and rapid economic development. The GDP per capita in 2012 rose to 946 US dollar and the poverty rate has plummeted from 1994 39.1% to 30.1% in 2007 and in 2011 its rate has decreased to 20.5% (World Bank 2012). Government spending on public investment for welfare has steadily increased, reaching 188.7 million US dollar in 2008 to 188.7 million US dollar in 2012. As of the end of 2010, the infant mortality rate decreased from 66 to 44 per 1000 from 2005, while the maternal mortality rate 47.1 to 20.6 per 1000 in same period, also HIV/AIDS rate has been decreased from 1.7 to 0.7 per 1000 which was the

highest rate year in 1998. According to the Department of Health report, Cambodia's health care centers nationwide estimated that 1024 in 2012, up from 967 in 2008. Especially, based on the developing plan for health insurance coverage and beneficiaries of the health care plan (1996), Health Equity Fund (HEF) and Community based Health Insurance (CBHI 2000). Recently Cambodia's committed to achieving universal health care which UN and ASEAN recommend with Health Strategy Plan I and II have prepared health plans. For example, Strategic Plan for Health Finances 2008-2015 aimed to eradicate health problems stemming from poverty (1), raise health care funds and quality (2) and promote universal health insurance coverage (Ministry of Health, 2008b).

By the solid foundation of legal system and public investment, positive signs are emerging in the development of Cambodia's health care system. Encouragingly health care infrastructure has gradually grown, more people are benefiting from health insurance, and government's budget have expanded. However, they still rely on foreign aids and it is not easy to establish a functioning health care system in Cambodia, which provides universal health care coverage, where technology, finance and human resources are limited to all Cambodian citizens. The challenge of the Cambodian royal government is to provide basic health care to all citizens, raise the level of medical service, and properly regulate the private health practices and all health care related markets (Ministry of Health, 2013).

2. History of Health Care Reform

Early medical reformation in modern Cambodia began in 1993 when the new constitution was adopted. Article #72 of the new constitution says that "public's health needs to be assured. The nation will fully consider the prevention of disease and medical treatment. And citizens of the poor should be able to receive free medical consultation at public hospitals, consulting room and obstetrics clinics. The constitution remains the main legal instrument to ensure the quality of life of the people, and the Cambodian government will do its best to help people build health care facilities, also they will help the people not to fall into poverty due to medical problems. Prior to 1996, public health facilities were officially free of charge, however, due to insufficient health care budgets, it led to the shortage of medicines and health care workers' salaries were lower than their living cost (WHO Cambodia, 1999). In 1996, the Ministry of Health established the National Charter of Health Fund as part of the overall health care reform to

enhance health care access to the people, especially the poor strata. Under the first beneficiary of the beneficiaries' payment, patients paid a partial fee of 500 Riel per treatment so the full treatment costs by paying each time they came to the hospital. 60% of these revenues were set up as incentives for employees and the remaining 39% were spent on operating costs and improving levels. In the same year, the World Health Organization (WHO) introduced the Operational District (OD) so that setting up a designated hospital and establishing commune-healthcare center to improve basic health care (Ministry of Health, 2002). As a result, within 24 states, 73 operating zones were established that govern designated hospitals, health centers and health care centers.

Health care reform is continuing to meet the needs of the citizens' basic health care needs. The existing beneficiaries' treatment system have failed to deal with the problem of treatment and informal medical expenses so that another type of revenue system, Health Equity Fund (HEF), was established. HEF is a system for poor or low-income families offering free health voucher for discounted price or free and generally NGOs are usually implemented to confirm that receivers are poor strata before releasing vouchers. HEF is funded by the development partners differs from the other beneficiaries of the exemption system which are all covered by the hospital.

Another system is the prepaid health insurance coverage called CBHI (Community-Based Health Insurance) to helps those who fall into poverty with urgent or unexpected medical expenses. This is funded by the beneficiary's payments and voluntary insurance system that NGO are responsible for implementation. CBHI is similar to existing insurance systems, but aimed the needs of rural communities in rural and isolated areas that often receive inadequate treatment (Koica, 2013). Insurance subscribers and their family can use health service as stipulated in the contracted public health facilities, such as health centers and designated hospitals. CBHI operators redeem the service used by the subscribers to the facility. (Ministry of Health, 2013)

3. Health Care Structure and Fund Raising

Since 1996, the health care system in Cambodia has established comprehensive hospitals and commune-healthcare center or health treatment center by Operation District (OD) (Ministry of Health, 2002). Each Operating District is responsible for 100,000 to 200,000 persons and consists of several health center and designated hospital. The health center is responsible for establishing the nearest public health facility near the village with 8,000 to 12,000 people and should be located within a distance of two hours or 10km. In the meantime, designated hospital should be located at least a distance of three hours or 20-30km by car or ferry. The operation area (OD) is operated under the supervision of the local health care community and each local health ministry works intimately with the Central Health Department,

which is responsible for policy, planning, manpower development and deployment, mobilization and allocation of resources (Ministry of Health, 2002). For that reason, health care centers provide "minimalist package of activities" that gives basic treatment and prevention activities through the Center's Clinic or service, designated hospitals comply with "Complementary Package of Activities" for complex health troubleshooting and continuous management, other national hospitals, training centers and other national health agencies provide tertiary services (Ministry of Health, 2008a).

In addition to the Operating District and national hospitals that provide public health services, private doctors play an important role in expanding the coverage of health care services. In private level, 1) A consulting clinic providing diagnostic and prescriptive treatment, 2) Specialized hospital in various fields, 3) Three types of poly-technic facilities that provide more professional services are permitted (Koica, 2013).

In terms of funding, there are three sources : national budgets, external funds provided by development partners or NGO, direct expenses also known as household expenditures. Cambodia's total health expenditure rose from 564 million US dollar in 2008 to 763 million US dollar in 2012. This translates into US\$ 52 per capita expenditure, while 61 % are direct costs, 24 % from national budgets, and 15 % from development partners. The direct cost of health care expenditure, which is the most percentage of the expenses, has increased from 25 US dollar per capita in 2008 (National Institute of Statistics, 2010) to US\$ 32 per capita in 2012 (Ministry of Health, 2013). Development partners' external funding was approximately 116 million US dollar in 2012 (Cambodia Development Committee). Funds are usually procured through bilateral or multilateral agreements and are allocated to health care programs in a variety of forms (Ministry of Health, 2013). National health budget refers to the annual recognition of the Government's total budget. Much of this budget is allocated to provide medicines, medical equipment and supplies to the medical centers, clinics and hospitals (WHO and Ministry of Health, 2013). The funding system aims to broaden the scope of health care services for the poor, eliminate the scope of health care, eliminate financial barriers, improve service levels, and improve public trust in health care facilities (Ministry of Health, 2013).

4. Problems Related to Health Care

Each Citizen uses public health facilities 0.4 times a year (WHO WPRO, 2008). In 2010 Census and health surveys show that people are seeking medical treatment among the first to seek private health care facilities in not only cities but also towns. City residents tend to go to private clinics first (27%), buy medicine at pharmacies (20%), and lastly receive treatment at the National Hospital. Patients in rural areas tend to be treated in public health centers, skilled health care workers, private

health clinics, or folk remedies (stores and markets) (National Institute of Statistic, 2011). In rural areas, medical professionals and nurses were more likely to give medical care. One percent of the total population was treated mainly in Vietnam, Thailand, and Singapore (National Institute of Statistics, 2011).

These facts indicate that the treatment is performed in several forms (Koica, 2013), which explains the situation for the following reasons.

- A lack of understanding of the health problems of health problems and treatments.
- The idea of receiving medical treatment close to home or family
- Finding private health care facilities first because they are flexible and easier to buy
- Limited or false information about health center care costs and available services
- In contrast, the rural areas are relatively limited in health care workers and are limited in scope to private health care facilities.

Eventually, accessibility, medical care, care levels and users' lack of information are main reason to choosing a public or private health care facility (Koica, 2013). Many people are worried about private health care facilities, but there are concerns that insufficient monitoring and regulation of private-sector health care (Koica, 2013). Local residents travel far to seek medical attention at the national hospital in Phnom Penh which offer the most of the fields in the country and hire about 54% of the nation's doctors.

5. Challenges of Health Care Field

Eighty percent of the 14 million people in Cambodia live in farming villages and depend on subsistence farming (World Bank, 2006). Economic development activities are mainly in the capital and urban areas, which lead to imbalances in imports. As a result, the average Gini coefficient remains at 0.4 (World Bank, 2007). Despite the significant increase in health care in the overall budget, the health care sector has raised the burden of living, funding, resources, the levels of private sector and public sector (Koica, 2013).

In 2011, Cambodia has 853 US dollar per capita GDP, where the World Bank designated as a low-income country, 20.5 percent of the total population of the entire population belongs to the poor. Therefore, health care services are still difficult for people in rural and outlying areas because of the lack of health care workers, and the lack of treatment based on priorities and priority selection. In other words, the underprivileged in the rural areas are likely to suffer from health problems because it is difficult to use basic health care services. A Cambodian socioeconomic survey conducted in 2004 confirmed that less than 60 percent of the poor could use health care services. Only 28.9% of people seeking medical treatment took advantage of public health facilities, and 56.8% utilized private health care services (National Institute of Statistics, 2011). Again,

Cambodia's public health sector is still low in terms of utilization.

Financial barriers to patients who need to pay for medical expenses, kickbacks, and other unanticipated expenses are still highly ongoing (Koica, 2013). Of the total health spending per capita of 52 US dollar per capita, 61% is personal expenditure, 24% is government budget, 15 % is the development partnership support and contribution (Ministry of Health, 2013). In order to solve the burden of health care, people will lose money, spend money on household income, borrow money, and then sell their properties (WHO WPRO, 2008), and do not emerge from the vicious cycle of poverty. As well as the difficulty of the demand side, there are several important issues in the delivery of health care services. According to the report of Koica (2010), because part of the budget is distributed and outside of the government's priorities, the government is limited to the supply side. Health care approaches in rural and remoted areas are still remained as a huge obstacle. For this reason, this part of health care guarantees still require the supports from development partners, this will have a negative impact on the continuing funds of the Cambodian health field.

Another problem is that patients do not have proper medical care, as health care workers lack medical skills, lack of medical supplies, lack of medical equipment, and inefficient schemes. The performance of public health facilities is not in good condition because the status of health care workers is severely insufficient. Due to the shortage of midwives and nurses, the health center has failed to deliver Minimum Package of Activities, lack of competent doctors causes fail to fulfil few designated hospitals' Complementary Package of Activities (Ministry of Health, 2006).

Effective and timely measures are also needed for lax regulation and monitoring of private health services field. In 2010 Census and health surveys show that private health facilities, such as private hospitals, clinics, pharmacies and health care workers, are greatly increasing in both urban and rural areas. Unfortunately, this sector does not have sufficient standards or standards for clinical practice guidelines and service levels and it leads to no proper regulation.

6. Policy Implication

Overall, the health care system in Cambodia has made remarkable progress with the economic stability and the continued support from development partners. The government has made large investments in public health infrastructure, and is expanding health facilities for people. Although the city's health care application is somewhat better, Health care services in rural areas are particularly poorly suited for treating chronic diseases and it is not easy to get medicines to the patients. Expanding health care facilities increased the geographic accessibility of health services to the citizens, but the satisfaction level of public health facilities is still failing to reach a goal. The satisfaction level depends on individual's financial capacity, service levels, and health

services delivery by human resources and funding.

As mentioned, household spending in Cambodia is a major source of Cambodian health expenditure, but about 20 percent of Cambodian citizens still live below the poverty line which making it a constant concern to everyone. The ability to raise funds is not only an incentive to improve service levels and the performance of health center employees, but it also has a crucial effect on strengthening the numbering system for patients in rural areas and far regions (WHO WPRO, 2008). Also because the major priority areas of health improvement are being promoted by development partners or NGOs, it is difficult to predict the long-term sustainability of such interventions as well as the efficient expansion of government budgets and effective allocation of funds (Ministry of Health, 2010). The other need is that the policy implications of health care in Cambodia is that universal health care applications remain a huge task for policymakers and need a multilateral approach. Almost all of the citizens have not signed up for medical insurance, less than 1 % of private health insurance coverage, privately owned, private health insurance coverage (National Institute of Statistics 2011). Compulsory health care in the official field protects public officials and private company employees. Unofficial voluntary health insurance by HEF establishment enhances access to health care, but only a few selective areas can be applied to prevent multiple non-binding constraints (Ministry of Health, 2010).

From this view, in order to meet the needs of the citizens, the Royal Government of Cambodia should present the following policy goals as concrete achievements.

- Efficient mobilization and allocation of resources
- Especially reinforcing roles and functions of hospitals and health centers in public sector.
- The restoration of trust to public health services among the people
- Determination of the possibility of an outpatient area in each facility to increase the proportion of health services in the entire population

7. Future direction of development

The health care system in Cambodia protects the accessibility of public health by law. Health care reformation were implemented with health care plan and beneficiaries' burden to upgrade health service for all citizens. Various health care financing plans were devised to lower the health care costs effectively for the poor and the underprivileged classes. In recent years, the number of mandatory insurance subscribers which is targeting to public officials and private workers has expanded. Private health facilities are accounted for a large portion of health care services. Thus, monitoring and regulation of private institutions and pharmaceutical vendors should be conducted to ensure the level of treatment and service reliability. Although development partners are a major asset to the development of health care in Cambodia, some of the budget flows in different

directions from the government's plan. Currently Cambodia's healthcare funding strategy is to use various resources, including government budgets, private revenue from development partners, and revenue from charging services. The government will continue to provide adequate funding for the public health sector and coordinate the funding of development partners with the government's priorities for the public health system. In order to achieve the universal health care coverage of Cambodia, a more comprehensive system should be needed including the current health care funding system. This system will be carried out according to the health care sector priorities in conjunction with the existing health care system.

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An Idea of Suggestion for Reducing Child Mortality in Cambodia -Case of Lower Respiratory Infection (LRI)-

Huimin Yang

Abstract

Between 2000 and 2015, Cambodia has made significant progress in the health of children. Under-five deaths per 1,000 live births were reduced from 124 to 54. However, according to other research data, 1 in 8 children dies before his or her fifth birthday. The trend of top ten causes of under-five child death in Cambodia between 1990 - 2015 shows that Lower Respiratory Infection (hereinafter referred to as LRI) has been the top cause for a long time. So, LRI is one of the most important causes of mortality among under-five children. LRI is a generic term for an acute infection of the trachea, airways, and lungs, which make up the lower respiratory system. There are mainly three types of LRI such as Acute Lower Respiratory Infection (ALRI), Lower Respiratory Tract Infection (LRTI), and Pulmonary Infection (PI). The causes of ALRI are viruses, indoor and outdoor air pollution while cases of LRTI and PI caused by defensive capability have been reduced. So, our suggestion is mainly focused on ALRI. First, to control the outdoor air pollution, we consider introducing carbon tax in Cambodia. Second, to improve the indoor air quality, we suggest promoting alternative energy sources in rural areas. Third, to cope with the poor access to medical service in rural areas, we introduce the Medical service on ICT.

One of three suggestions is the introduction of Carbon Tax and Subsidy. The aim is to reduce air pollution in urban areas. As in the case with other South East Asian countries, air pollution in accordance with urbanization and industrialization is one of the biggest problems in Cambodia, which is also the main reason of LRI. To cope with this issue, there are many technical solutions such as flue gas desulfurization equipment and filter dust collector. In addition, political approaches are also important. Carbon Tax can be one of them. It is true that carbon tax is implemented mainly in European countries and it is not popular in Southeast Asia, but it is also true that the situation is gradually changing. By overviewing the discussion among each leading country such as Thailand and Viet Nam, we consider the advantage and difficulty of carbon tax, and how to localize it in Cambodia, which can be useful for future policy making.

Another leading cause of LRI among young people in Cambodia is indoor pollution caused by smokes and dust particles. Around 95% of households in rural areas consume biomass which comprise of wood fuels such as firewood, charcoal which are readily available for domestic use. The pollutants disperse inside the households and are inhaled by its inhabitants, mostly

women and children who stay at home most of the time. Due to economic reasons and lack of access to more efficient resources, the persistence of biomass consumption exists. To decrease indoor pollution, conventional cooking methods using solid fuels must be improved. Projects on improved cook stove have been started but are mainly focused on improving the efficiency of fuel consumption. The design does little to contain smoke and dusts from the burning fuels. To address the containment of these pollutants, a similar project that was started in Bangladesh may be adapted by Cambodian households. A cook stove set-up may be installed in homes using traditional materials. The design involves a contained stove top with small openings for fuel inlet and dust. Smoke is contained in the burning cavity and is equipped with a pipe that leads to the outdoor for smoke exhaust. The idea not only makes for more energy efficient cooking but also significantly decreases the smoke. Alternatively, further promotion of alternative energy sources such as liquefied petroleum gas (LPG) and/or biogas will be helpful. These produce little to no pollutants and are more efficient than biomass. They are already in use but not as widely popular as biomass. As initial capital investments are necessary, they may be promoted through local cooperatives with the funding of Cambodian-based private financiers.

It is widely known that the problem of public welfare and medical policies in developing countries is related to money and in Cambodia, most of the medical policies are relied on international aids and NGO. Especially in rural areas, benefits of policies are very limited because of its poor access and expensive cost. So, we offer a feasible and low-cost policy, which is the medical service with mobile network. With cellphones and its network, people can share tips of the preventive medicine, simple treatment and medical common sense through the voicemail or SMS. This service will contribute not only to prevent LRI but also to establish the patient tracking system. It is very simple and it has already introduced in other developing countries such as APOJON Project in Bangladesh and ImTeCHO Project in India. The cellphone penetration rate is very high in Cambodia, so these two cases are worth referring for establishing a practical system to increase the public medical service's accessibility and enhance the education of sanitation.

We analyzed the national trend of child mortality in Cambodia and decided to focus on LRI. As in the case of other issues, LRI cannot be solved by just one policy and a multi-disciplinary view is crucially important. Three

status to be associated with the risk of ALRI. Deficiencies of vitamin D and/or calcium the strongly associated with severe ALRI in hospitalized children in some settings.^[11,12,13]

In 1907, since probiotics were conducted by Metchnikoff,^[14] it has been increasingly used to benefit the human host's immune system.^[15] And then more and more reviews and meta-analyses also have reported a positive, albeit modest, effect of probiotics in respiratory tract infection prevention.^[16,17,18] Then, in 2015, Georgia Vêras de Araujo and his coworkers^[19] explored and described clinical trials effect of probiotics on the symptoms, duration of disease, and the occurrence of new episodes of upper and lower respiratory infections in healthy children and elucidated the benefits of probiotics in the treatment of respiratory infections in healthy children.

On the other sides, air pollution, including fuel combusting, substandard automobile exhaust gas, household air pollution (HAP) et. al, was also focused on proposing intervention estimates for child LRI linked to air pollution. In 2013, Dan Pope and his group^[23] conducted a review found evidence linking HAP exposure with child LRI, low birth weight (LBW), stillbirth, preterm birth, stunting and all-cause mortality. And reducing exposure to HAP could substantially reduce the risk of several child survival outcomes, including fatal pneumonia, and the proposed effects could be achieved by interventions delivering low exposures. Larger impacts are anticipated if WHO air quality guidelines are met. To achieve these benefits, clean fuels should be adopted where possible, and for other households the most effective solid fuel stoves promoted. To strengthen evidence, new studies with thorough exposure assessment are required, along with evaluation of the longer-term acceptance and impacts of interventions.

And according to Michela Sonego and his coworkers' research results,^[27] low maternal educational level, low socio-economic status and other related factors (i.e.lack of sewerage and latrine and poor quality of water) were significantly associated with ALRI and These results are also consistent with the distribution of the global burden of LRI, with hospitalizations and deaths concentrating in the poorest countries. (figure.2).

In this article, we discussed the causes of ALRI including viruses, indoor and outdoor air pollution, nutrients deficiency and proposed our suggestion mainly focused on ALRI of methods and treatment. First, to control the outdoor air pollution, we consider introducing carbon tax in Cambodia. Second, to improve the indoor air quality, we suggest promoting alternative energy sources in rural areas. Third, to cope with the poor access to medical service in rural areas, we introduce the Medical service on ICT.

Discussion and Results

This report was performed through a research protocol that was written to guide the implementation of

serveries about air pollution in urban areas and rural areas in different district and conduct some suggestions for reducing air pollution and improving medical interventions to prevent LRI and then focusing on the issues of Cambodia, which was ranked first in the causes of child-death under five in Cambodia.

