Ministry of Education
Department of Higher Education (Lower Myanmar)
Taunggoke Degree College

Taunggoke Degree College Research Journal

Vol.1-A, No.1 October,2018.

Taunggoke Degree College Research Journal 2018

Vol. (1-A), No. 1

Editorial Board

Contents

Preliminary Phytochemical Investigation and Antioxident Activity of leaves from *Carica papaya* Linn; Thin-Baw and leaves of *Dolichandrone spathacea* (L.f) Tha-khut

Win Naing*

Abstract

This project is concerned with the phytochemical investigation of leaves of *Carica papaya* Linn; Thin-Baw and leaves of *Dolichandrone spathacea* (L.f) Tha-khut by test tube and TLC methods. The preliminary phytochemical tests of the selected plants revealed the presence of amino acids, carbohydrates, glycosides, organic acids, phenolic compounds, reducing sugars, saponins, starch, steroids, tannin and terpenoids. The phytochemical constituents of petroleum ether extracts and 70% ethanol extracts were confirmed by thin layer chromatography method. From the observation, petroleum ether extracts from *Carica papaya* may contain steroids, terpenoids and alkaloids and ethanol extracts were found to be present terpenoids. Besides, the antioxidant activity of petroleum ether extracts and 70% ethanol extracts from the leaves of Thin baw and Tha-khut plants were measured by using1, 1 – diphenyl-2- picrylhydrazyl (DPPH) radical. All of 70% ethanol extracts from the leaves showed higher antioxidant potential than any other petroleum ether extract.

Keywords: *Carica papaya* L., *Dolichandrone spathacea* (L.f), phytochemical constituents thin layer chromatography, antioxidant activity, DPPH

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INTRODUCTION

Photochemistry is the branch of science that deals with the study of phytochemicals. Phytochemicals (from the Greek word phyto, meaning plant) are biologically active, naturally occured chemical compounds found in plants, which provide benefits for human health further than those attributed to macronutrients and micronutrients. They protect plants from diseases and damage as well as contribute to the plant's colour, aroma and flavour. (Saxena *et al*., 2013)

Carica papaya belongs to the family of Caricaceae. It is not a tree but a herbaceous succulent plant that possessed the supporting stem. The plants are usually short lived, but can produce fruit for more than 20 years. The plants are male, female and hermaprodite. The native of Papaya plant is tropical America. Now, the papaya is well known in nearly all tropical regions and the Pacific Islands. It is a rich source of three powerful antioxidants: vitamin C, vitamin A and vitamin E. It is used as a traditional medicine for the treatment of various diseases like cancer, malaria, dengue fever, viral infection such as common cold, eczema, warts etc. the studies conducted in some countries have shown that there is a significant antibacterial activity in organic extracts of different parts of *Carica papaya*. The leaf tea or extract of Papaya has a reputation as a tumour destroying agent. The high level of natural self defence compounds from the parts of the plant is highly resistant to insect and disease infestation (Wikipedia).

Dolichandrone spathacea (L.f) (Tha-khut) is one of the distributed plant species along the coastal region. It is known as Tui and mangrove trumpet tree. It is a species of the plants in Bignoniacea family. It can be found in the places from South India, Serilanka to New Caledonia.Mangrove Trumpet tree is an attractive, evergreen tree with intensely fragrant flowers, growing up to 20 meters the wild for local use as a food and medicine. The plant sample of *Dolichandrone spathacea* is a huge reservoir of variety of secondary metabolites like saponins, tannins, flavonoids, quinies , alkaloids, anthralene derivatives, reducing sugar, glycosides, carbohydrates, quercetin, kaempferol, iridoids, terpenes, steriods, etc.(Trease and Evans, 1980)

MATERIALS AND METHODS

Plant Materials

State in June the leaves of Carica papaya (Thin-Baw) and flowers and leaves of Dolichandrone spathacea (Tha-khut) were collected from campus of Taunggoke Degree College, Tounggoke Township, Rakhine, June, 2017.

***Carica papaya* (male & female)**

Dolichandrone pathacea

Figure 1. Selected Medicinal plants

Chemicals and Reagents

Chemicals used were petroleum ether, ethanol, ethyl acetate from BDH and also locally from the commercial chemical stores in Yangon, Silica gel 60 GF_{254} precoated aluminium sheets (20 cm x 20 cm) (Merck Ltd.,Japan) are used for TLC screening.

The reagents used for phytochemical tests were Dragendorff's, Mayer's, Wagner's, sodium picrate solution, 10%H_2SO_4 , 5%$FeCl_3$,10% ethanolic KOH, 1%$AlCl_3$,10% lead acetate, ninhydrin reagent,10% naphthol, conc.HCl, Mg turning,bromocresol green indicator, iodine solution, acetic anhydride, Benedict's solution and 1%gelatin.

Preliminary Phytochemical investigation of the Selected Medicinal Plants by Test Tube and TLC Methods

Preparation of PE and 70%Ethanol Extracts

Dried powder sample (30 g) was boiled with 150 mL of PE for about 30 minutes using Sohxlet extractor and then concentrated with water bath.

Dried powder sample (100 g) was percolate with 400 mL of ethanol in air tight container for two day at room temperature and then filtered and concentrated with water bath. The procedure was repeated for three times.

Procedure

Test for alkaloids

The dried powder sample (2 g) was treated in a test tube with 1% HCl (10 mL) for 30 min in a water bath. The suspension was filtered into a test tube and the filtrate was divided into three parts A, B and C (Marini-Bettolo, *et al.*, 1981). 5 drops of Wagner's reagent was added to filtrate A, 5 drops of Mayer's reagent was placed into filtrate B and 5 drops of Sodium picrate solution was added to the filtrate C.

Test for α-amino acids

The dried powder sample (2 g) was boiled with 25 mL of distilled water until 1/3 volume remained and filtered. The filtrate was then dropped on filter paper and sprayed ninhydrin reagent and heated in the oven at 90-100˚C for 10-15 minutes observation was made to see if violet color spots indicating presence of α-amino acid (Robinson, 1983).

Test for carbohydrate (Molish's Test)

The dried powder sample was boiled with distilled water and filtered. The filtrate was introduced into a test tube and a few drops of 10% α-naphthol was added and shaken. The test tube was then inclined at an angle of 45˚ and concentrated sulphuric acid was added slowly along the side of the test tube. Red ring indicates the presence of carbohydrate (Shriner *et al*., 1980).

Test for flavonoids

The dried powder material (2g) was extracted with 70% ethanol and evaporated to dryness, and treated with 15 mL of pet ether (60-80˚C). A few drops of concentrated hydrochloric acid were added to the defatted alcoholic extract and then 0.5 g of magnesium ribbon was added. A colour which develops within 3 minutes indicates the presence of flavonoids. A pink, reddish pink, (or) brown colour was produced (Robinson, 1983).

Test for glycosides

The dried powder sample (3g) was boiled with distilled water for about 10 minutes, allowed to cool and filtered. The filtrate was treated with 10% lead acetate solution. White precipitate shows the presence of glycoside (Marini-Bettlo, 1980).

Test of phenolic compounds

The dried powder sample (3g) was boiled with distilled water and filtered. The filtrate when