First, air pollution is associated with many health impacts, including chronic obstructive pulmonary disease (COPD) linked to enhanced ozone (O₃), and acute lower respiratory illness (ALRI), cerebrovascular disease (CEV), ischemic heart disease (IHD), COPD and lung cancer (LC) linked to PM2.5.^[31]

In accord with the global burden of disease for 2010,^[30] we calculate that outdoor air pollution, mostly by PM2.5, leads to 3.3(95% confidence interval 1.61–4.81) million premature deaths per year worldwide, predominantly in Asia. Many previous studies have been based on air quality measurements, largely focusing on urban pollution.^[32,33,34] Herein, we adopted a dialect methods to demonstrate the link between air pollution and healthcare measurement. And many feasible methods, such as carbon tax, have been proposed. For example, the National Green Growth Strategy of Vietnam (2012---) is using financial, credit and market-based instruments to promote and support the development of the green economy and green products.

Moving towards the establishment of a management system and trading of certified greenhouse gas emissions, carbon tax and fees and levies. And the eleventh national economic and social development plan of the Thailand (2012-2016) is Conducting market research to identify revenue opportunities through selling carbon credits, including standards that link to international markets on both a voluntary and a regulated basis.

In addition, studies should be made of the emission quota system, the efficiency of greenhouse gas reduction, a break-even analysis comparing management costs of mitigation. And for Singepore and Taiwan, the anxious to prevent air pollution has been legislative by government. Singapore determined to play its part to protect the living environment. The Government intends to introduce carbon tax as part of efforts to reduce greenhouse gas emissions. Given the highly pollutive nature of diesel the diesel tax instead of permanently reducing the annual tax paid by diesel vehicles and introducing a volume-based duty on diesel (Budget 2017--). And Taiwan government has made a Greenhouse Gas Reduction and Management Act (2015-) to respond to the impact of climate change. Under the principle of equality and social welfare promotion, the government should implement tax mechanisms on imported fossil fuels based on carbon dioxide equivalent.

The countries in Europe and America also performed a preferential carbon tax policy to energetically develop new environment friendly energy. In the past, wood is the primary energy fuel in various thermal processes in developing countries. And household energy demand is meeting through tradition

fuels as woody biomass, agricultural waste, animal dung, and charcoal, etc. in rural area. (figure.3)



Figure.3 Traditional biomass burning stoves

The World Health Organization (WHO) report reveals that the smoke released by burning of biomass contributes approximately 3% of the total global burden of disease, 1.6 million premature deaths every year, which includes 0.9 million children death under five years of age.^[35] There are many researchers, scientists and non-government organizations have conducted various studies on the socio-economic aspects during implementation of improved biomass cookstoves at the actual user's site.

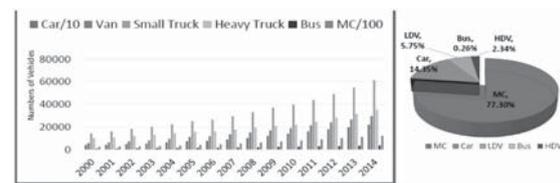
Although switching to cleaner cooking over the traditional stoves can bring significant benefits in terms of monetary or non-monetary parameters such as health, forest, climate etc. the household income plays a major role during selection of cooking fuel as reported by Jan^[36] in Pakistan, Heltberg^[37] in Guatemala, Barnes et al.^[38] in Bangladesh, Pine et al.^[39] in Mexico, Bansal et al.^[40] in rural India, and Nlom and Karimov^[41] in northern Cameroon. It still needs a long way to go because of the different barriers such as financial, market, quality, political, infrastructure, awareness and socio-cultural barriers.

Recently, financial and policy support in the development and utilization process of new energy in Asia brought hope to carbon tax for reducing air pollution. As for inequality between rural and urban areas and inequality within urban area, we suggested to have a local tax and progressive carbon tax. We think this situation will have some obvious changes in the next decades.

The suggestion for reducing air pollution

Second, we conduct a survey on reducing outdoor and indoor air pollution in urban areas of Cambodia. And the capital--Phnumpenh was discussed as an example. Phnom Penh is located in the south-central region of Cambodia, and is fully surrounded by the Kandal Province. It located at 11.55°N 104.91667°E (11°33' North, 104°55' East),^[28] covers an area of 678.46 square kilometers (262 sq mi), with some 11,401 hectares (28,172 acres) in the municipality and 26,106 ha (64,509 acres) of roads. And The municipality is subdivided into twelve administrative divisions called Khans (districts) and these twelve Khans are further subdivided into 76 Sangkats (communes), and 637 Kroms. Of the 12 Kans, Dangkao, Meanchey, Porsenchey, Sen Sok and Russei Keo are considered the outskirts of the city. Meanwhile Phnom Penh also had a population of 2,009,264 people,

with a total population density of 5,358 inhabitants per square kilometer (13,877/sq mi) in a 678.46 square kilometer (262 sq mi) city area. The population growth rate of the city is 3.92%. The city area has grown fourfold since 1979, and the metro area will continue to expand in order to support the city's growing population and economy. And Phnom Penh's population is expected to increase to 3 million at the end of 2016.^[29] But according to our recent survey, 32% of the arterial roads are in bad condition and with the rapid development of the economy and population of the city, the number of vehicle has rapid increased over the past 10 years (figure.4), and air pollution problems related to it also appear gradually.



Source: Department of Vehicle Registration of MPWT, 2014

Figure.4 The growth of vehicle fleets in PNH from 2000 to 2014

Here we investigate the link between child mortality and air pollution in urban and rural environments of Cambodia. In December 2013, R. Honey and his coworkers conducted measurements of HAP levels (24-hour PM_{2.5} [particulate matter] concentrations) in nine Samlout households confirmed them to be several times higher than those recommended by the World Health Organization.^[42] To our knowledge, this is the first time that PM_{2.5} concentrations have been recorded in Cambodia. In rural regions of developing countries such as the Samlout District in northwest Cambodia, where more than 90% of people rely on solid cook fuels,^[43] the problem is particularly important. They also give some suggestions and analysis of the problem, such as local and national policy change, infrastructure and market development and Education and health systems strengthening.

And existing methods of developing cookstoves in Cambodia mainly focus on improved efficiency of cooking. Nimbkar Agricultural Research Institute (NARI) developed a lanstove i.e. a dual purpose lantern running on 55–60% ethanol-water mixture and used for lighting as well as cooking and heating. (Fig. 5)^[44] This dual purpose stove has fuel consumption 250–275 g/h (58% ethanol-water mixture), efficiency about 27% and gives light output 1200–1325 lm without any type of indoor air pollution. And other designed stoves have also been widely reported with an extended surface heat plate accessory on cookstoves or experimental TE generator suitable for- “Planète Bois” the energy-efficient multifunction mud stove.^[46,47] But they were either only workable in lab or having a lower heating transfer efficiency. Furthermore, Thacker et al.^[45] studied the challenges and benefits associated with achieving the

appropriate balance between the two competing design objectives of technical capabilities and usability, and demonstrated its application through the modification of a traditional cookstove an inexpensive set of pot skirts constructed from 24 gauge thickness sheet metal that integrated directly with the traditional stove, (Fig.6).^[48] These pot skirts allowed for varying sizes and number of pots and have a 41.7% increased thermal efficiency, 32.7% decreased fuel consumption, and 28.8% decreased time to boil.



Figure.5 Lanstove in operation



Figure.6 A final prototype of pot skirt attached to a traditional biomass cookstove

However, with the government of Cambodia rolling out the Cambodia National Biodigester Program, 24,000 biodigesters were constructed through 69 micro-enterprises in 15 provinces from 2006 to 2016. There will have been a great improvement of the solution of air pollution in rural areas. And the biodigesters can be installed in homes that have sources of animal dung or organic wastes, with a cost of \$500 excluding an investment subsidy of \$150 per household biodigester. They are converted to biogas which can be consumed in LPG stoves and can also provide energy for lighting. It provides affordable, safe and clean energy to a low income rural population. And household level generation of biogas from animal waste for both cooking and lighting, while producing high quality organic fertilizer, is increasingly proposed as a viable part of the solution for farming households. And domestic biogas is of crucial importance to meet rural Cambodia's energy challenges and to boost the rural economy by providing

employment opportunities. To insure the success of this program, an important factor is the special biogas loan that is made available through three nationally operating micro-finance institutions in Cambodia.

But there are some burning issues that the substantial amount of animal manure are required to kick-start biodigestion initially. As to our survey, about 1,500 kilograms of animal manure are needed for the smallest four-cubic-meter tank and it takes 20 kilograms at least daily to keep up with daily needs for a household. It comes significant challenge to maintain the development of this project. It's gratifying us that governmental regulation and coordination and financial support to the low-income families will motivate the local people. The development of a market based biogas sector is crucial in ensuring a healthy and continuous development after donor funding.

The suggestion for Medical Service on ICT

The third, we carried out a mobile health project-- Medical Service on information and com Tissue (ICT) in rural areas. Resource-poor countries have long struggled to control infectious disease, reduce mortality and severe morbidity, and improve childhood survival rates with inadequate resources that are echoed in delayed diagnosis and poor medical service delivery at local levels. From the 1980s, various financing systems have been introduced to supplement government budgetary allocations, loans and bilateral aid, to deter the unnecessary use of health services, and from 1988, to improve access to and quality of services. But the numbers of medical personnel seem to be nowhere near enough. The average Cambodian had only 0.35 contacts per year with organized health services—the lowest contact rate in the region ranking 174th among member states of the World Health Organization on overall health system performance in 2000.^[49,50]

And the current situation still doesn't change much now. In 2001, KVEDAR, M.D. and his groupers had conducted a research on monthly telemedicine clinic helping provide health care to residents in a remote region in Cambodia and demonstrated that the store-and-forward e-mail consultative support for mobile nonphysician health care workers is a feasible model for delivering care in the developing world.^[51] And high mobile and smartphone penetration rate will promote this model 's development in today's society.

According to a research of the technology NGO Open Institute presented from August 2015, 94% of the 15-65 years old labor population has cell phone and 39.5% of Cambodians has more than one smartphone in 2015 and this is double times more than smartphone users in 2013. (Fig. 7)

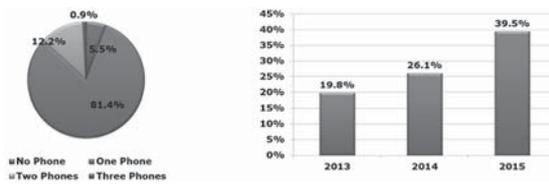


Figure.7 The number of smartphone used and penetration in Cambodia

So we think this model will still have a huge effect on nowadays medical service in rural Cambodia. We modified this model combined with the direction of today's communication technology and call it medical service ICT. Through the health program with ICT (Mobile), medical service center of the government can offer free basic treatment and medical service through the telephone and giving medical information using SMS.

For example, the apojo project in Bangladesh and ImTeCHO Project of India. The apojo project is the mobile service for mothers and newborns who are difficult to use medical service in Bangladesh rural area, can give a easily and accurate measurement on maternal and child health treatment. Bangladesh government, local NGO, and mobile companies bind together to initiate first service in 2011, and currently four hundred thousand mothers are using this service. And the service items are detailed and comprehensive including text messages for newborns and mothers' health care service twice in a week (Also sent to family), voicemail for nonreaders, text messages gravitational cycle and health related message for newborns by the user's personal data and medical treatment by phone call, round-the-clock call center operation (emergency respond counselling).

As for the ImTeCHO Project of India, although Indian government set the ASHA (Health Worker) to reduce mother and child death rate in 2000, the result was below the expectation. But in 2013, reinvent the mHealth application and supported ASHA program with great success because of its schedule management, medical advice, medical check-up support in all Indian languages, high risk patient follow-up, ASHA service maintenance, digitalization of medical records and medical training with mobile video service good accessing for medical service. But it also has Following challenges needed to be resolved.

- Cambodia's medical policy problem is basically the lack of government's financial fund.
- Government is trying to increase accessibility of medical service through several policies, but it is not a problem that can be solved within a short period of time.
- Through installing medical call center, delivering medical common sense and tips through voice message and offering early medical service through phone calls.
- This service (feasible and possible policy) will earn good effect in case of preventing diseases.

Conclusion

LRI has become a global and serious health killer in least-development and developing countries. And these countries have a lot in common, including bad environment, such as out-door and indoor air pollution, and backward and inadequate medical service. The most difficult of all is to explore a feasible method of balancing the costs and strategy. Because in rural areas of these district, people usually have a low income, poor educational status and traditional backward ideology. So there will be a great challenge to induce advanced technology and ideas to these rural areas. How to explain the benefits and urgency to develop green energy and protect environment to farmers is still needed to be in cooperated with relative sectors, such as special funding subsidy, introduction and promotion of advanced technologies, and legislation.

In this report, we talked about interaction between the air pollution and LRI. And furthermore, discussed the biomass energy by using biogas technology to overcome the difficulty of energy supply and air pollution in rural areas. And then inducing the policy of carbon tax to encourage developing environment friendly fuels and green energy. And to solve the large pay bills of the hospital, we also designed a new mobile health project called medical service ICT to use basic medical service offering free basic treatment and medical service through the telephone and giving medical information using SMS to all patients.

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The Current Issues in Power Supply System in Cambodia and Some Ideas to Improve it

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1. Introduction

1.1 The objective of this report

This report is aiming to classify the issues existing in the power supply system in Cambodia and to propose several ideas to improve the condition. By analyzing secondary data mainly collecting from the publish of Cambodian government and some of the major international organizations which is active in Cambodia's power sector, such as Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), World Bank (WB), this report attempts to illustrate a comprehensive picture of Cambodia's power sector, including the current issues, the efforts made by the government and the private sector to improve the condition and the challenges they are facing, concluding by suggestions for building a self-sufficient and sustainable power development system in Cambodia.

Attentions have to be paid to the following point. Some of the information in this report was published more than two years ago. As Cambodia is developing rapidly, part of the information might be outdated thus cannot represent the current situation precisely.

1.2 General introduction to Cambodia

Surrounded by Thailand, Laos, and Vietnam, Cambodia covers a total area of 181.0 square kilometers with approximately 15.8 million people living in the country in 2016. In the same year, GNI per capita (Calculated by Atlas method) was 1,140 US dollars, ranked 181 in 216 countries.

The relatively low development level is partly due to the conflict lasted for decades. The latter destroyed infrastructure and human capital, almost stopped the developing process of Cambodia. The situation took a favorable turn in 1993, a new regime was established. After that, the economy has developed rapidly with an annual growth rate of around 7%, industries such as textile and tourism are growing fast. The economic development boosted the increasing of electricity demand, pushing it to an annual growth rate of 25%, and the average growth rate from 2003 to 2008 was more than 20%.

Meanwhile, electric power system was rebuilt on least-cost principles with emphasis on large coal, hydro, and imports after the conflict ended. Big cities such as Phnom Penh has access to electricity while more than half of population lives in the rural area and has limited access to stable electricity. Although foreign capital has helped Cambodia to expand its ability to power supply, the electricity output still cannot fulfill the growing

demand.

Cambodia has stated its responsibility in developing its power system:

- To provide an adequate supply of energy throughout Cambodia at reasonable and affordable price,
- To ensure a reliable and secured electricity supply at reasonable price, which facilitates investment in Cambodia and development of national economy,
- To encourage exploration and environmentally and socially acceptable development of energy resources needed for supply to all sectors of Cambodia economy,
- To encourage the efficient use of energy and to minimize the detrimental environmental affects resulted from energy supply and consumption.

More specifically, Cambodia aimed at 100% of the villages have access to any type of electricity's services in 2020, 70% of the households in the rural area have access to grid quality electricity in 2030. Update to 2016, the data refer to these indicators are 62% and 57% respectively.

2. General information on power sector

2.1 Organizations of the power sector

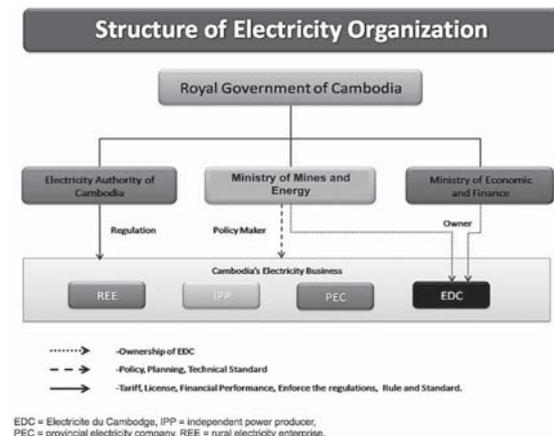


Fig. 1 Structure of Electricity Organization in Cambodia

Source: EAC Annual Report, 2016 Edition.

The structure of electricity organizations in Cambodia is illustrated in Figure 1. The duty and right of each organization, as well as the relationship among different organizations, can be summarized as follows.

Electricity Authority of Cambodia has been granted the right by the Royal Government to be "an autonomous agency to regulate the power sector in the Kingdom of

Cambodia¹. It consists of three members, all the members shall be designated and proposed by the Prime Minister, then be appointed by Royal KRET. The responsibilities of EAC are as follows²:

- To issue Regulations
- To issue Licenses to Electric Power Service Providers
- To Review Cost and Approve Tariffs
- To resolve Disputes
- To Regulate, Impose Penalty

The Ministry of Mines and Energy (MME) “shall be responsible for setting and administrating the government policies, strategies and planning in the power sector”³. The main responsibilities are as follows:

- Energy Policies
- Electric Power strategies
- Power development plan
- Technical, Safety, Environmental Standards
- Other Duties

Electricite Du Cambodge (EDC) is the biggest firm in power sector in Cambodia, owned by the MME and the Ministry of Economic and Finance (MEF). EDC is “an autonomous, commercial, legal and state-owned enterprise, with the responsibility for generation, transmission and distribution throughout Cambodia”⁴. It purchases electricity from Independent Power Producers (IPP) and distributes it to consumers all over the country. In 2015, the proportion of energy sent out by IPP counted 98.5%, the rest were from EDC and other licensees operating generation facility⁵. In the meantime, expansion of transmission network is part of EDC’s role.

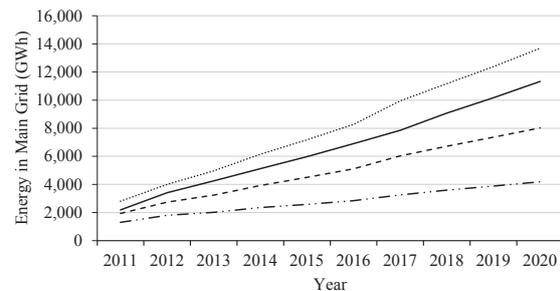
Another responsibility of EDC is rural electrification. Rural Electrification Fund (REF) is an organization established in 2004 by Royal Government of Cambodia (RGC) to help to boost rural electrification. Till 2012, REF was working as an independent organization with financial support from WB, but after that, it was transferred to the control of EDC⁶.

Rural Electricity Enterprises (REE) refers to the independent power suppliers in the rural area. Usually, they provide power generated from sources such as Heavy Fuel Oil (HFO) and sell it to the residents who can afford it. In the past, most of them were running without licenses issued by EAC, but as EDC expanding its distribution network, more and more REE chose to legalize their business so they won’t be replaced completely by EDC.

2.2 Electricity demand and supply

Figure 2 showed the projection of electricity

demand in Cambodian National grid till the year 2020. This projection was done by JICA and one of the electricity suppliers in Japan named the Chugoku electric power co., Inc. These organizations suggested that since the demand for electricity is developing at a high speed in Cambodia, it is better to do projections in a relatively short time period instead of making long-term demand forecasts.



..... High case - - - - Base case - · - · - Low case — Forecast Result
Fig. 2 Comparison of electricity demand projection in National Grid of Cambodia

Source: JICA and 中国電力株式会社, 「カンボジア国電力セクター基礎情報収集・確認調査ファイナルレポート」, March 2012.

Table 1 showed the data of power generated domestically and purchased from neighboring countries, as well as the data of electricity consumption in Cambodia in 2015. When comparing the data in table 1 to the information contended in Figure 2, it could be found that the energy sold to consumers in 2014 and 2015 was 4144.12 and 5205.34 million kW respectively, both between the projection for the base case and high case. Energy sold to consumers increased by 25.61%, while numbers of consumers increased more than 30%. In the year 2015, generation capacity grew by 9.66%, and the energy generated increased by 46.79%, which caused the drop in total import by 15.36%. Cambodia is moving towards a society with more power self-sufficiency and less dependent on importing energy. Importing from Laos grew steeply while the part from Thailand dropped steeper than that, though in a short period thus cannot represent the long-term trend.

Overall loss percentage decreased by approximately 1% from 2014 to 2015, but the absolute value of 13.47% is still high.

2.3 Electricity facilities Generation

At the present time, the construction of hydro and coal-fired power plants in Cambodia is almost following the development plan. Up to 2017, there are eight newly constructed power plants under operating, includes five hydropower plants and three coal-fired power plants. The installed capacity totaled 1,420 MW, a little bit behind schedule because of the stagnation in coal-fired power plant development. Table 2 and 3 listed the major power plants on the agenda and their running status.

1 EAC Report 2016 Edition, pp.6.

2 Ibid, pp.7.

3 Ibid.

4 United Nations, Cambodia Energy Sector Strategy (Draft). Retrieved on August 2, 2017. <http://www.un.org/esa/agenda21/natinfo/countr/cambodia/energy.pdf>

5 EAC Report 2016 Edition, pp.82.

6 Ibid, pp.21.

Table 1. Data of power generation and consuming in Cambodia in 2015

Description	Unit	Data for 2014	Data for 2015	Percentage Increase
Energy Generated	million kWh	3,058.36	4,489.27	46.79
Energy Imported	From Thailand	523.56	307.39	-41.29
	From Vietnam	1,265.72	1,200.39	-5.16
	From Laos	13.77	18.31	32.96
Total import	million kWh	1,803.05	1,526.08	-15.36
Total energy available	million kWh	4,861.41	6,015.35	23.74
Generation capacity	kWh	1,511,338.00	1,657,274.00	9.66
Numbers of consumers	Number	1,424,735.00	1,859,204.00	30.49
Energy sale to consumers	million kWh	4,144.12	5,205.34	25.61
Overall loss percentage	Percent	14.75	13.47	-

Source: EAC Annual Report, 2016 Edition. pp. 33-34.

Table 2. List of the major hydropower plants in Cambodia

No.	Project	Country of Supplier	Type	Power (MW)	COD	Running Status	Contract
1	Kamchay Hydro Power Plant	China	Hydro	193	2011	○	44-year, BOT
2	Kirirom III Hydro Power Plant	China	Hydro	18	2012	○	30-year, BOT
3	Stung Atay Hydro Power Plant	China	Hydro	120	2013	○	-
4	Stung Tatay Hydro Power Plant	China	Hydro	246	2015	○	37-year, BOT
5	Lower Stung Russey Chhrum Hydro Power Plant	China	Hydro	338	2013	○	35-year, BOT
6	Lower Se San II & Lower Sre Pok II	Vietnam	Hydro	400	2017	Under construction	-
7	Stung Chhay Areng Hydro Power Plant	China	Hydro	108	2017	Suspending	-
8	Lower Sre Pok III + IV Hydro Power Plant	-	Hydro	368	2018	-	-
9	Sambor Hydro Power Plant	China	Hydro	450	2019	-	-

Source: Current Status of Renewable Energy in Cambodia

Presented by MME on 12-14 December 2016, Bangkok, Thailand

Table 3. List of the major coal-fired power plants in Cambodia

No.	Project	Type	Power (MW)	COD	Running Status
1	200 MW Coal Power Plant (I) in Sihanouk Province - Phase 1	Coal	100	2013	○
2	200 MW Coal Power Plant (I) in Sihanouk Province - Phase 2	Coal	135	2016	○
3	700 MW Coal Power Plant (II) -Phase 1	Coal	270	2015	-
4	700 MW Coal Power Plant (II) -Phase 2	Coal	100	2017	-
5	700 MW Coal Power Plant (II) -Phase 3	Coal	100	2018	-
6	700 MW Coal Power Plant (II) -Phase 4	Coal	100	2018	-
7	700 MW Coal Power Plant (II) -Phase 5	Coal	100	2019	-
8	Coal Power Plant (III) or Gas Power Plant	Coal/Natural Gas	400	2020	-

Source: <http://www.phnompenhpost.com/business/giant-coal-plant-taking-shape-sihanoukville>

Table 4. Summary Information about Generation Facilities and Energy Sent-out classified by Generation Type

No.	Type of Generation	Installed Capacity, kW		Proportion of Installed Capacity in % for 2015	Energy Sent Out, Million kWh		Proportion of Energy Sent Out in % for 2015
		End of Year 2014	End of Year 2015		Year 2014	Year 2015	
1	Hydropower	929,430	929,700	56.10	1,851.60	2,159.64	48.11
2	Diesel/ HFO	291,268	304,629	18.38	326.97	163.66	3.65
3	Bio mass	22,640	19,945	1.20	16.79	38.15	0.85
4	Coal	268,000	403,000	24.32	863.02	2,127.82	47.40
	Total	1,511,338	1,657,274	100.00	3,058.38	4,489.27	100.00

Source: EAC report 2016 Edition, pp.83.

Statistics also showed that the development of generation sector is on the right track. Table 4 showed the generation facilities and energy sent-out by generation type. In the year 2015, the installed capacity of coal-fired power plants grew by more than 50%, the proportion of energy sent out by coal-fired power plants caught up

with that of hydropower plants. Now the proportion is almost half-half as planned. Power generation by diesel and HFO dropped rapidly as the new plants put into operation.

Transmission

There are several different grids exist in Cambodia. As summarized in Table 5, the National Grid served more than 96% of the consumers, followed by Vietnam Grid (10.16%), Thai Grid (1.92%) and isolated distribution systems (1.16%). The isolated distribution systems refer to eleven isolated grids located in the provinces away from the capital city.

Cambodia has ambitious plans regarding its grid development plan. Until 2027 roughly 2,100 km electricity grid (230kV and 115kV transfer lines) are to be constructed with interconnections between existing grid systems such as Phnom Penh and surroundings, connections to planned power plants as well as cross-border lines to Laos PDR.

3. Current issues for end users

Cambodia overall has three issues related to electricity: relatively high prices, unstable supply, and inadequate supply. The issues will be discussed separately.

3.1 Relatively high tariff

There have been plenty of studies showing that the electricity tariff in Cambodia is much higher compared to the neighboring countries, especially when taking GNI per capita into consideration⁷. Domestic tariff gap exists, too. The tariff in Phnom Penh city is approximately 60% of that in other areas⁸.

Cambodia applies flat tariff. Table 6 listed the tariffs for different categories of consumers in the capital city and provincial town of Prey Veng, Kratie and Mondulhiri.

According to the EAC Report (2016 Edition), “*The tariff for consumers is determined based on the cost of electricity purchased and the cost of distribution. ...For the licensees generating electricity using Diesel/HFO, the cost of electric supply is related to the cost of Diesel/HFO*”. For the latter, EAC implements a Fuel Cost Adjustment (FCA) mechanism to adjust the tariffs “*in a simple and transparent manner*”. The tariff for different slab rates of fuel (Diesel/HFO) is determined after public consultation, so when the cost of fuel changes, the tariff could be changed correspondingly without consulting the public.

The last time that tariffs in Phnom Penh and Kandal Province were adjusted in 2010⁹. In the year of 2009, the tariff for domestic use was 390 Riels/kWh for all kWh if

consumption up to 50 kWh per month, but in 2010 it rose to 610 Riels/kWh. The tariff for all kWh if consumption between 51 to 100 kWh/Month and more than 100 kWh/Month was 610 Riels/kWh and 720 Riels/kWh respectively, and the tariff changed to 720 Riels/kWh for all kWh if monthly consumption exceeds 50 kWh in 2010. In a word, the tariff for domestic consumers in this region has increased on the contrary of planned.

On the other hand, the tariff for Embassy, NGO and Foreign Residents and Institutions in Phnom Penh and Kandal Province decreased from 890 Riels/kWh to 820 Riels/kWh for all kWh. A new category named “Customer paying by Government budget” was set, with a tariff of 780 Riels/kWh. In general, higher tariffs compared to the domestic use has been set for organizations such as Embassy, NGO, Foreign Residents and the customers paying by Government budget. However, other resource showed that the default of electricity bill by the government is common¹⁰.

There are several hypotheses for the increase of electricity tariff for domestic use. Excluding the effect of increasing income level, inflation, change of purchasing power of Cambodian Riel, the other possible reasons include the growth of consumption needs, and the adjustment of profit by the supply side, since the state-owned company EDC is the dominant distributor in Cambodia. For EAC and EDC, the national power grid needs to be expanded in a high speed to meet the consumption needs and to achieve the development plan as well, so tariffs will also have to fund the extension of the distribution network.

With the development of large hydro potentials and more coal-fired power plants, the tariffs might decline to a reasonable level in the future.

3.2 Inadequate supply

In Cambodia, most of the electricity was consumed in the area around the capital city. Meanwhile, 79% of the population lives in the rural area outside provincial and district towns¹¹. Due to the lack of distribution network, the rural area especially the isolated ones can hardly get access to stable electricity supply. In 2016, there is only 57% of all households in Cambodia have access to grid-quality electricity, 62% of all villages have access to electricity of any type¹². According to the National Strategy Development Plan 2014-2018, the indicators should be improved to 70% and 100% respectively.

7 Retrieved from the calculation of BENI SURYADI, Senior Research Analyst for Policy Research and Analytics Program in ASEAN Center for Energy. August 1, 2017. <https://asean.bicaraenergi.com/2014/05/asean-electricity-tariff-2014/>

8 The result is calculated by using the tariff for domestic use in Phnom Penh and provincial town of Prey Veng, assuming that monthly used less than 50 kWh. Detailed numbers refer to Fig. 1.

9 EAC Report 2010 Edition and 2011 Edition, Chapter 5, Electricity Tariff of Licensees.

10 JICA 産業開発・公共政策部, 「カンボジア王国 送変電システム運営能力強化プロジェクト詳細計画策定調査報告書」, 2012年10月 . pp.9

11 Retrieved from the data bank of World Bank on August 1, 2017. <http://data.worldbank.org/indicator/SP.RUR.TOTL.ZS>

12 Presented by Mr. Por Nimol on behalf of General Department of Energy, Ministry of Mines and Energy, Cambodia, in the Asia LEDS Partnership Regional Workshop: Mechanisms that Catalyze Finance for Grid-Connected Clean Energy, on July 1, 2016.

Table 5. Grid systems in Cambodia

No.	Grid system	Energy input in %	Energy sold to consumers %	Consumers served %
1	National Grid	89.97	89.53	96.32
2	Vietnam Grid at MV	6.67	7.10	10.16
3	Thai Grid at MV	2.81	2.80	1.92
4	Lao grid at MV	0.31	0.31	0.44
5	Isolated Distribution systems	0.20	0.19	1.16
6	Gen. Licensee to Captive Industry	0.06	0.07	0.00
	Total	100.00	100.00	100.00

Source: EAC Annual Report, 2016 Edition, pp.88.

Table 6. Tariff of EDC for Phnom Penh, Kandal Province, Provincial Town of Kampong Speu, Prey Veng, Kratie and Monduliri

Area / Category		Electricity Tariff /kWh
Phnom Penh, Kandal, Kampong Speu		
Domestic in Phnom Penh and Takhmao Town of Kandal Province	Monthly used \leq 50kWh	610 Riel
	Monthly used >50kWh	720 Riel
Domestic in Ch. Bamon City of Kampong Speu Province	For all customers	720 Riel
Embassy, NGO and Foreign Residents and Institutions	For all customers	820 Riel
Customer paying by Government budget, Commercial (business) and -Industrial customers	Small customers	*MA + 0.036 USD
	Medium customers	MA + 0.028 USD
	Large customers	MA + 0.024 USD
	**MV customers	MA + 0.020 USD
Provincial Town of Prey Veng, Kratie and Monduliri		
Domestic		1,050 Riels
Government. Institutions		1,050 Riels
Small Industrial, Business		1,050 Riels
Medium Industrial, Business		980 Riels
Big Industrial, Business		920 Riels
MV Consumer		850 Riels
MV Consumer outside the distribution area		800 Riels
MV Consumer for pump set for agriculture during 22:00 to 7:00 Hrs		600 Riels

*MA: Estimated average cost of electricity purchased during the year, which was fixed as 0.157 USD/kWh for the year 2015.

**MV: Customer who is directly connected to MV Grid.

Source: Report on Power Sector of the Kingdom of Cambodia (EAC Report), 2016 Edition.

The power supply in the rest area is mainly provided by isolated systems owned and operated by private REE that generate power from imported diesel and HFO¹³, thus the electricity tariff is much higher compared to the urban area as mentioned before. The price for electricity generated by HFO fluctuates as the oil prices changes, ranging from \$0.65/kWh to \$0.90/kWh. The average cost for rechargeable car batteries reached \$1/kWh¹⁴. More than 11 million people use chargeable car batteries as a source of electricity, and kerosene and candles for lighting. Furthermore, most of the rural areas in Cambodia have limited access to the power supply for only 4-5 evening hours per day¹⁵.

13 ADB. 2011. Energy Sector Assessment, Strategy, and Road Map, 2011–2013: Cambodia. Manila.

14 Ibid.

15 Ibid.

The REF was operated as an independent organization to improve the situation of rural electrification, but after the financial support from WB ended in 2012, it was put under the management of EDC. With WB's support, it has made some efforts such as introducing Solar Home System to the isolated areas by providing loan or subsidies to the households which are willing to install this system. Also, they tried to develop the mini hydropower which was not in use in the rural area, to help these regions to build an independent off-grid power system. However, not all the efforts worked well. The reasons are complicated, including the limitation of the environment, and some other subjective factors such as corruption. Other researchers have mentioned that one of the WB's project is postponed because that they cannot find reliable organizations or individuals to carry out the plan.

The extension of national grid to the remote area has

Table 7. Plan for rural electrification development 2011-2030

Extent of Coverage of rural area by the year		2010	2015	2020	2030
Electrified HH	Grid extension	6.9%	29.1%	47.4%	66.2%
	Hydro mini-grid	0.0%	0.6%	0.3%	0.1%
	Biomass mini-grid	0.0%	0.4%	0.3%	0.0%
	Existing diesel mini-grid	4.4%	1.9%	1.4%	0.6%
	New diesel mini-grid	0.0%	1.9%	1.2%	0.1%
	SHS	0.0%	0.7%	1.4%	0.2%
	Total percentage of HH received electricity supply	11%	34%	52%	67%
villages received electricity supply	grid extension	10.9%	46.1%	78.3%	94.8%
	Hydro mini-grid	0.0%	1.5%	0.6%	0.2%
	Biomass mini-grid	0.0%	1.2%	0.7%	0.1%
	Existing diesel mini-grid	11.9%	5.4%	2.7%	0.9%
	New diesel mini-grid	0.0%	5.1%	1.9%	0.1%
	Existing BCS	34.7%	14.3%	6.8%	1.3%
	New BCS	0.0%	4.5%	9.0%	2.6%
	Total percentage of villages received electricity supply	57%	78%	100%	100%

Source: The study of IED for baseline scenario.

been taken as the most effective way for rural electrification, and the plan for it was built as Table 7 showed. Grid extension was expected to cover 66.2% of the households and 94.8% of villages in the rural area in 2030, but the high cost and low return of building transmission lines in the rural area remain the biggest problem¹⁶. It is said that the thieves stealing the existing transmission line are also a severe problem, implied that the low-income issues need to be addressed too.

3.3 Unstable supply

The blackout caused by unstable electrical transmissions often happens in Cambodia. The condition has been better in the recent years, but the lack of efficient national grid regulation and the instability of importing electricity from neighboring countries are still the obstacles to making more progress.

Due to the lack of electricity, available time of school or hospital is very limited. Besides, it affects crucially on the local economy. Therefore, this situation causes the barrier to the development of the rural area and Cambodia itself.

4. Main challenges

4.1 Short-term challenges

At present, the main issues of the power system in Cambodia can be summarized as follows: Deficiencies in the power generation structure, limited transmission capacity, and stagnation of rural electrification. As there are more and more power plants being completed, the generation capacity is gradually catching up with the growing demand. The transmission network remains to be the bottleneck of the whole power system. Without an effective transmission network and a well-functioning

National Control Center, the power will not be allocated in an effective way. On the other hand, the rural electrification cannot be achieved without a wide distribution network. It is expected to be improved in the coming years.

4.2 Medium- and long-term challenges

Compared to the short-term challenges which can be solved with a sure amount of financial and technical support, as well as time, the medium- and long-term challenges are thornier. There are three major challenges: the impact to the environment, the shortage of resource for power generation, and energy security.

4.2.1 Environmental impact

In the development plan for power generation of the Cambodian government, the power generation structure by resource could be divided into two phases. The period till 2023 could be seen as the first phase, which claims that hydropower and coal-fired power should be almost half-half for the power generation output. From 2024 to 2030, gas will take place of coal.

There is no need to explain the impact of the coal-fired power plant on the environment, so here a light will be shade on that of hydropower plants. Hydropower plants play an important role constantly in different phases of power generation development. Hydropower is preferable because of its relatively high efficiency, but it has been accused of possible environmental impact for years as well. The constructing process of a hydropower plant usually causes a series of environmental damage, including the change of land cover (Vegetation), the topographical change, and so on. After constructed and being put into operation, there is evidence showing that the reservoirs that used in most of the hydropower plants have a severe impact on the climate around the plant sites.

16 JICA and 中国電力株式会社, 「カンボジア国電力セクター基礎情報収集・確認調査ファイナルレポート」, March 2012. pp. viii.

4.2.2 Resource shortage

The resources for power generation in Cambodia include fossil fuels such as coal and gas, and water resource as well. In a 2009 report the Japan Development Institute (JDI) stated that while coal reserves in Cambodia are small, they may be enough to supply coal for a 400 megawatt (MW) coal-fired power plant for more than thirty years. The installed capacity of the completed coal-fired power plants totaled 505 MW in 2016. The report goes on to say that additional energy could be obtained through imported coal from seaports along the coast of the Gulf of Thailand and imported power from Thailand, Laos, and Vietnam through the national grid and the ASEAN Power Grid¹⁷.

Even if the needs of fossil fuel such as coal and gas could be imported from neighboring countries, there is no guarantee for the water resource. Figure 3 showed the hydropower plants which are built or planned to be built on the Mekong mainstream. The data in the map was updated to 2010, the conditions have changed in the past seven years, with more and more power plants being built.

There are more than eight hydropower plants in upstream of Mekong River in China, the installed capacity totaled over 1.7 GW. The impact of the big dams to the water flow to down streams are gradually being observed since the year 2011, it is said that the hydropower operations has considerably increased dry season flows and decreased wet season flows¹⁸. The changes can be observed over 2000 km downstream in Cambodia. The high density of hydropower plants in downstream countries, especially in Laos, will possibly worsen the situation. From the perspective of self-sufficiency for energy, it takes more long-term sight to form the energy strategy.

4.2.3 Energy security

The development plan of regional grids in ASEAN countries and the Great Mekong Subregion (GMS), named ASEAN Power Grid and GMS Power Trade Plan respectively, are undergoing. But there are still issues need to be addressed to achieve this goal. First, there are technical barriers to this plan. All the member countries are in different phases of development, thus the infrastructure including electricity facilities vary. To build a regional grid, all the barriers need to be cleared to make sure that all the member countries adopt the same regulations in the same standard, while following the same framework to adjust, run and maintain the joint system.

Another issue is energy security. So far, Cambodia

has been under the instability of importing energy from neighboring countries. An unpredictable technical accident happened in Thailand could cause a blackout in the whole Phnom Penh City, as it happened in the past. This kind of risk escalates while several countries join in this system, different technical levels in different member countries may make it more complicated.

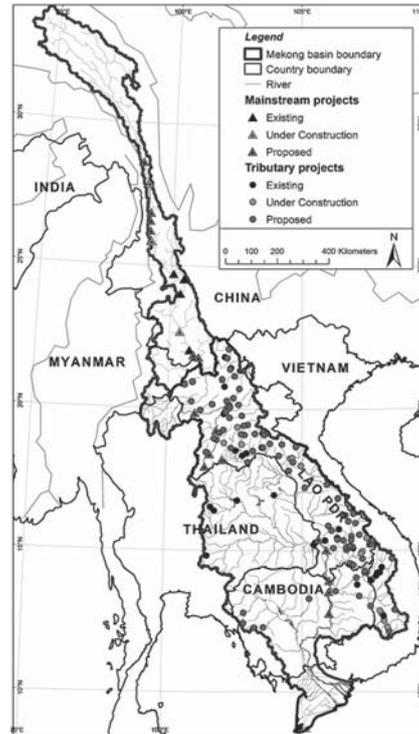


Fig. 3 The hydropower development on the Mekong mainstream in 2010

Map design: University of Canterbury, Data source: MRC Hydropower database
<http://mekongriver.info/hydropower>, Retrieved on August 3, 2017

5. Suggestions and conclusion

We would like to propose several ideas to improve the electricity supply in Cambodia.

- (1) To optimize the power generation structure by adjusting the output of hydropower plants and coal-fired power plants according to seasons. The output of hydropower plant largely depends on the water flow, but reservoirs in each power plant could be used to regulate it to some extent. By collecting data on water flow in different seasons over the year, projections of water flow in coming years could be made. Based on the projection, plans on power generation by different facilities could be built. In the raining season, the output of hydropower plants reaches the peak and the part surplus to the consumption can be exported to neighboring countries. In the dry season, the coal-fired power plants could fill up the gap between electricity demand and supply. By taking full use of reservoirs,

17 http://www.sourcewatch.org/index.php/Cambodia_and_coal Retrieved on July 13, 2017.

18 Timo A. Räsänen, Paradis Someth, Hannu Lauri, Jorma Koponen, Juha Sarkkula, Matti Kumm. Observed river discharge changes due to hydropower operations in the Upper Mekong Basin. *Journal of Hydrology*, 2017; 545: 28 DOI: [10.1016/j.jhydrol.2016.12.023](https://doi.org/10.1016/j.jhydrol.2016.12.023)

the running season of hydropower plants can be extended so power supply from water resource will replace the part that taken by coal-fired power plants, which will be more environmentally friendly.

- (2) To build an effective National Control Center. As the extension of the national grid going on, and more and more power plants are putting into operation, a well functioned National Control Center is indispensable. The existing National Control Center has sure amount of facilities, but it will not be enough when dealing with a whole power system which is growing bigger and bigger.
- (3) In general, there are needs for engineers and skilled workers in almost every segment of the power system, for instance, the power generation sector. Most of the power plants both hydro and coal-fired ones have been built by foreign companies, mainly from China and Vietnam, under the contract of Build-Operate-Transfer. The contracts will end in around 30 to 40 years, the relevant human resources have to be ready to take over the responsibility to run the power system.
- (4) To adjust the current price system. As analyzed in the former session, the electricity tariff in Cambodia has increased in recent year, it is against the development goal set in the National Strategy Development Plan 2014-2018. As the generation cost going down because of the operating of more hydropower plants, it is possible for EDC and EAC to reduce the tariffs. However, the pressure of expanding grid network to remote areas still exist, so maybe in the coming few years, the tariffs may remain at a high level to cover the expenditure in transmission and distribution network development.
- (5) To introduce more renewable energy such as mini hydropower plants and Solar Home System to the rural area. As a supplement to the national grid, these off-grid power generation facilities might be more practical even taking construction cost into consideration.

Despite the corrupted government, we believe that the power supply condition in Cambodia will be improved gradually in the peaceful years to come. With the help of the foreign aid and international organizations such as World Bank, Asian Development Bank and JICA, power plants and transmission lines has been built one by one, and the growing needs in industrialization will accelerate this process. The only problem is, it calls for a long-term sight from the government to plan for the future generation. Environmental friendly and self-sufficient power system are needed, therefore the power sector development plan for the next five-year may need to keep the balance between economic development and environmental protection, efficiency and security.

Getting Out from the Least Developed Country: Cambodia “Electricity Issues of Cambodia – Suggestions on building an affordable & sustainable power supply system in Cambodia –”

Asuka Umemoto

Introduction and Background

In this course, we have been mainly focusing on Cambodia as target countries. I will not fully cover issues which Cambodia are facing since we mainly focused on the issues of energy supply, especially on electricity problem. Before I go on to the main topic, I'd explain the basic information of Cambodia briefly. Cambodia is not old country despite its rich history. It had been controlled by Khmers Rouges from 1968 to 1978. During this time of period, it is said that more than 50,000 citizens were murdered by this government. Not only horrible massacre, but also people were forcibly recruited as soldiers, especially young people of pre-teen from rural and poor villages.

After the end of Pol Pot, still Cambodia is chased by its phantom. But, Cambodia is gradually changing from how it used to be of Pol Pot era. In 1993, the election was held under the supervision of UNTAC. In this election, a royalist party FUNCINPEC won. Cambodia brought back its monarchy to the country. The both Norodom Ranariddh and Hun Sen were chosen as prime minister. With this change, Cambodia restarted as 'Kingdom of Cambodia'.

However, in 1997, there was conflict between FUNCINPEC and Cambodian People's Party which is ruling by Hun Sen. This conflict lead to the downfall of Ranariddh as prime minister and in 2003, FUNCINPEC lost its power in Cambodia's politics. Since then, Hun Sen has been ruling the government.

It is often said that Cambodia's government and politics has issues related to Hun Sen and his family. Even on our topic, there was some spur that government of this country itself might be the problems of Cambodia. But, the important issue on this is that we cannot really find reliable data or information related this issue since these issues are related to Hun Sen and his family or other politicians. It is true that Cambodia is known as one of the worst country where the corruption is occurring daily basis in and outside of politics. Even in the civil society, it is hard to avoid the corruption and this is one of the reason why foreign companies avoid to invest Cambodia. Back to the topic, international NGO such as Transparent.org are watching Cambodia's current situation on corruption and issuing annual report, but since this is not our main focus of topic, I'd skip here.

Cambodian government is currently working on how to get out of their statue: the least developing countries. It is true that their development is still middle

of the way. Cambodian government has plan called NSDP (National Strategic Development Plan) which is aimed to develop the country. The targets are varied from financial sector, agriculture, forestry, fisheries, industries, energy development, transportation, telecommunication, tourism, health, education and de-mining programme.

So, now I'd like to focus on the main topic of our research here. Surely, Cambodia is one of the least developing countries in the world and Asia. Despite its financial supports from the foreign aid, this country's developing speed and level remains low compared to neighbouring countries. What is the problem here? Cambodia depends on foreign aids, however it doesn't seem to work well. Cambodia needs enough basis to develop by their own. Thus, it is clear that the electrification plays a crucial role in this context. Electrification is essential for making stable society and economy. In Cambodia's case, capital city or big city such as Phnom Penh has access to the electricity whilst people in the rural area has limited access to electricity. In Cambodia, more than half of population lives in the rural area where people cannot have access to stable electricity.

Cambodia overall has 3 problems related to electricity: high prices, unstable supply and inadequate supply. These problems are very dominantly in the rural area. Currently, most of the people in rural area are depend on the car battery as their energy resources. Because, electricity fee is quite higher compared to the urban area's and there's no transmission grid to most of the rural area. If people wants to use any electrical appliances in their houses, they use charged car battery as energy resources. If the battery runs out, they go to the battery charging station to re-charge battery. The original energy resources for these batteries come from the diesel generator. Due to the lack of electricity, available time of school or hospital is very limited. Besides, it affects crucially on local economy. Therefore, this situation causes the barrier to development of the rural area and Cambodia itself. To tackle this problem, not only the Cambodian government, but also foreign aid such as World Bank, JICA and ADB proposed several projects. However, the situation improved slightly.

By reviewing the past projects and ongoing projects, we propose two solutions for the rural electrification: expansion of the transmission grid and introducing the renewable energy. In Cambodia, there's already some electrification by renewable energy such as hydroelectricity are already installed. However, this way

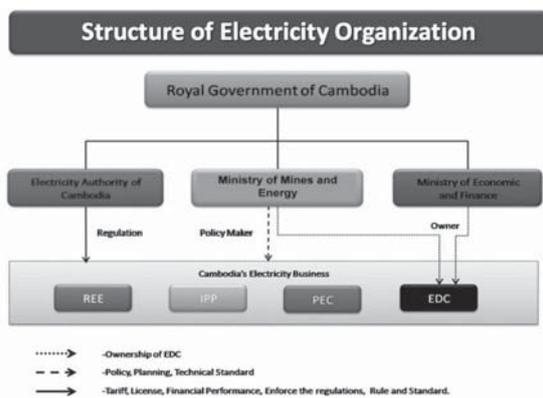
of energy generation highly depends on the season. Therefore, we should install alternative way of generation complement existing energy generation. In this case, we propose energy generation by solar power system. It is said that Cambodia has the potential for solar power generation since hours of sunlight per day of Cambodia is 6 - 9 hours. There was already projects in the rural area to install solar home systems, however it didn't work well since the project asked people of the rural area to pay the installation fee.

Fabricating and installing solar power system is not cheap, but the cost is decreasing year by year and efficiency improves better these days.

This paper has 3 chapters. 1) Power System of Cambodia, 2) Current Situation of Rural Electrification and 3) Solutions and Challenges. In first chapter, I'd like to explain about power system of Cambodia briefly. In second chapter, I'd like to focus on electricity issues of rural area since more than 60% of citizens of Cambodia live in rural area. Therefore we can tell that the issues they are facing is the issues Cambodia overall is facing. In last chapter, I'd like to suggest some possible solutions

Power System of Cambodia

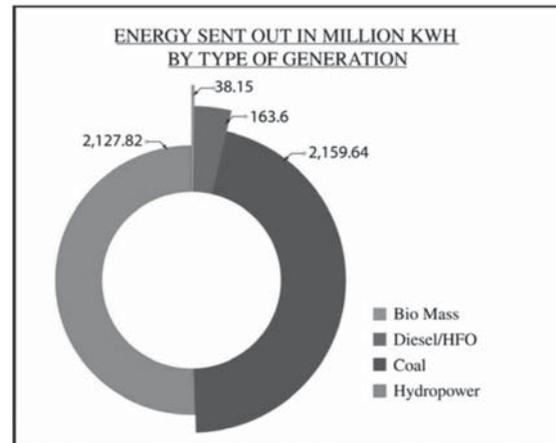
Firstly, I'd like to look at the structure of electricity organisation of Cambodia. According to the annual reports issued by EAC (Electricity Authority of Cambodia), the structure of organisation and bureau are classified as below picture. Royal Government of Cambodia has control over EAC, Ministry of Mine and Energy and Ministry of Economic and Finance. Ministry only works in this case as policy maker, but EAC plays the role as regulator. In Cambodia, there's more than 100 private company which sells electricity to people. They are subcontractors and to sell electricity, they need to have license from EAC. By paying license fee, they can own license and have business.



EDC = Electricite du Cambodge, IPP = independent power producer, PEC = provincial electricity company, REE = rural electricity enterprise.

Secondly, I'd like to look at the current electricity generation of Cambodia. Cambodia depends on its electricity resources from importing from neighbouring countries. As for generation in country itself, Cambodia depends on electricity generation mostly by coal, diesel

and hydropower. Generation by coal and diesel can be the reason of high prices of electricity fee since the natural resources are imported from other countries and its prices directly effects on the price making process. Besides, these natural resources are limited. How about hydropower? The same as neighbouring country, Cambodia also has dry season. When it comes to dry season, sufficiency of generation by hydropower decrease, on the other hand, in rainy season, it can be the cause of over producing.



Current Situation of Rural Electrification

According to NSDP, Cambodian government has goal: to have access to electricity supply by the national grid and other sources by 2020. However, unfortunately, current situation is not favourable. In urban area or capital city like Phnom Penh, electricity grid is existing and people has access to electricity. However, people in rural area usually don't have access to electricity. Even they have access to it, the prices are 4 times higher than urban area, thus only limited people can access to electricity in rural area. In Cambodia's case, most of Cambodians live in rural area, therefore, lack of electricity is huge problem for them to live. Electricity is one of essential infrastructure. Without electricity, it is difficult to do daily activity.

Currently, most of people in rural area are depending on its energy resources on car battery. They use it to watch TV or use any other electric devices. Surely, it is not convenient compared to life with fully access to electricity, however, this is the way they have been through. They recharge car battery when it runs out. In every small villages of Cambodia, they have battery charge station, there people can charge car battery with small amount of money. This electricity comes from diesel power generation. They generate electricity there and convert it to small car battery. These generators are usually old. Therefore, it sometimes can be the cause of environmental destruction.



(Diesel electricity generator)



(Car battery and TV)

Solutions and Challenges

As for solutions, in other word, to build sustainable and affordable electricity supply system, we suggest to optimise management, change the structure, expand the coverage area, protection of the grid and wires and installing renewable energy such as solar power.

More details, as mentioned in other chapter, Cambodia has dry season and rainy season, therefore, change the prices rate for season can be one of the solution. Changing structure can help to bring electricity more efficiently and reasonably. Expanding the coverage area is quite important since most of national grids don't cover rural area and it is very essential. In developed countries, this usually cannot be huge problem, but countries like Cambodia, some people steal electrical wires which are made from copper. So that they can sell it and make money out of it. And in Cambodia, this happens quite often and it can give damage to the transmission of electricity. As for renewable energy, as I mentioned in the introduction and so on, Cambodia has good potential for solar power generation since daylight time per day is 6 to 9 hours. Renewable energy is clean and eco-friendly, therefore, it is very possible way of electricity generation.

Yet, Cambodia might face some challenges. hydropower generation can be cause of environmental destruction. For example, in other countries, they are shifting the way of electricity generation from hydropower to other renewable energy since hydropower energy generation depends on the weather. Besides, operating and building facilities can be harmful to ecosystem. Cambodia now has the plan to build more hydropower generation in and

round Mekong area. This might lead to conflict over energy and natural resources. As for renewable energy such as solar power, it had high potential, but it costs a lot. Therefore, it is difficult for Cambodia alone to install solar power generation system and has to rely on foreign aids.

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Suggestions on building an affordable & sustainable power supply system in Cambodia Abstract

ZHANG FAN
Joint Seminar 2. Group C

1. Research questions

What is the status quo of power sector in Cambodia? What do they want to achieve and how is it going? What is the obstacle and how to overcome it?

2. Backgrounds

Cambodia is one of the least developing countries in the world and Asia. Decades of conflict destroyed infrastructure and human capital, which almost stopped the developing process of Cambodia.

The situation took a favorable turn since 1993, a new regime was established. After that, the economy has been developed rapidly with an annual growth rate of around 7%. Meanwhile, electric power system was rebuilt on least-cost principles with emphasis on large coal, hydro, and imports. Big cities such as Phnom Penh has access to the electricity while people in the rural area has limited access to stable electricity, as more than half of population lives in the rural area.

On the other hand, the demand for electricity supply is growing fast. According to the available electricity demand forecast in Cambodia prepared by the Ministry of Industry, Mines and Energy in 2007 and on the demand forecast by World Bank and KEPCO in 2006, the electricity demand projection in Cambodia in 2024 is 3,045.33 MW and 16,244.61 GWh for capacity and electric energy respectively. Although foreign capital has helped Cambodia to expand its ability to the power supplying, the electricity output still cannot fulfill the growing demand.

3. Current situation

Cambodia overall has three problems related to electricity: relatively high prices, unstable supply, and inadequate supply. As a great share of the electricity is imported and are used to produce more than half of locally produced electricity, Cambodian electricity prices are among the highest in the region. With the development of large hydro potentials and more coal-fired power plants, the tariffs might decline in the future. Yet, the national power grid is still under constructing, so tariffs will also have to fund the extension of the distribution network.

These problems are more severe in the rural area. Currently, most of the people in rural area are dependent on charged car battery as their energy resources, because there's barely any transmission lines extended to most of the rural area. Offered by thousands of Rural Electrification Entrepreneurs, the original energy resources for these batteries come from the diesel

generator, thus the electricity tariff is much higher compared to the urban area. Due to the lack of electricity, available time of school or hospital is very limited.

Besides, it affects crucially on the local economy. Therefore, this situation causes the barrier to the development of the rural area and Cambodia itself. Taken all these into consideration, Cambodia has ambitious plans regarding its grid development plan.

Until 2027 roughly 2,100 km electricity grid (230kV and 115kV transfer lines) are to be constructed with interconnections between existing grid systems such as Phnom Penh and surroundings, connections to planned power plants as well as cross-border lines to Laos PDR. Furthermore, Cambodia has constructed or planning/constructing nearly 20 power plants fueled by hydro and coal, make it possible to build a self sufficient power system.

At the present, the main issues of the power system in Cambodia can be summarized as follows:

- Deficiencies in the power generation structure,
- Limited transmission capacity,
- and Stagnation of rural electrification.

4. Suggestions

We would like to propose four suggestions to improve the electricity supplying condition.

(1) To optimize the management of power grid, by balancing the using of thermal power and hydropower. promoting rainy season hydropower exports (On the basis of the better transmission system), and adjusting the existing tiered pricing system.

(2) To change the structure of power grid from single loops to ring loops.

(3) To expand the coverage area of the power grid and to introduce renewable energy to the rural area.

(4) To protect the existing power grid against thieves.

4. Closing remarks

Despite the corrupted government, we believe that the power supply condition in Cambodia will be improved gradually in the peaceful years to come. With the help of foreign aid and international organizations such as World Bank, Asian Development Bank and JICA, power plants and transmission lines has been built one by one, and the growing needs in industrialization will accelerate this process.

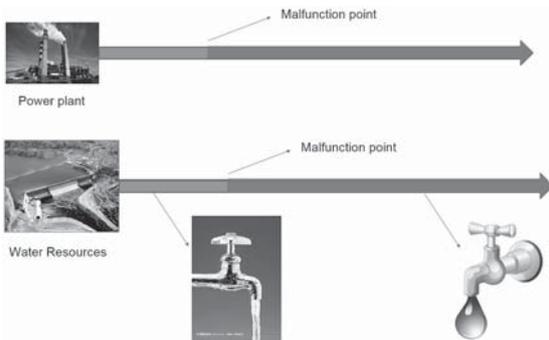
The only problem is, it calls for a long-term sight from the government to plan for the future generation. Environmental friendly and self-sufficient power system

Even though the cost of single-wire loop transmission line is low, and the management of it is easy. There are too many disadvantages of this system.

Disadvantages of the radial distribution system

- The end of distributor near to the substation gets heavily loaded.
- When load on the distributor changes, the clients at the distant end of the distributor face serious voltage fluctuations.
- As users are dependent on single feeder and distributor, a fault on any of these two causes interruption in supply to all the users connected to that distributor.

In order to describe the system easily to understand, I use an example of water system to describe it as the following picture shows.



Ring network power supply system

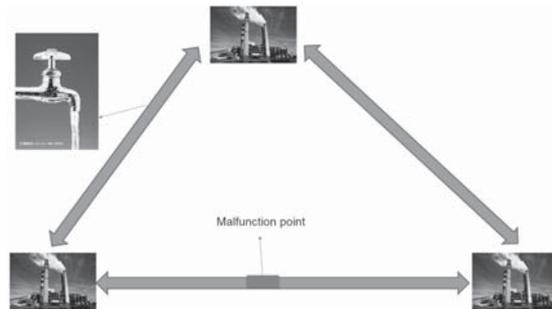
The drawback of radial electrical power distribution system can be overcome by introducing a ring main electrical power distribution system. Here one ring network of distributors is fed by more than one feeder. In this case if one feeder is under fault or maintenance, the ring distributor is still energized by other feeders connected to it. In this way the supply to the consumers is not affected even when any feeder becomes out of service. In addition to that the ring main system is also provided with different section isolates at different suitable points. If any fault occurs on any section, of the ring, this section can easily be isolated by opening the associated section isolators on both sides of the faulty zone transformer directly.

Advantages of the ring network power supply system

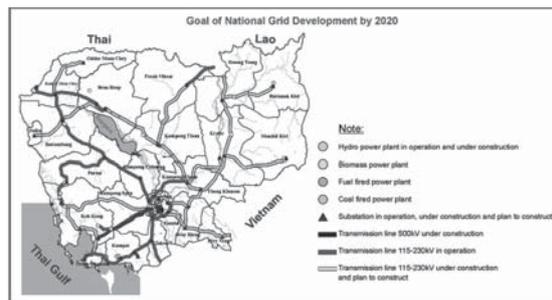
- In ring power is supplied from both ends as compared to radial
- In case of a fault in the radial circuit the entire system goes off unlike in ring where by in case one end gets a fault the other end still keeps on supplying power

- Compared to the radial system, the voltage drop is less along the distribution line
- More subscribers can be installed to the system than the radial system
- Less voltage fluctuations can be seen at client's terminals. Voltage fluctuations in high loaded areas can be reduced using a tie line.

In order to describe the system easily to understand, I use an example of water system to describe it as the following picture shows.



I think the target should be close to the power grid system of Japan.



(3) Optimize the management of power grid.

Adjust the existing tiered pricing system

- 1.To people: In the rainy season, using the different pricing system, encourage people to spend more.
2. To company: set up different price in peak, ordinary and low time of power consumption. Encourage company to use more in low time.
- 3.To power plant: set up different price, encourage them to produce more power in the peak time.

Promote rainy season hydropower exports

For examples:

To make a power exchange with Thailand and Vietnam.

Using the rainy season power to exchange the dry season power even though at low ratio (2 : 1)

Balance the using of thermal power and hydropower

Tell the investor (thermal power plant) how many hours their factory can work in

one year. (e.g.4000hours)

Benign cycle

End of rainy season: according to water reduction, open the thermal power unit gradually

Dry season: hydropower maintenance

End of dry season: according to water increment,

open the thermal power gradually

Rainy season: thermal power maintenance

(4) Protection.

Protecting existing power grid

1. The seriousness of the consequences of stealing the power grid.
2. Enact new laws
3. Detect the case of stealing facility of power grid
4. Protect the facilities directly

(5) Long-term sight in development.

The Kansai Electric Power Company supplies electricity at 100V/60Hz.

Although 200V has been implemented for some appliances, basically the voltage in Japan is 100V.

Appliances brought from overseas might not be used at the voltage in Japan. Note that the plug sockets for 100V and 200V are different in shapes.

The electric frequency is different on either side of the Fujigawa River in Shizuoka Prefecture and Itoigawa City in Niigata Prefecture, with 50Hz in the east and 60Hz in the west. The frequency in Kansai Electric's service area is 60Hz.



50 Hz and 60 Hz in Japan

World's Largest Dam Removal Unleashes

U.S. River After Century of Electric Production

AUGUST 27, 2014. on a remote stretch of the Elwha River in northwestern Washington state, a demolition crew hired by the National Park Service plans to detonate a battery of explosives within the remaining section of the Glines Canyon Dam. If all goes well, the blasts will destroy the last 30 feet of the 210-foot-high dam and will signal the culmination of the largest dam-removal project in the world.

The removal of the Glines Canyon Dam and the Elwha Dam, a smaller downstream dam, began in late 2011. Three years later, salmon are migrating past the former dam sites, trees and shrubs are sprouting in the drained reservoir beds, and sediment once trapped behind the dams is rebuilding beaches at the Elwha's outlet to the sea. For many, the recovery is the realization of what once seemed a far-fetched fantasy.



Elwha dam in USA

But In Asia, Africa, and South America, large hydroelectric dams are still being built, as they once were in the United States, to power economic development, with the added argument now that the electricity they provide is free of greenhouse gas emissions. But while the U.S. still benefits from the large dams it built in the 20th century, there's a growing recognition that in some cases, at least, dam building went too far—and the Elwha River is a symbol of that. For an example, Chinese Three Gorges Hydroelectric Power Station.



Three Gorges Hydroelectric Power Station in China

We think that, in the process of the power development in Cambodia, the government of Cambodia should have a long-term sight in the development. Just Do not repeat the mistakes human have made in the history.

Group 1: Feasibility of the Project with Woodchip Power Generation

Tomoyuki MUKAYAMA

Introduction

The Profile of Okinoshima Town

Oki islands included in Shimane prefecture are located in the Sea of Japan. Okinoshima town is located Dogo in Oki islands. Figure 1 shows location of the Oki islands and Okinoshima town. The profile of Okinoshima town is follow:

Population: approximately 15,000

Area: 241.64km²

The demand for electrical power: 10~22MW

The current population is approximately 15,000 people with a 53% decrease since 1955 due to an aging population, dwindling birth rate, reduced economic activity and declining employment. The economy has weakened due to their comparative disadvantage of primary resource-based industries on the Japanese main island. As of the electricity is generated by heavy fuel oil which is imported and subsidized by the prefectural Shimane and government. The Shimane and local Oki government want to address these demographic and economic trends before they decline further. Investments in renewable energy sources could enable sustainable economic development, job creation, and population growth. It is difficult to estimate the islands' future population however we assume that the electricity demanded will remain constant.

With the price of heavy oil increasing and expected to continue it was suggested that using the wood chips to generate heat and electricity will be a feasible project that will stimulate a slight profit. Figure 2 displays the concept of Green complex. The Green Complex is comprehensive business management across multiple divisions including; forest logging, wood chip production, energy business, supply of pulp raw material and chemical production of lignophenol resin would be necessary. Finally, Reviving the local forest and sea of

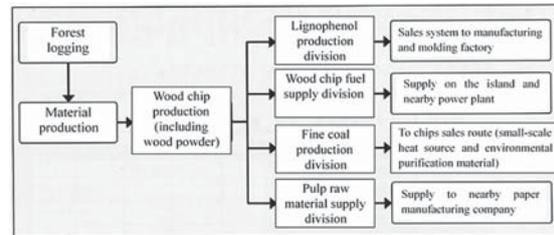


Figure 2 concept of Green complex

Okinoshima Islands. The key to making this business a success will be the establishment of a management structure based on the collaboration between such companies and local companies that are familiar with on-site conditions. Therefore, it is necessary to obtain sufficient profit by utilizing biomass.

Biomass Power Plant

Currently, around 1,000 m³ are unused while 15,000 m³/year are logged. By raising the logging to 3,000 m³/year, which is the amount required to conservation and management of forest, we estimated that 2,000 m³/year of unused materials will be produced and 1,000 t/year of woody pellet can be produced. On Oki Island, they are planning to generate biomass pellets, and the power plants consume 2,000 t/year of pellets annually. However, there are about 9,000 t of unused woody biomass on the Okinoshima town. Therefore, it is necessary to think about effective utilization of woody biomass other than using it for pellets. We propose to use this material for power generation without pelletizing this material.

Biomass conversion refers to the process of converting biomass feedstocks into energy that will then be used to generate electricity and/or heat. First, the spanner dryer -dries the wood chips supplied at the mill. The raw wood chips have around 50% water content and once dried has a 5% water content. The Gasfire generates combustible gas (mainly composed with CO and H₂) by putting dry wood chips in a high temperature chamber. The heat is then used to boil water and make steam, the steam drives a turbine, the turbine drives a generator, and the generator makes electricity/heat. Biomass fuels are typically used most efficiently and beneficially when generating both power and heat through CHP. Figure 3 shows the facilities of woodchip power plant. Construction costs are about 150million JPY.



Figure 1 Location of Oki islands and Okinoshima town

Time Value of Money

The present value of money is the value of a future stream of revenue or costs in terms of their current value. Future revenues and costs are adjusted by a discount rate that reflects the individual's time and risk preference. Often, the discount rate is some interest rate that represents the individual's best alternative use for money today. In making business decisions, it's important that you include the time value of money (money you hold today can earn interest in the future). Therefore, if you spend money today to build a new factory or company, you're giving up the opportunity to earn interest. In the future, your factory generates profits, but you need to know whether or not those profits are large enough to offset the interest you lost by not buying a bond. This is determined by calculating the present value.

In terms of biomass power plant, the cost and revenue over the life-cycle of the project does not reflect today's dollar value. Therefore, the whole life costs and revenues of a power plant should be taken into account (the total cost of owning a power plant over its entire life). Whole life cost includes design and building costs, operating costs, associated financing costs, depreciation, and disposal costs.

Figure 4 displays the discount rate in Japan. A low discount rate in Japanese economy since 1995. Therefore, it is important to consider the interest rate of a country (prediction before taking a risk over your company or factory). Since 2010, the interest rate in JP has been less than 1 % (which is good). Lower interest rates encourage spending and investment. It seems it is a rational choice for now to invest in renewable energy in terms of the future of economy.

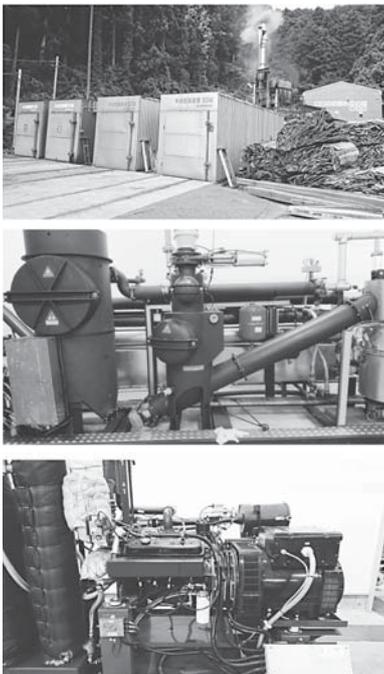


Figure 3 Facilities of woodchip power plant

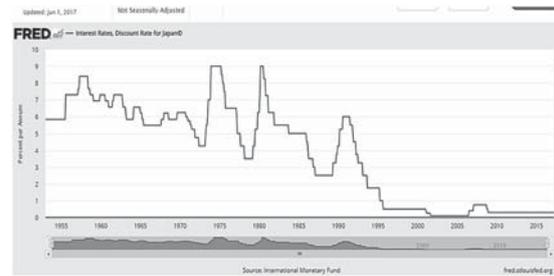


Figure 4 Discount rate in Japan

Methods and Discussion

Feed in Tariff

It is mainly used for the purpose of expanding the spread of renewable energy and reducing price as part of measures against global warming, securing energy sources, and coping with environmental pollution. The subsidy level is guaranteed for a certain period at the time of installation of facilities. It is a system that can flexibly adjust the grant level according to the change in production cost and the stage of development of technology. By appropriately operating it, it is said that the penetration promotion effect per cost will be highest. It is used in more than 50 countries around the world and is a general method as a renewable energy subsidy policy. On the other hand, there is a danger that the diffusion rate becomes too small or excessive depending on the price setting. There are the following features in Feed in tariff.

Advantage:

- In order to be able to recruit private investment, it is superior to the other systems by promotion effect.
- Enhance the safety of the loan.
- Encourage stable investment and development in the target technology, enhance the competitiveness of the industry.
- Promote stable growth of small-sized and medium-sized producers.
- Flexible institutional design is possible, and it is easy to combine with other promotion systems.

Disadvantage:

- If the purchase price (tariff) is higher than the market price of electricity, increase the electricity fee.
- Depending on the setting of the tariff, the penetration speed may become too small or excessive with respect to the planned value. When it is too small, it will not proliferate. If it is excessive, dissemination expenses will increase with respect to the penetration amount, and the electricity charge will be increased more than planned accordingly.
- It may be a limiting factor for exchanging power across national borders.

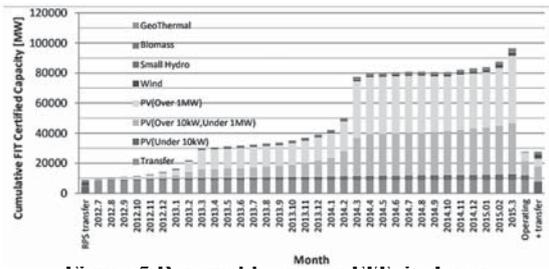


Figure 5 Renewable energy FITs in Japan

Table 1 Feed in tariff (Biomass)

Energy source		Biomass				
Biomass type		Biogas	Wood fired power plant (Timber from forest thinning)	Wood fired power plant (Other woody materials)	Wastes (excluding woody wastes)	Wood fired power plant (Recycled wood)
Tariff (per kWh)	Tax incentive	40.95 yen	33.60 yen	25.20 yen	17.85 yen	13.65 yen
	Tax rebate	39 yen	32 yen	24 yen	17 yen	13 yen
Duration		20 years				

Figure 5 shows the Japan renewable energy FITs. According to the Ministry of Economy, Industry and Trade (METI), in only 3 years, Japan doubled its renewable energy capacity (from 2013 to 2015). Those renewable energy projects have cumulatively generated 90,000 GWh of renewable electricity in 2015. The FIT has helped Japan to double its renewable electricity content in three years. Table 1 shows the feed in tariff of biomass. FIT of woodchip power plant is 32 JPY by this table.

Woodchip Power Plant

In general, Woodchips will be distributed into several types of biomass: fine coal, boiler, power plant, wood pellet, pulpwood (paper). Woodchips can go to several activities. We are assuming that the woodchips go to the power plant. According to the municipality of Okinoshima town, the amount of raw wood that used as biomass are 23,000 T/year. In this report, we are assuming that all of the woodchips go to the power plant. We estimated the cost and income of this project.

Revenue is the income generated from sale of goods or services, or any other use of capital or assets, associated with the main operations of an organization before any costs or expenses are deducted. Revenue is shown as the top item in an income (profit and loss) statement which all charges, costs and expenses are subtracted to arrive at net income. Revenue is also called as sales or turnover.

Profit = Revenue - Costs

Revenue = Plant scale · FIT · Hours/day · Days/year · Capacity factor

Plant scale is determined by the electricity demand.

FIT: 32 JPY/kWh.

Hours/day: 24 hours/day

Days/year: 365 days/year

Capacity factor is 87% (Baseline load), 30% (Variable load).

Costs includes personal expenses (including

Table 2 Model case of wood biomass power plant in Japan

Plant scale	5,700	kW
Facility expenses	398,000	JPY / kW
Disposal fee	19,900	JPY / kW
Running expenses	27,000	JPY / kW
Fuel amount	60,000	t / year

Table 3 Calculation result of plant scale and various costs

(a) Plant scale

Plant scale	4.34	MW
Facility expenses	1,727,320,000	JPY
Disposal fee	86,366,000	JPY
Running expenses	117,180,000	JPY / year
Fuel amount	45,684	t
Fuel cost	60,918,901	JPY / year
Endurance year	15	years

(b) Fuel amount

Fuel amount	23,000	t / year
Fuel energy	0.095	kW / t
Fuel cost	30,670,000	JPY / year
Plant scale	2,185	kW
Facility expenses	869,630,000	JPY
Disposal fee	43,481,500	JPY
Running expenses	58,995,000	JPY / year
Endurance year	15	years

workers, maintenance, etc.), facility expenses (including warehouses, CHP plant, boiler, electricity transmission, district heating, cooling), disposal fee, fuel cost.

We introduce a model case of wood biomass power plant in Japan, is shown table 2. This table shows the case when the power plant scale is 5,700 kW. We referred to various costs and fuel consumption from this. We applied this to the case of Okinoshima town. As a precondition, the annual electricity consumption per capita is about 2,533kWh in Shimane prefecture. In addition, the population of the Okinoshima town is approximately 15,000. From the above, result of calculation is shown the table 3 (a). It is about 4.34MW as a result of calculating required power generation amount. Note that this value is based on flat demand. However, there is a serious problem in here. That is that unused material on Oki Island is 23,000tons. In this calculation result, it exceeds the upper limit by 45,000tons. Therefore, this power plan cannot be realized.

We analyzed again using the preconditions as the fuel amount. The result is the table 3 (b), and the power generation amount is about 2 MW. Also, since this amount of electricity can be supplied to the grid electric power, it is possible to sell power to the electrical grid.

So, we propose installing the plant of this size.

Economic Feasibility

Table 4 shows the estimate profit for the woodchip power plant. This table is explained the economic evaluation when actually introducing it. The endurance life of the biomass power plant is 15 years in general. In the first year, it spend on the facility expenses only. From the second year to the fourteenth year, only fuel and running expenses will be charged. However, in the final year, disposal costs of power plant will be added. From this table, facility expenses is collected in just two years.

The net present value (NPV) is defined as the present value of investments future net cash flows minus the initial investment. NPV is defined in the following equation and table 5 displays the net present value of woodchip power plant.

$$NPV = \sum TNC \cdot DF = \sum_1^n TNC \cdot \frac{1}{(1+r)^n} \quad r: \text{discount rate, } n: \text{number of years}$$

From this calculation, the number of years varies depending on the discount rate, initial investment can be

recovered during several years. And very profit can be obtained. This is because the capacity factor is 87%, which is very high as a power plant. In consideration of the fluctuation of the operation rate, the estimate was carried out even when the capacity factor set to 30%. The results are shown in table 6. From this table, it is understood that NPV is negative when the operating ratio is 10%. Based on the above results, the IRR (Internal Rate of Return) was calculated to be about 7%. Internal rate of return indicates the business return according to alternative return that may be gained on the same investment. The internal rate of return is the discount rate that will create a zero net present value. The IRR is based on the NPV formula, and is solved iteratively for when NPV=0.

Since current Japanese interest rates are less than 1% as shown in Figure 4, it is considered that the plan of this woodchip power plant can sufficiently secure profitability.

Conclusions

We suggest Woodchip Power Plant for the

Table 4 Profit for the woodchip power plant

Plant scale: 2,185kW (fuel amount: 23,000t/year)			
year	revenue	cost	Net Real Value
0	¥0.00	¥869,630,000.00	(¥869,630,000.00) ←facility expenses
1	¥532,874,304.00	¥89,665,000.00	¥443,209,304.00 ←fuel expenses, running expenses (personal expenses, maintenance, etc.)
2	¥532,874,304.00	¥89,665,000.00	¥443,209,304.00
3	¥532,874,304.00	¥89,665,000.00	¥443,209,304.00
⋮			
13	¥532,874,304.00	¥89,665,000.00	¥443,209,304.00
14	¥532,874,304.00	¥89,665,000.00	¥443,209,304.00
15	¥532,874,304.00	¥133,146,500.00	¥399,727,804.00 ←disposal fee, fuel expenses, running expenses
total	¥7,993,114,560.00	¥2,258,086,500.00	¥5,735,028,060.00

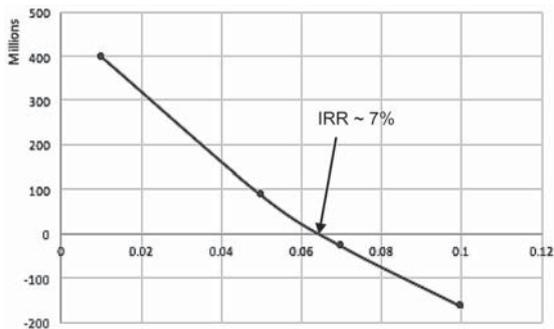
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Table 5 Net present value

Net Present Value			
year	1%	5%	10%
0	(¥869,630,000.00)	(¥869,630,000.00)	(¥869,630,000.00)
1	¥438,821,093	¥422,104,099	¥402,917,549
2	¥434,476,330	¥402,003,904	¥366,288,681
3	¥430,174,584	¥382,860,861	¥332,989,710
⋮			
13	¥389,431,439	¥235,043,357	¥128,381,948
14	¥385,575,682	¥223,850,816	¥116,710,862
15	¥344,305,334	¥192,275,908	¥95,691,658
total	¥5,238,037,509	¥3,709,815,670	¥2,491,046,079

Table 6 Net present value when capacity factor is 30%

year	2185kW (fuel: 23,000t/year)			Net Present Value		
	revenue	cost	Net Real Value	1%	5%	10%
0	¥0	¥869,630,000	(¥869,630,000)	(¥869,630,000)	(¥869,630,000)	(¥869,630,000)
1	¥183,749,760	¥89,665,000	¥94,084,760	¥93,153,228	¥89,604,533	¥85,531,600
2	¥183,749,760	¥89,665,000	¥94,084,760	¥92,230,919	¥85,337,651	¥77,756,000
3	¥183,749,760	¥89,665,000	¥94,084,760	¥91,317,741	¥81,273,953	¥70,687,273
4	¥183,749,760	¥89,665,000	¥94,084,760	¥90,413,605	¥77,403,765	¥64,261,157
5	¥183,749,760	¥89,665,000	¥94,084,760	¥89,518,421	¥73,717,871	¥58,419,234
6	¥183,749,760	¥89,665,000	¥94,084,760	¥88,632,100	¥70,207,497	¥53,108,394
7	¥183,749,760	¥89,665,000	¥94,084,760	¥87,754,554	¥66,864,282	¥48,280,358
8	¥183,749,760	¥89,665,000	¥94,084,760	¥86,885,697	¥63,680,269	¥43,891,235
9	¥183,749,760	¥89,665,000	¥94,084,760	¥86,025,443	¥60,647,875	¥39,901,123
10	¥183,749,760	¥89,665,000	¥94,084,760	¥85,173,706	¥57,759,881	¥36,273,748
11	¥183,749,760	¥89,665,000	¥94,084,760	¥84,330,402	¥55,009,411	¥32,976,134
12	¥183,749,760	¥89,665,000	¥94,084,760	¥83,495,447	¥52,389,915	¥29,978,304
13	¥183,749,760	¥89,665,000	¥94,084,760	¥82,668,760	¥49,895,157	¥27,253,004
14	¥183,749,760	¥89,665,000	¥94,084,760	¥81,850,257	¥47,519,197	¥24,775,458
15	¥183,749,760	¥133,146,500	¥50,603,260	¥43,587,091	¥24,341,033	¥12,114,018
total	¥2,756,246,400	¥2,258,086,500	¥498,159,900	¥397,407,371	¥86,022,290	(¥164,422,961)

**Figure 6 Internal rate of return**

independence of energy on Okinoshima town. The main conclusions from the analysis performed can be summarized as follows.

- (1) It is possible to introduce biomass power plants of about 2 MW. This reduces external dependence of revenue and energy by FIT.
- (2) Economic efficiency can be expected by IRR is higher than interest rate.
- (3) Profit is improved by maintaining the distribution of unused materials and increasing the capacity factor by securing sufficient quantities.

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Impression after completing the practice

Fieldwork B was a class that learned by actually seeing and learning how to realize economic and energy independence in isolated islands on the theme of Oki Islands. Particularly at Oki Islands, they are conducting demonstration tests and practical application related to biomass using materials generated by abundant wood processing for energy independence. It was an interesting

class for me, because I could pursue a series of forest resource flow with lecture and field practice. I was able to learn biomass power plant using timber produced at that time at logging and sawmills. In the forest which was planted, thinned and maintained for forestry, I saw the logging and processing process from tree to timber for the first time. Moreover, not only logging by chain saws but also logging using heavy machinery was powerful. However, in places where they cannot log with heavy machinery, it is still mainly manpower and I also realized there is room for improvement.

For biomass power plant using end materials and unused materials that cannot be used for forestry, I was interested and understood as knowledge before this class. When introducing these facilities, it is a major premise that there is economy such as operation and profit. I think that it has become a very good opportunity since I have never consider that.

This group work is organized not only by Doshisha University but also by Hiroshima University and the University of Texas at Austin. I learned the difficulty and the interesting of working on one problem with students of various cultural spheres other than Japanese way of thinking. Especially Texas university students actively said, first of all I realized that the attitude of trying to advance the discussion is significantly different from Japanese students. There is a big difference in the background knowledge because each major field is different, and sometimes the discussion did not convey well. I think that it was good that we were able to make one proposal in a group for the task within the limited time that is the group organization. At the same time, however, I think that many problems have been found as a reflection point. In this class, the lecture started about two months ago, but we were unable to meet with group members and make a plan about group work before going to the site. We were scheduled to make a face to face meeting, but in fact it is impossible to conduct a pre meeting as a result of time zones and individual schedules do not agree with each other. I would like to pay attention to time management so that we can prepare thoroughly in advance in next group work.



Public Involvement for Better Consensus Building

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1. Introduction

Dogo island, Oki islands, Shimane prefecture, was once a major timber production site, and forestry played significant role in local economy; as many villages in mountainous region in Japan used to be before the industrialization. However, forestry in Japan is now facing serious problems. As Japanese economy had grown after WW2, the labor cost had also increased, which resulted the rise of timber price. Consequently, they lost the competitiveness against the cheaper imported timbers. Now, lots of planted trees have left in the forest since it doesn't make profit. In addition to that, the island is facing serious depopulation and aging society. All those things brought the shortage of forestry workers. As a result, forests are left unmaintained in many places in Japan, and Dogo too.

In pre-industrialized era, forest adjacent to human habitats had been managed by near-by farmers and forestry workers to obtain products from the forest. The forest area applied these economic activities is called "Satoyama" in Japanese. However, the economic system around Satoyama is not working well in these days because many of those forest products used to be utilized by villagers have lost their economic value in modern life style. As a result, those activities are declined and Satoyama areas are now not maintained as used to be.

Lack of proper management to the forest does not only lose the value of their invested properties, but unmanaged forest also loses the functionality that the forest has when it is well maintained, which endangers the regional ecosystem and the security against the disasters. It is, therefore, very important for local communities to re-establish a system to maintain proper forest management.

Municipality of Okinoshima, which covers whole Dogo island, thus, has been promoting a plan called "Midori no Kombinat"; linearly means "Green Complex" to create business and industry to support forestry business. The main objective of the plan is to create new business or industry by utilizing unused wood biomass, such as waste from sawmill, wasted logs, woods resulted from thinning, fallen-down trees due to natural disaster or damaged trees due to insect plagues, etc. By successful completion of this plan, new circulation of money would be created from materials used to produce nothing. In other words, the plan anticipates to utilize local resources effectively for making more money from limited amount of resources, and ultimately that attracts people who end up maintaining the forest.

In this project, the utilization of unused material is realized by the production of woodchips and lignophenol, and also the utilization of methane as a byproduct. Among of these, the woodchips production has been commercialized and used in many places, but others have not yet been commercialized. As for the R&D of lignophenol, theoretical construction and small laboratory scale experiments have been done but R&D has not been yet matured to make steady production, which is required for the commercialization. Technical problems are the major obstacles to be overcome, but solving those problems requires very good knowledge about the chemical reaction processes which cannot be made by a semester long study.

These are so many obstacles to be overcome other than technical issues in order to realize the commercialization of new technology, or even more to establish it as a business. For example, as a new business, the business model such as the actual budget balance, supply chain, sales channel, etc. has not been completely consolidated. Therefore, policy supports and financial supports are needed until the business consolidates its business model. Or, establishment of good relation with local communities would be another important aspect for the success since they are share stakeholders of local resources and environment, and also one of potential customers.

To understand this project, group work had carried out. Our group topic is "Public involvement for better consensus building". In this paper, firstly what we studied in on-site practice by site visiting are summarized, and then our group works will be discussed.

2. Acquired Knowledge

The schematic diagram of "Midori no kombinat" project is shown in below.

This figure shows that the project has mainly some projects; lignophenol plant, biomass power, fertilizer from seawood, carbonization furnace, and pellet factory. In this fieldwork, we focused on lignophenol plant, biomass power, and pellet factory i.e., forestry. The purpose of this project is jobcreation, securing environments for long-term settlers, and expansion of number of visitors. This project is also related to another project in okinoshima-cho called "Okinoshima-cho biomass industrial city plan". This plan has mainly four eco-projects; lignophenol plant, biomass power plant, wood pellet business, and incineration plant by methane fermentation. Our research targets are corresponding to

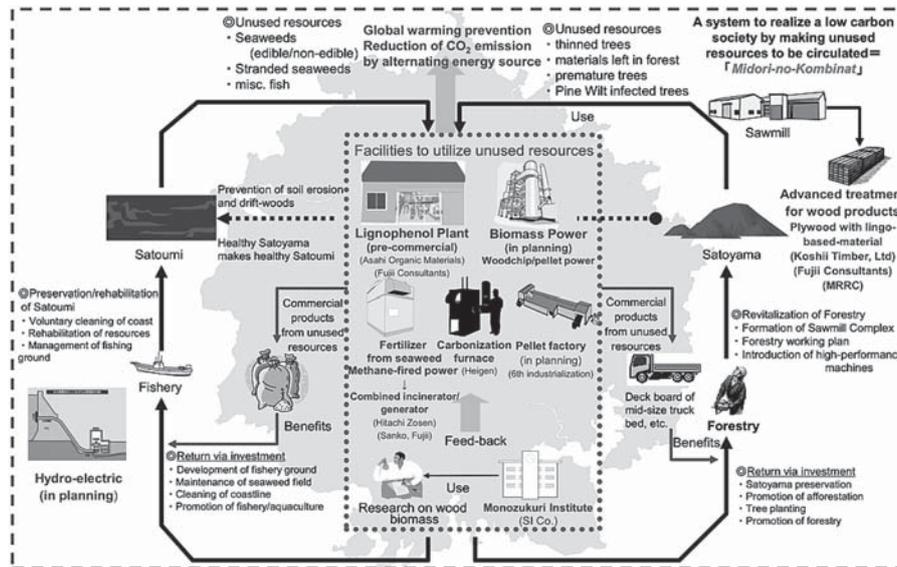


Fig. 1. The schematic diagram of Midori no kombinat project in Okinoshima-cho.

lignophenol, biomass, and wood pellet.

2.1. Lignophenol Plant

Lignophenol is developed organic material from biomass by professor of Mie university. As I mentioned before, there are some unused natural resources in Okinoshima-cho. Therefore, effectively use of biomass are expected. Now, research and development of commercial products made from lignophenol are going on. To save and reduce emitting the carbon dioxide by utilizing biomass materials, some biomass products have been developed such as paint, adhesive, and so on by joint research with company located inside and outside of this island. Workers in lignophenol production facility want to expand their scale. However, an opportunity to provide the such information concerning about expanding plant and employment. This concept is conducting with member of this plant and local government only. Therefore, locals those lives in nearby area never know the situation. So, this lignophenol plan is beyond the scope of public involvement.



Fig. 2. The photograph of lignophenol production facility.

2.2. Natural Forest

Okinoshima-cho have 21,101 ha of forest area which corresponds to 86.8 % of whole area. This forest area per person can be ranked one of the highest in the world. However, there are many problems in forest due to the decreasing in population, going outside the island of younger generation to get a job. Therefore, there are many forests which are not maintained. Moreover, local government and forest cooperative don't identify that the whose forest is this. So, identification of the forest located in rural area is very important work to conduct forest industry effectively.

2.3. Woodchip Fire Power Plant

There are many unused biomass resources in Okinoshima-cho. Therefore, forest cooperative utilized for wood pellet project, wood biomass power generation, etc. In fact, there is a biomass power generator called Oki Green Power Station (OGP) in the sawmill at the center of the island. OGP generator house has a couple of 45kW generator composed of gasifier and Combined Heat and Power Unit (CHP). In future, this facility intends to install more two units. The electric power generated by the biomass system are only used in the sawmill facility at present. In a series of woodchip power generation, water content is most important factor. Due to some reasons, the generation system made in Germany is unstable. Therefore, overcome problems like stable operation, utilization of exhaust heat, and so on is expected in this stage. Now, Okinoshima-cho have six diesel power generators. As a future plan, three 45kW biomass power generator provide the generated power for the neighbor. This leads a new job creation, however, local resident has never been informed this fact. This is not called as a public involvement. For future of this town, sawmill facility should make an opportunity to

introduce the facility to the local resident.



Fig. 3. The photograph of dried wood chips utilized for biomass power generation.

2.4. Forestry Site

We took the site visiting the forestry site of whole process; seeding, harvest, and sawing. There are about 630 forest cooperatives in Japan. Ones of okinoshima-cho is composed of paltry 25 persons. This cooperative has managed by investment by forest owners. The organization manage a cycle of cutting, using, seeding, and growing. They also mentioned about the issue of owener's leaving forestry. What 40% of forest owners had gone outside the island makes forest cooperative to difficult forest management. Therefore, building a web-based database system about forest resources is necessary. If there is a database, everyone including owners and local residents are easy to access and easy to utilize the forest resources. Moreover, forest cooperative should make opportunities for forest owner monthly or annually to share benefits and knowledge.



Fig. 4. The photograph of the sapling of the Japanese cedar sold by forest cooperative.



Fig. 5. The photograph of the cutting process by human.



Fig. 6. The photograph of the cutting a timber for fixed length by harvester.

3. Questionnaire Survey

To recognize of awareness of forest management and forest resources from local residents' side, a questionnaire survey was carried out from Aug. 8th to Aug. 20th 2017. There are mainly two types of questions such as closed-ended (fixed-choise) questions and open-ended questions. Since this content is difficult to understand, plenty of closed ended questions which are easy to answer were adopted. Participants of our research are 53 okinoshima-cho local resident. Our questionnarire has three types of questions; general information, social involvement to industrialization in okinoshima-cho, and degree of interest about midori no kombinat project. In part of general information, gender, age, origin, occupation, and fundamental knowledges about forestry were inquired.

4. Results and Discussion

4.1. General informations

Participant informations are shown below.

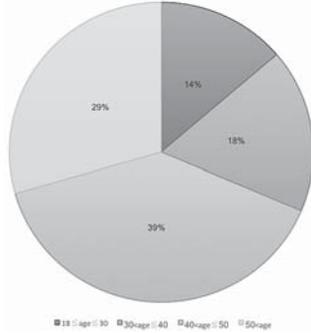


Fig. 7. Age distribution of 53 participants.

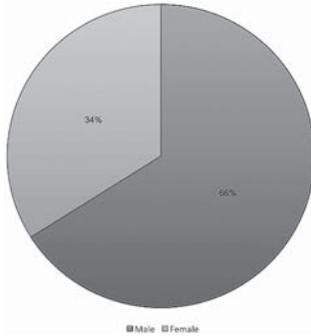


Fig. 8. Gender distribution of 53 participants.

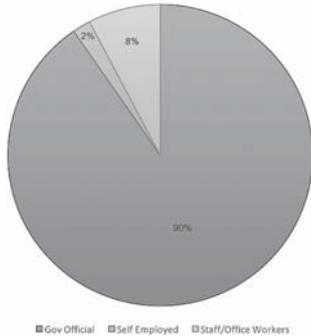


Fig. 9. Job distribution of 53 participants.

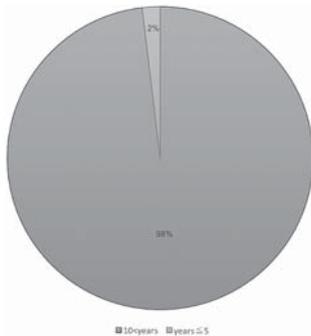


Fig. 10. Dwelling history in Okinoshima-cho of 53 participants.

According to these general information about resident in okinoshima-cho, collected data are quite partial especially in occupation and dwelling history. Namely most of participants living in this town more than 10 years as a government employee. Because our survey has time and distance limitations, we cannot conduct the research on our own.

4.2. Social involvement to industrialization in Okinoshima-cho

The results about social involvement to industrialization in Okinoshima-cho are shown in Fig. 11 and 12.

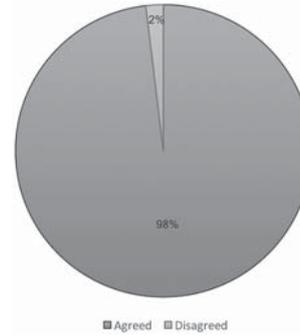


Fig. 11. The forest resources utilization.

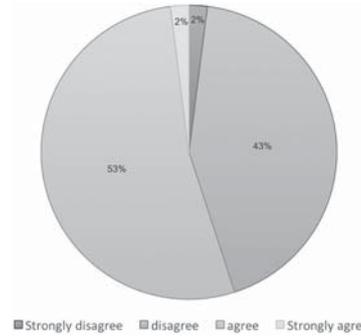


Fig. 12. The public involvement of revitalization in Okinoshima-cho.

According to these figures, 98% of local resident agree that forest resources should be utilized. While almost half of the resident don't think public involvement can contribute to revitalization of the okinoshima-cho. Based on our research, it might be because other project in okinoshima-cho didn't include public involvement before. They were all top-down projects.

4.3. Midori no Kombinat Project

The third part of our questionnaire survey is about Midori no Kombinat project. The results are shown in below.

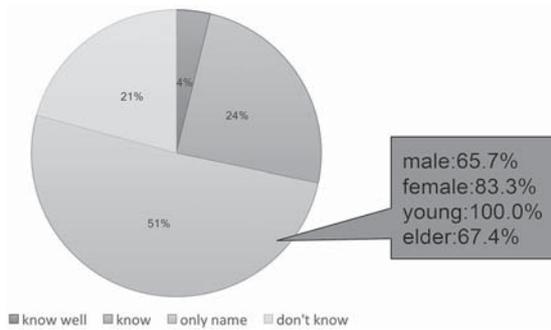


Fig. 13. The degree of recognition for the Midori no Kombinat project.

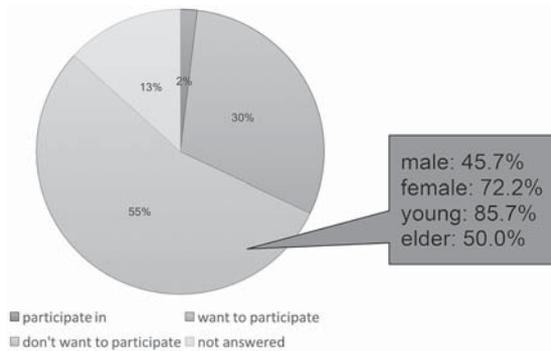


Fig. 14. The eagerness to take part in the Midori no Kombinat project.

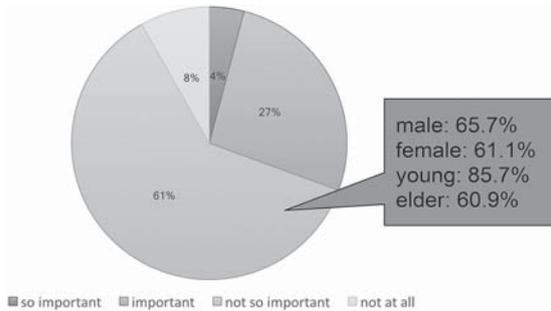


Fig. 15. The importance of Midori no Kombinat project for local resident.

According to Fig.13., even if almost all of answerer are governmental officer, they don't know about this project very well. Therefore, we can guess that the local resident doesn't know about the project because they only have limited access to information of the project. Especially in younger generation, they never know about the details of this project. This implies a defect of policy system of the project. To revitalize forest industry, future generations have to involve positively in this project. According to Fig. 14., more than half of respondents don't want to participate in the project. This is not a problem of local residents but an issue of characteristic of the Midori no Kombinat project. From Fig. 15., most of respondents feel that the Midori no Kombinat project is not so important for them and their families. From these results of questionnaire survey, the

Midori no Kombinat project is not a low degree of recognition but also no chance for public involvement. Therefore, the project has to be overhauled to acquire job creation for the future generation and chance of public involvement.

5. Conclusion

The many public employees of Okinoshima-cho are main factors of this project. Nevertheless, they don't think public involvement is important for revitalization of Okinoshima-cho. Moreover, a strong tendency of low motivation for taking part in the project in younger generations was marked. According to the series of surveys and discussions, the Midori no Kombinat project needs public awareness to have mutual benefits both public and project. Now, due to the project's characteristics, public involvement is unnecessary. However, for the development of the whole Okinoshima-cho and its local people, public involvement is crucial. Therefore, I'd like to propose two types of recommendations: education and promotion. The former is education about how forest management is important and how to effectively utilize forest resources for forest owners, students, and public. Forest cooperatives should make an opportunity to share information such as benefits and knowledge monthly or annually. As I mentioned above, building a web-based database is effective for utilizing forest resources. In school, especially in high school, teachers educate students about the importance of forest management and forest resources including biomass, renewable energy, etc. Students should also spread their knowledge at any places for increasing public involvement. This leads to the increasing of employment opportunities, for example, lignin plant, biomass power supplier, development facility exploiting biomass, and so on. Needless to say, local government is the most important role of this project. They should hold festivals, events, and some activities to pervade the information. Distributing pamphlets written in Japanese and English in wave pages are effective for raising awareness for this project. Moreover, because Okinoshima-cho is selected as a global geopark, special lectures for local residents and tourists have to be held about forest resources. For future projects, local government should focus on public involvement and participation.

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- and all materials which are distributed in this course.

Proper Subsidy / Financial Support for Promoting Pellet Stove

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1. Introduction

Dogo islands, Oki islands, Shimane prefecture, was once a major timber production site, and forestry played significant role in local economy ; as many villages in mountainous region in Japan used to be before the industrialization. However, forestry in Japan is now facing serious problems. As Japanese economy had grown after WW2, the labor cost had also increased, which resulted the rise of timber price. Consequently, they lost the competitiveness against the cheaper imported timbers. Now, lots of planted trees have in the forest since it doesn't make profit. In addition, to that, the island is facing serious depopulation and aging society. All those things brought the shortage of forestry workers. As a result, forests are left unmaintained in many places in Japan, and Dogo too.

In pre-industrialized era, forest adjacent to human habitats had been managed by near-by farmers and forestry workers to obtain products from the forest. The forest area applied these economic activities is called "Satoyama" in Japanese. However, the economic system around Satoyama is not working well in these days because many of those forest products used to be utilized by villagers have lost their economic values in modern life style. As a result, those activities are declined and Satoyama areas are now not maintained as used to be.

Satoyama activity is a way to manage forests in practical meanings, especially in the preindustrialized era. But, practical demand was not the only reason for villagers in past to maintain forest. Shintonism, which provides a very bottom foundation of Japanese culture and way of life, sees divinity in everything in the world. Trees and forests were no exceptions. Forest which provides wealth to people was some part of forest was strictly protected and maintained by locals. This kind of spiritual activities has also been declined during the modernization and almost vanished today.

Lack of proper management to the forest does not only lose the value of their invested properties, but unmanaged forest also loses the functionality that the forest has when it is well maintained, which endangers the regional ecosystem and the security against disasters. It is, therefore, very important for local communities to re-establish a system to maintain proper forest management.

Municipality of Okinoshima, which covers whole Dogo island, thus, has been promoting a plan called "Midori no Kombinat"; linearly means "Green Complex" to create business and industry to support forestry business. The main objective of the plan is to

create new business or industry by utilizing unused wood biomass, such as waste from sawmill, wasted logs, wood resulted from thinning, fallen-down trees due to natural disaster or damaged trees due to insect plagues, etc. By successful completion of this plan, new circulation of money would be created from materials used to produce nothing. In other words, the plan anticipates to utilize local resources effectively for making more money from limited amount of resources, and ultimately that attracts people who end up maintaining the forest.

In my group work, we have investigated subsidies for the Green Projects, and the subsidies are important role in promoting the project. We focused on the subsidy for the pellet stove shown in Figure 1, which is already existed but our work is investigating whether the subsidy is proper or not from various points.



FIGURE 1. An image of the wood pellet stove.

2. Types of Subsidies

Subsidy is defined as a sum of money granted by the state or a public body to help an industry or business keep the price of a commodity or service low. Subsidy and the things likely to be subsidy are generally divided into three components: direct subsidies, indirect subsidies and non-subsidies. The first ones are such as cash subsidies and grants, and also includes stock purchases. Higher value of stock works as a subsidy in a lot of situations. The second ones contains tax concessions (tax credits) and assumption risk (loan guarantees). The last ones are non-subsidies like taxes / penalties for non-compliance (carbon tax) and revenue bonds (tobacco bonds). They should be clearly divided into for the practical future plans.

3. Heat Options

In order to compare with the performance of the heating system, we investigated three options likely to

compete the pellet stove, which are fire wood stove, conventional stove and pellet stove. The summarized result is shown in FIGURE 2. The first one, fire wood stove gives the users physical burden to gather the wood for citizens. According to the lecture by municipality officer, the citizens using fire wood stove are willing to change to the pellet stove due to the disadvantage point of fire wood stove even if the installment and running cost of the pellet stove is higher. In addition, pellet stove is easier to use and more environmental friendly. The other option, conventional stove has a lot of advantages in the aspect of the cost. This is about 10 times cheaper than pellet stoves (4 times cheaper when current subsidy applied on pellet stove).

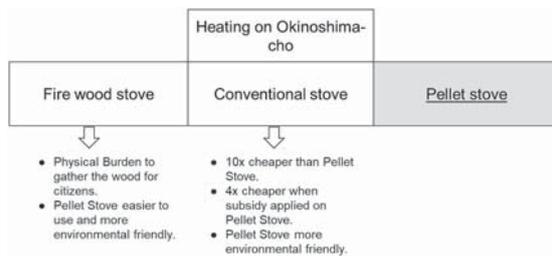


FIGURE 2. The features of heating option compared with pellet stove.

4. SWOT Analysis of the pellet stove

Pellet stove was analyzed with the method of SWOT, which is composed of 4 sections: strength, weakness, opportunities and threats. FIGURE 3 shows the result of the SWOT analysis about the pellet stove. At the first, a lot of strength points are found such as user friendly, high efficiency, automatic refilling and operation of the stove, convenient fuel, no oil for stove, biomass energy and environmentally friendly. Weakness, at the next, has cost inefficiency, difficulty with maintenance, noisy operation and electricity dependent. In the section of the opportunities, we found subsidies for pellet stove, resource availability, increased supply and tax incentive to switch to pellet stoves. There are, on the other hand, threats such as many competitors, high costs and population.

The output information obtained from this result is that the pellet stove has much positive points than negative points. This suggests that using pellet stove has a lot of advantages. However, the importance in aspect of the subsidy is whether these advantage meets the demand enough to make citizens satisfied to ignore the negative points especially cost problem.



FIGURE 3. The result of SWOT analysis of the pellet stove.

5. Case Studies

Three cities were compared for the setting proper pellet stove subsidy in Oki islands as a case study. The three cases including Oki islands itself are Okinoshima-tyo, Hamamatsu city in Shizuoka prefecture and German. The method of case study should be powerful for deciding value of the pellet stove subsidy because the selected case has success story. Firstly, the case of Dogo islands including Okinoshima-tyo is introduced, and then continued to Hamamatsu city, German.

5.1 Dogo Islands

Dogo islands shown in FIGURE 4 are positioned at the 50 km north from the Shimane prefecture and this factor is important in the case studies because we have to compare with as much factor as possible.



FIGURE 4. The location of Oki islands on the map.

The cost of installing pellet stove is the sum of a body itself: 300,000 yen and construction cost: 200,000 yen. Current existed subsidy for pellet stove in Okinoshima tyo gives 2/3 expenses and that's up to 300,000 yen per a machine. The target is people, organizations or corporations having as address in Okinoshima-tyo. The capacity is up to only 10 entities per year. The way to apply to the subsidy needs to submit

forms to the Agriculture, Forestry and Fisheries Division of Okinishima-cho.

5.2 Hamamatsu city in Shizuoka prefecture

Hamamatsu city located in the center in Japan shown in FIGURE 5 (red area) is one of the successful city for the installment of the wood biomass project in Japan. There is a utilization project of wood biomass in this city. The project promotes to use biomass fuel like wood pellet. The noticeable point is that the change of sales volume of wood pellet made in Hamamatsu city between 2013 and 2014. The produced volume was drastically changed from 27,870 kg in 2013 to 112,963 kg in 2014 according to the investigation attempted by Hamamatsu city in 2014. This fact estimates that the number of facilities and machines using pellet as fuel significantly increased.



FIGURE 5. The location of Hamamatsu city on the map.

There are reasons why sales volume of the wood pellet have increased. To begin with the subsidy in Hamamatsu city, the target are individuals, corporations or organizations who install pellet stoves in residences or stores in Hamamatsu city. The subsidy is for purchasing and installing pellet stove. The value of the subsidy gives less than 1/3 of expenses for purchase, up to 50,000 yen. This is less than that of Okinoshima-tyo. Therefore, the value of the subsidy is not vital factor for the project.

The unique factor in Hamamatsu city is the way of the promotion method. Hamamatsu city, for example, collaborated with TENRYU. Collaboration with TENRYU no mori (production area of pellet) and design let the city create a lot of kind of promotion product such as a picture, a brochure, a guide book and so on: these products are designed by the students belonging to the design school in Hamamatsu city. The picture book let the children in elementary school know the significance of forest resources. The brochure promotes purchasing pellet stove to people who wants to build their house. The guide book intends company to use renewable energy related in the forest. In addition, wood pellet produced in this city is named after TENRYU pellet

shown in FIGURE 6 (not so different from comparison (a) and (b)) to get the brand in the pellet production field.

These promotions can work for the utilization of wood biomass including pellet stove through letting the people know the wood biomass in the variety of the promotion method. Wood biomass energy will be more important in the next generation, which means the educating to the young people like elementary students should be effective. These promoting campaign is needed to attempted in Oki-islands.



(a) TENRYU wood pellets.

(b) Common wood pellet.

FIGURE 6. Images of the pellet produced.

5.3 German

German is located very far from Japan shown in FIGURE 7. This is bad point as a case study due to the much different background for the wood biomass. That is why German case is briefly introduced in the aspect of the subsidy about pellet stove. A subsidy of 3,500 Euro was allocated to the households who switch to pellet stoves. The sales of pellet stove remained below expectations; only 3.1% of overall sales volume of heat generator. The reason was the significant decrease of prices on the market of oil and fossil fuel. Thus, subsidy alone do not necessarily work to the success in promoting the wood pellet stoves.



FIGURE 7. The location of German on the map.

6. Recommendation

Through the case studies, the recommendation for the pellet stove in Oki islands was supposed. At the first step, we mention about the optimization about subsidy usage. Applicants should not be required to find and provide a construction company for the installation. The municipality should contact with a specific construction company to install the stoves at a discounted price. To realize this recommendation, two points are needed. The first one is negotiation with a construction company to

offer a discounted price. The other one is saving money for the investment in other initiatives. After installing pellet stove, the household receiving subsidy should conduct performance monitoring and evaluation of the pellet stove. It will provide with evidence to prove the efficiency of the pellet stove and attract more users and investors.

FIGURE 8 show the additional program as a recommendation and has three sections: gap analysis, awareness campaign and tax incentives. In the section analysis, we recommend to do survey of residents and to hold town-hall meetings. The result provide with setting a database about residents and understanding awareness and willingness. The next section, awareness campaign has much roles which are creating committee, designing posters, ads, brochures, social media, books. In addition to the roles mentioned above, seminars, providing certificates, and understanding importance of Geopark will have possibility as a additional program. This section results in increase of resident’s understanding and willingness to switch into pellet stove from current heating options. The final section, tax incentives is composed of taxes on petroleum and gas, and tax credits on local corporate tax to hotels and restaurants. This final section allows citizens to increase willingness to switch in to pellet stove. We have considered to how to increase the willingness from the various aspects obtained at the case studies, and actually this is a great factor to promote the installing wood pellet stove.

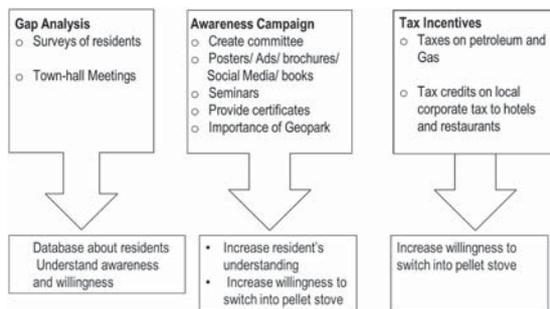


FIGURE 8. Recommendation: addition programs.

7. Logical Framework

Our study was summarized into logic model of pellet stove subsidy in Dogo islands shown in FIGURE 9. This model is modified model of typical logic model, and is composed of 5 sections: inputs, outputs, short-term outcomes, long-term outcomes and assumptions. Process of setting pellet stove subsidy for the promotion is explained in this figure. In other words, the result of our study about pellet stove was summarized.

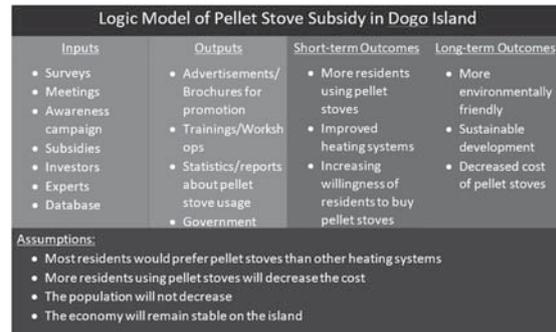


FIGURE 9. Logic model of pellet stove subsidy in Dogo Island.

8. Conclusion

Study of pellet stove subsidy is attempted by group 4, and we conclude our study into two sentences. The first one is that current pellet stove subsidy might not be efficient because of the high costs and low demand. The other one is that we recommend to complement the subsidies with other programs to encourage public involvement.

Promoting Pellet Stove in Proper Subsidy or Financial Support: A case study in Okinoshima Island

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Summary

Renewable technology is becoming more feasible for use in remote areas due to decrease the equipment cost and uncertainties regarding the supply and price for fuel alternatives.

Okinoshima Islands of Japan or as it knows Oki include Dogo, was once a major timber production site, and forestry played significant role in local economy; as many villages in mountainous region in Japan used to be before the industrialization. However, the forest in Japan is facing a serious problem. The cost of labor force in Japan had increased during last ten years ago, as a result of the rise to timber price.

The local government of Okinoshima island is planning to run and create new startups to run the forest area, as well as to increase the local economy of the island. They purpose of that to make the island be a friend with environment. It gains one of heritage site in UNSCO organization.

One of the proposed projects in the island to run all local companies which they are working in the forest, and to subsidize people who wish to convert heating system by using pellet stoves. The government will subsidize people more than 60% of the total cost. The report argued the best way of subsidy policy for people, and try to find answer to the question which is the subsidy still the best way to provide pellet stoves for people.

Overview

Okinoshima Islands of Japan or as it knows Oki include Dogo, a round-shaped island, and three small inhabited islands in the Dozen district: Nishinoshima, Nakanoshima and Chiburi, which are part of a 38-island ring archipelago 40 kilometers (24 miles) north of Japan's Honshu coast in the Shimane Prefecture. Oki's population of approximately 20,493 has decreased 53 percent since 1955 [1].



Figure 1: Okinoshima Islands

The islands' traditional businesses of fishing, forestry, agriculture, and tourism have declined. Economic interactions with mainland Japan via boat have fallen as the inhabited islands are becoming more isolated. The Oki district would prefer to maintain a healthy population size to support local livelihoods and Oki residents wish to protect their natural environment and preserve the unique culture and geological history of the islands.

The population for the islands is approximately 15,000. However, the economy has weakened due to its decreasing and aging population as well as the comparative disadvantage of primary, resource-based industries distant from the Japanese main island. As of 2015 most of the Oki's electricity is generated by heavy fuel oil imported to the islands and subsidized by the prefectural Shimane and governments. The Demand for electrical power in 2015 fell between 10 and 22MW.

Dogo island was once a major timber production site, and forestry played significant role in local economy; as many villages in mountainous region in Japan used to be before the industrialization. However, the forest in Japan is facing a serious problem. The cost of labor force in Japan had increased during last ten years ago, as a result of the rise to timber price.

Many planted trees have left in the forest as it doesn't make a good revenue. In addition, the island is facing serious depopulation and aging society. However, forests are left unmaintained in many places in Japan, and Dogo island too.

Background

The local government of Okinoshima island is planning to run and create new startups and business to work in forest and increase the local economy of the island. In pre-industrialized era, forest adjacent to human habitats had been managed by near-by farmers and forestry workers to obtain products from the forest.

Now, the local government is going to provide pellet stove for all people in Okinoshima island. A pellet stove is a stove that burns compressed wood or biomass pellets to create a source of heat for residential and sometimes industrial spaces. By steadily feeding fuel from a storage container into a burn pot area, it produces a constant flame that requires little to no physical adjustments [2]. Most pellet stoves are constructed using large, heat conductive, steel or cast-iron pieces, with stainless steel to encase circuitry and exhaust areas. Pellet furnaces and pellet boilers are also available in addition to the

decorative stove. These units can be retrofitted into existing home heating systems with only minor changes to existing ductwork and or plumbing. The heating industry has considerably shifted toward biomass stoves and heating devices based on efficient combustible and renewable resources.

Municipality of Okinoshima conducted economic feasibility study for the project. At that time, the use of woodchip power generation was not included in the plan. With limited amount of resources, the installation capacity would bring the best economic benefit for people in the island. The production and process in Okinoshima islands as showed below:

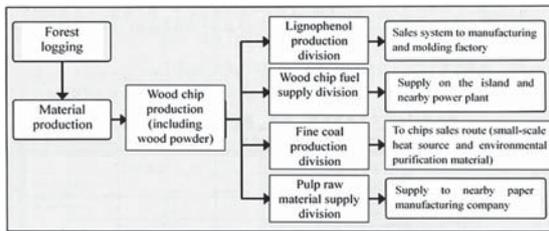


Figure 2: Green complex

The Green complex is comprehensive business management across multiple divisions including; forest logging, wood chip production, energy business, supply of pulp raw material and chemical production of indophenols resin would be necessary to enable a more efficient profit making [3].

The key to making this business a success will be the establishment of a management structure based on the collaboration between such companies and local companies that are familiar with on-site conditions. Biomass conversion refers to the process of converting biomass feedstocks into energy that will then be used to generate electricity and/or heat.

First, the spanner dryer -dries the wood chips supplied at the mill. The raw wood chips have around 50% water content and once dried has a 5% water content. The Gas fire generates combustible gas by putting dry wood chips in a high temperature chamber.

The heat is then used to boil water and make steam, the steam drives a turbine, the turbine drives a generator, and the generator makes electricity for heat. Biomass fuels are typically used most efficiently and beneficially when generating both power and heat through break point.

In terms of biomass power plant, the cost and revenue over the life-cycle of the project does not reflect today's dollar value. Therefore, the whole life costs and revenues of a power plant should be taken into account. Whole life cost includes design and building costs, operating costs, associated financing costs, depreciation, and disposal costs.

According to the Ministry of Economy, Industry and Trade (METI), in only 3 years, Japan doubled its renewable energy capacity (from 2013 to 2015). Those renewable energy projects have cumulatively generated 90,000 GWh of renewable electricity in 2015.

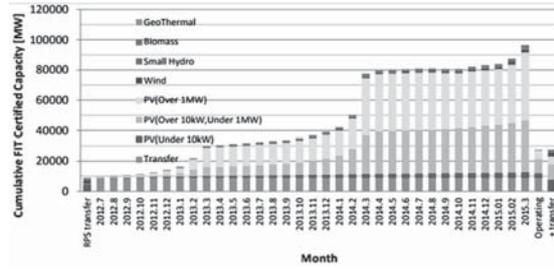


Figure 3: Japan Renewable Energy.

Woodchips will be distributed into several types of biomass: fine coal, boiler, power plant, wood pellet, pulpwood (paper). Figure below shows all the distribution for biomass resources.



Figure 4: Biomass Resource Distribution

According to the municipality of Okinoshima, the amount of raw wood that used as biomass are 23,000 T/year. Figure below show some approaches in Japan for using and producing biomass in different prefectures.

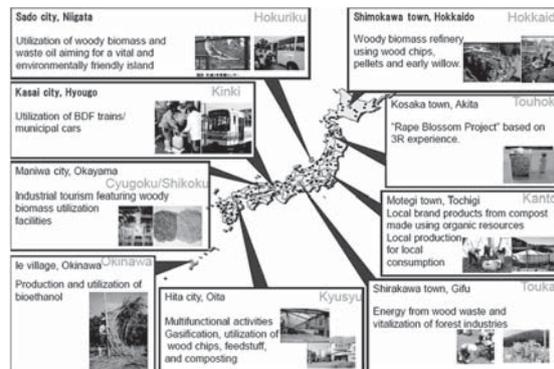


Figure 5: Some Approaches in Japan

In Hokkaido and Iwate prefecture, wood pellets are actively produced. Use of wood pellets in pellet stoves has increased because of strong environmental consciousness and convenience. Wood pellets are an alternative to heating oil and diesel, so use contributes not only to countering escalating gasoline prices but also to the reduction greenhouse gas emissions.

Satoyama Forestry can be managed to effectively provide biomass for the creation of all small business, However, inefficient management in the forest will drive up costs for all of the other business, so the local government wants to increase biomass procurement from Satoyama forestry to feed local business.

Most of the biomass produced during the forestry process is not used, due to the imitation of information

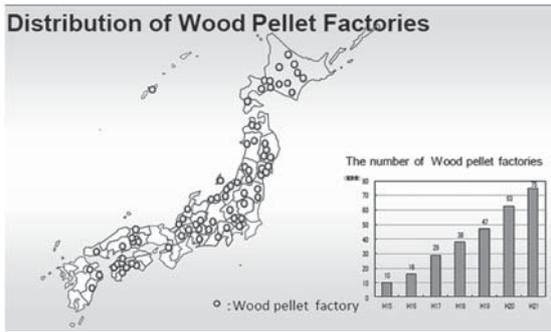


Figure 6: Distribution of Wood Pellet Factories.

about forest ownership, as well the forest road systems are not developed and are costly for local businesses, and no system of information sharing between stake holders about biomass

Forestry companies cannot sell biomass except on behalf of owners. If owners cannot be reached, thinning and harvesting cannot take place. A great deal of profitable forestry activity cannot take place because of the problem of absentee land ownership [3].

There are no technologies used to map forests or detect diseased, fallen or rotted trees for extraction. Forestry companies survey the forest by driving through the public roads and doing sight assessments of plots. National database of aerial photographs of cedars planted during last decades is cross referenced with local prefecture records to find harvestable trees. Although some plots need to be thinned to reduce density and promote stable growth, forestry companies are unable to contact owners to undertake management

Lack of knowledge about forest resources, the absence of modern forestry mapping techniques and absentee ownership create significant hardships and costs for the local forestry industry. These inefficiencies drive up the cost of biomass and make it more difficult to realize the goal of successfully managed local business fueled by biomass resources from Satoyama forestry. The technologies are used in forest in manual felling, harvester processor, and using of tracked vehicles. Manual felling requires high-intensity physical labor in tow person per a team which work approximately 100-150 trees a day.

Harvester processor is designed to maximize efficiency and complete multiple tasks at once, and extracting, processing, and cutting. The problem is that cannot operate on steep slopes and has a swinging arm with limited reach. Using of tracked vehicles can cause soil compaction which prevents roots from getting proper nutrients and can inhibit or altogether prevent growth [3].

Pellet Stove Project

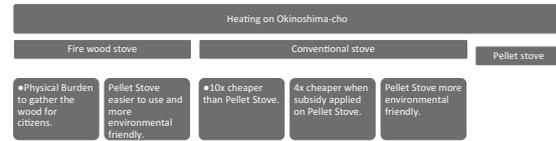


Figure 7: Current Heating System in Oki Island

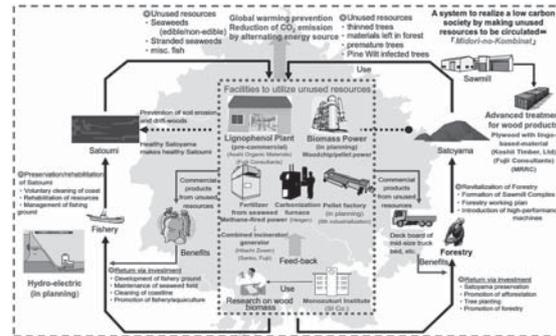


Figure 8: MidorinoKombinat Project

Objectives and Assumptions

As the main objective of the project in theme to proper subsidy or financial support for promoting the product for all people in island. Municipality of Okinoshima is planning to introduce new subsidy for promoting the installation of pellet stove. The municipality is a small township and consequently, the budget is limited as it will be 300,000 yen per one installation.

By the fieldwork, the question is providing a subsidy still the best option to promote the usage of Pellet Stove or what kind of subsidy scheme could achieve both the maximum effect and the least burden to the municipality's general budget?

First of all, let assume that most residents would prefer pellet stoves than other heating systems, as well more residents using pellet stoves will decrease the cost. In addition, the economy will remain stable on the island, and population will not decrease during next years. However, subsidy is very important for all people, so and it will be helpful if there is any plan for the local government to increase the subsidy by the time, and help to provide database for suppliers in the island to provide the products in low cost.

Problem Analysis

For the problem analysis, below is SWOT analysis to determine and analyze the external and internal factors for pellet stoves. The two-up blocks analyze the internal factor and others are the external factors.



Figure 9: SWOT Analysis.

Case Studies

There are many case studies: global and domestic cases for pellet stoves. The first story from German and the second one from Hamamatsu city in Shizuoka prefecture.

Pellet Stoves in Germany

Germany is considered to be one of the countries where the contemporary model of a wood stove was first introduced and put to use [4]. Germany is produce a large amount of pellet stove items which dominate in local and domestic market and offer a broad range of stove models.

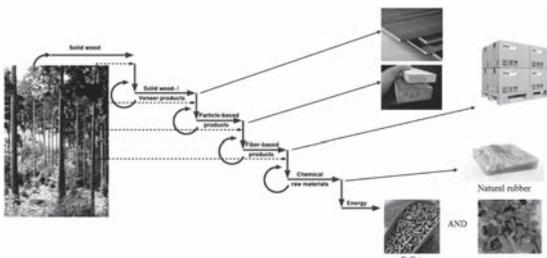


Figure 10: Potentials for cascading of recovered wood from building deconstruction in Germany

Moreover, the increased biomass usage in Germany leads to bigger demand for pellet stoves which have broad range of functions apart from heating nowadays.

Table 1: Permanent Forest Road Network

	Germany	Japan	Oki Islands
Forest Road Density (m/ha)	118	5	9
Forest Coverage (%) (~ha)	33	67	87
Forest Area (ha)	11 mil.	25 mil.	21,101
Exploitation (m3/yr)	56 mil.	20 mil.	22,000
Efficiency (m3/ha)	6.00	0.80	1.04
Source	tradingeconomics.com		

The sales rates of pellet stoves tend to move in the opposite direction to the development of prices for fossil fuels. The overall amount of pellet installations in Germany grew to the modest rate of 50,000 installations since 2008 until the end of 2011.

In 2010 the share of biomass heat generator from the overall sales volume of heat generators (oil and gas heat generators, heat pumps, and biomass) was only 3.1%. The bigger shares had low temperature oil boilers (6.1%) and heat pumps (8.3%). Despite the market incentive program, which was supposed to make pellet installation usage more popular as well as increase the sales figures in German. The sales of Pellet Stove remained below expectations; only 3.1% of overall sales volume of heat generator.



Figure 11: Pellet stoves in EU

European Union is the biggest pellet market in the world. The consumption of wood pellets in Europe plays a significant role, as well according to approximate evaluation provided of German Biofuel Portal, around a half of the 24.5 million metric tons of pellets produced worldwide originate from Europe.

The government of Germany set a new legislation which implies increased subsidizing. They subsidy all people who are eager to change their old heating systems for new pellet boilers and stoves. A subsidy of 3500 Euro was allocated to the households who switch to pellet

stoves.

The government of Germany decided to increase the basic subsidy for heating systems which work on pellets and have capacities of up to 100kW from 36 Euro per kW to 80 Euro per kW. As well, in the future, they are planning to increase the subsidies costs even more. Household owners who are to replace their existing heating systems with pellet considering boilers and stoves will receive up to 5,250 Euro, and grants of up to 3,500 Euro will be awarded for new buildings.

However, in the future the legislative basis for the increased biomass usage in Germany will promote wood pellet market and wood pellet stoves market in particular. This is going to be implemented by subsidizing and setting legislative requirements for biomass usage.



Figure 12: Pellet named TENRYU made in Hamamatsu city.

Hamamatsu City in Shizuoka prefecture Hamamatsu or Hamamatsu-shi is a city located in western Shizuoka Prefecture, Japan. As of September 1, 2015, the city had an estimated population of 789,407, making it the prefecture’s largest city and a population density of 507 persons per km². The total area was 1,558.06 km² (601.57 sq mi) [5]. The achievement of Hamamatsu city for the utilization project of wood biomass by promote using biomass fuel is a successful model.

The change of sales volume of pellet which made by Hamamatsu city between 2013 to 2014 from 27,870 kg to 112,963 kg, so the number of facilities to machines using pellets as fuel significantly can be estimated [6]. The sales volume of pellet in the city were increased by subsidize all people, individuals, corporations or organizations who install pellet stoves in residences or shops in Hamamatsu city to purchase and installment of pellet stove.

Amount of subsidy by the local government is less than 30% of expenses for purchase in maximum 50,000 yen for one pellet stove. Hamamatsu city are putting emphasis on the promotion of pellet stove by using brochure and guide book for promoting with students of Hamamatsu design school. The subsidy complemented with the campaigns made an impact, as it is not the main reason to increase the sales volume of pellet stoves Hamamatsu city.



Figure 13: Shizuoka Prefecture.

Alternative Solutions

There are different types of subsidy in Japan as the table:

Table 2: Types of subsidies

Direct Subsidies	Cash subsidies (grants)
	Stock purchases (higher value of stock)
Indirect Subsidies	Tax concessions (tax credits)
	Assumption of risk (loan guarantees)
Non-subsidies	Taxes and penalties for non-compliance (carbon tax)
	Revenue bonds (tobacco bonds)

The cost of pellet stove is 300,000 yen in addition the construction cost of 200,000 yen. However, the local government is going to subsidize the people more than 60% of expenses up to 300,000 yen per a machine in process to submit the forms to Agriculture, Forestry and Fisheries Division of Okinoshima-cho. The subsidy will go to people, organizations or corporations that having an address in Okinoshima-cho, and the capacity will be up to 10 entities per year.

Business Model

Table 3: Business Model

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segment
<ul style="list-style-type: none"> - Local government - Domestic government - Suppliers - Providers - Maintenance 	<ul style="list-style-type: none"> - Prepare for sessions. - Publications and statistics. - Training by the time. - Materials. - Workshops. - Decision making and set policies. - Awareness campaign. - Brochures for promotion. 	<ul style="list-style-type: none"> - Heating better - Cost low - Good saving 	<ul style="list-style-type: none"> - Surveys. - Reports. - Materials. - Workshops. - Awareness campaign. - Advertisements. - Brochures for promotion. 	<ul style="list-style-type: none"> - People in Okinoshima islands, Dogo island, - Firms - Hotels - Small startups
	Key Resources		Channels	
	<ul style="list-style-type: none"> - Set policies. - Create data base. - Subsidies. - Investors. 		<ul style="list-style-type: none"> - Onsite - Online - Mobile 	
Cost Structure		Revenues Streams		
<ul style="list-style-type: none"> - Total: 500000 yen [+] - Subsidy: 200000 yen [-] - In charge: 300000 yen 		<ul style="list-style-type: none"> - Crate data revenue flow for every 6 months - Revenue = Plant Scale * FIT * Hours/day * Days/Year * Capacity Factor 		

Logical Frameworks

Table 4: Logical Frameworks

Inputs	Outputs		Outcomes – Impact		
	Activities	Participation	Short Term	Medium Term	Long Term
<ul style="list-style-type: none"> - Money and Investment. - Experience and Experts Staff. - Technology. - Knowledge. - Data base. - Subsidies. - Investors. - Experts. 	<ul style="list-style-type: none"> - Sessions. - Publications. - Surveys. - Reports. - Training. - Materials. - Workshops. - Decision making. - Awareness campaign. - Advertisements / Brochures for promotion. 	<ul style="list-style-type: none"> - Suppliers, - Providers, - Local Gov. and Domestic Gov., - Insurance companies, - Donors, NGO, and - Statistics or Research institutes. 	<ul style="list-style-type: none"> - Improve the quality of system which provided to people, - Reduced and decreased the cost of heating consumption. - More residents using pellet stoves. - Improved heating systems. 	<ul style="list-style-type: none"> • Procedures for sharing the data. • Policies for Decision making. • Behaviors to increase the safety for system. • Practices. - Increase the safety. • More residents using pellet stoves. 	<ul style="list-style-type: none"> • Cost: to reduce. • Setting convenient policies for all stakeholder. • More environmentally friendly. • Sustainable development. • Decreased cost of pellet stoves. • Increasing willingness of residents to buy pellet stoves.
Assumptions			External Factors		
<ul style="list-style-type: none"> • Most residents would prefer pellet stoves than other heating systems. • More residents using pellet stoves will decrease the cost. 			<ul style="list-style-type: none"> • The economy will remain stable on the island. • The population will not decrease. • Local government will increase the subsidy by the time. • There are many suppliers in the island for the products. • The resources in the island is available all the time. 		

Implementation

The flowchart below shows the process of subsidy by the local government of Okinoshima island:

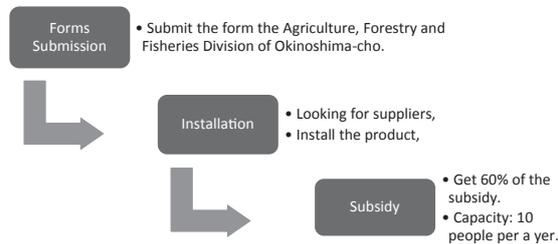


Figure 14: The process of Government subsidy.

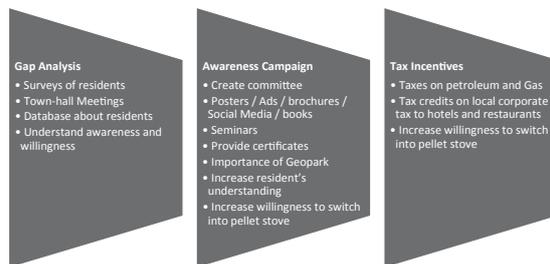


Figure 15: Additional programs for promoting the product.

Conclusion

In general result for the fieldwork to Okinoshima island, 25,000 extra timber are needed for the project, as well Satoyama forest management system in Oki-islands is inefficient well for the people. However, local government should change the system to provide the proper technology for the harvest system.

Moreover, all suppliers and new startups business in the island have facing a big problem according to lack of the information about forest in the island, as well the sharing of database is too low due to lack of studies. Whatever, the improvement of communication and introducing new technology will make the project more success in future.

Thus, in conclusion for the project, current pellet stove subsidy might not be efficient due to the high costs of project for people in according to the revenue and also their saving which make the demand in low level, so that the government should promote another program for subsidies, and it is high recommended to promote pellet stove in Okinoshima island for all people.

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Final report for Oki onsite

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1. Introduction

1.1 Current situation of the project

Dogo island located in Sea of Japan was once a major timber production site. As many villages in mountainous region in Japan used to be before the industrialization, forestry played significant role in the local economy. After the World War II, the timber price had risen by increase of the labor cost due to growth of Japanese economy. That resulted in loss of the competitiveness against the cheaper imported timbers. Now, many planted trees have left in the forest since they don't make profit. In addition, the island is facing serious depopulation and aging society. All those things brought the lack of forestry workers. As a result, many forests in Japan, including Dogo island, are left unmaintained.

Municipality of Okinoshima-cho, which covers whole Dogo island, has been promoting a plan called "Midori no Kombinat"; linearly means #Green Complex" to create business and industry to support business related to forestry. The main objective of the plan is to create new business or industry by utilizing unused wood biomass, such as waste from sawmill, wasted logs, woods resulted from thinning, fallen-down trees.

In this project, the utilization of unused material is realized by production of woodchips and lignophenol, and the utilization of methane as a byproduct. Among of these, the woodchips production has been commercialized and used in many places while the others have not yet been commercialized. As for the R&D of lignophenol, theoretical construction and small laboratory scale experiments have been operated. However, the R&D has not been yet matured to make steady production, which is required for the commercialization.



Fig. Map of Oki islands.

There are some technical problems are the major obstacles to be overcome, but solving these problems require high knowledge about the chemical reaction processes which cannot be made by a semester long study. Also, there are many obstacles to be overcome other than technical issues to realize the commercialization of new technology, or even more to establish it as a business.



Fig. Lignophenol.

By successful completion of "Midori no Kombinat" plan, new circulation of money would be created from materials used to produce nothing. In other words, the plan anticipates utilizing local resources effectively for making more money from limited amount of resources, and ultimately that attracts people who end up maintaining the forest. However, the project's progress is not as rapid as originally estimated. Main reason of slow progress is the lack of budget because of small municipality size. The situation surrounding the project would be more complex because feasibility of the project with woodchip power generation decreases as interest rate increases, as Group 1 mentioned.

1.2 Group work topic

Attracting People/Money by Using Positive Image of the Project; Project provides not only the actual products or money by selling them to the community, but also provides an opportunity to disseminate certain positive image to the outside of the community. Oki islands' economy actually depends largely on the tourism, and serious depopulation is going on. How can we utilize this positive image for attracting more people and money?

As above the project's current situation and the group work topic, Dogo island is requiring people both who want to live in and who visit as tourism because economy of the island really depends on the tourism and

produced commercially and used in many places. As for lignophenol experiments, at a stage of small laboratory, have already cleared while matured experiments have not started yet. To utilize unused materials further and develop the biomass technology, a new institution should be established. This institution can cooperate with universities, companies and other research institution outside of the island.



Fig. Rousoku-iwa.



Fig. Undried woodchips.



Fig. Lignophenol plant in Dogo island.

3. Public awareness

According to the questionnaire of Group 3, 85 % of young people living in the island said the biomass project is not important. In addition, more than half of respondents are unaware of the project. Okinoshima-cho is planning to establish “subsidiary system of residential wood pellet stove installment” for household or enterprise by aiming to further increase of wood pellet and its use in 2017. At present, only 150 households have installed the pellet stove. The number of the wood pellet stove spread for ordinary homes may reflect on these

results. Moreover, Group 4 concluded that the current pellet stove subsidy might not be efficient because of the high costs and low demand, and recommended to complement the subsidies with other programs to encourage public involvement.

As for tourism for foreigners, it is difficult for them to obtain information in Oki islands. While there are English website and employees who can speak English at Nishinoshima-cho which is other part of Oki islands, none of them are available at Dogo tourism office. According to Japan National Tourism Organization, the number of foreign tourists who visit Japan has been increasing and it exceeded 20 million in 2016.

Concerning Oki islands tourism offices, they can be regarded lack of unity among themselves since each of them has own vision and strategies for attracting visitors, residents and investments. To pursue improvement of current Oki islands’ tourism situation, cooperation between each office is important.

As for Japanese tourism, the tourism to Oki islands has declined in part due to reduction in group tour. Comparing with individual tour, the group tour has higher possibility to contribute to the islands economy because it brings more people. A special program that can attract not only individual tour but also group tour should be established in the islands.



Fig. An example of the biomass project: Oki Green Power Station.



Fig. Wood pellet stove.

4. Case study

4.1 Case of Ama-cho

Ama-cho (Ama town) is in Nakanoshima which is one of Oki islands and is in Dozen part, and its population is about 2,400. Ama-cho succeeded to increase residence with many activities despite a part of Oki islands as well as Okinoshima-cho, Dogo island. We can refer case of Ama-cho to the first point of our blueprint: welfare of local residents. The activities and that of results are shown below.

● Activities of Ama-cho

- Financial support for people who wishes to start fishery (e.g. 150,000 yen per month for 3 years till their salary reaches to decent level).
- Affordable loans for people who want to start new business in Ama-cho.
- Mayor of Ama-cho cut 50 % of his salary to manage the budget.
- Other officers of Ama-cho agreed to cut their salary to manage the budget.
- Established and advertised 'Oki beef' and 'Haruka oyster' brand.
- Opened new courses at the high school in Ama-cho with scholarship for students from outside of the town.



Fig. Map of Ama-cho.

● Results of the activities

- Population increased and currently 20 % of population of Ama-cho is from outside of the town.
- Population of young generation, that represents from 0 to 39 years old, increased.
- 'Haruka oyster' is now exported to Dubai, the United States, etc. and annual turnover reaches to 200 million yen (about 2 million dollars).
- There is boom of housing construction due to the shortage of housing for people from outside of the town.

4.2 Case of Costa Rica

Costa Rica is a country in Central America located between the Pacific Ocean and the Caribbean Sea. It has a population of around 4.9 million, in a land area of

51,060 km².

The country is rich in nature and its half of the land area is covered by forest. Totally, national parks and nature reserved area is occupying over quarter of the land area. In this country, there are lots of biodiversity and pristine water and beaches. Thus, it can be said that the environment of Costa Rica is similar to that of Dogo island. On the other hand, the number of tourists and the tourist income in Costa Rica are increasing unlike the case of Dogo island. We can refer the case of Costa Rica to the second point of our blueprint: tourism activities.

Costa Rica is a hotspot for eco-tourism: emphasis on visiting unspoiled natural places, and on disturbing the natural environment as little as possible. Many of the first eco-tourists were academics that came to study biology. However, many of today's eco-tourists are not so. There is some key to continued tourism growth: innovative attractions.



Fig. Costa Rica location.

● Eco-lodges

- Built using sustainable materials
- Sustainable power (e.g. wind and solar)
- Some proceeds used for environmental preservation, education
- Range from shoestring budget to high-end luxury

● Adventure Activities

- Zip-lining
- Mountain biking
- Bungee jumping
- Whitewater rafting
- Regular endurance races
- More than 50 % now come for adventure activities.

Table of tourism statistics in Costa Rica

Year	Tourists (thousands of people)	Earned by Tourism (millions of dollars)	Relationship % of GDP (Tourism/ exports)
2003	1.237,95	1.199,40	19,70
2004	1.452,93	1.357,40	21,50
2005	1.679,05	1.569,90	22,30
2006	1.725,26	1.629,30	19,90
2007	1.979,79	1.894,70	20,30
2008	2.089,17	2.144,20	22,60

Source: MIDEPLAN based on data from ICT 2009.



Fig. An eco-lodge in Costa Rica.



Fig. Zip-lining in Costa Rica.



Fig. Whitewater rafting.

4.3 Case of Korea - KNUE

Korea National University of Education (KNUE) was established in 1984 by the president law to make the integrated education center. It is located in Cheongju.

The number of student is about 2,000 while once was 100 at first. The purposes of this university are teacher training, teacher in-service training and research of education. Now, the most focused one is teacher in-service training.

As shown in the picture, the university have been surrounded by the small hills and lots of rice field. There was another purpose to make the bunker as a regional military headquarter. At that time, there was no hospital, no markets but just one road.

They use the 2 ways for teacher in-service training between online and offline. They can get some benefits the offline training courses. Also providing the offline training service, they can call the teachers and stakeholders in education to their location. The number of teachers as training member is 2 or 3 times over than the number of student per year. Thus, as well as the university officers, many teachers who have an economic power visit and stay around this region. This results in increase the benefit for local economy. Though there was only one road in this region, there are little bit more roads, more over 10 cafes, 3 supermarkets and etc. at present.

We can refer this case to the final point of our blueprint: forestry institution.



Fig. An aerial photograph of KNUE.

5. Conclusion

Regarding the questionnaires implemented by Group 3, raising awareness of the Oki islands biomass project has the potential to revitalize the forestry value chain, creating jobs and developing industries linked to the forestry environment. This in turn could revitalize the islands' economy. Our concrete proposals are shown below.

- Advertisement campaigns inside as well as outside the island.
- Research centers focused on improving the existing technology for producing biomass products such as wood pellets and lignophenol, to achieve greater efficiency and reduce production cost.
- Encourage business formation via government

subsidies research grants and so on.

- Improve the infrastructure: transportation, communication facilities and restaurants.
- Promote Oki islands as a premiere eco-tourism destination.
- At initial stage, we need to at least have small successful projects, if not a bigger one (as was pointed out by Mr. Hisashi Kajiyama in the lecture at Hiroshima University), so that others can also be inspired to do the same.

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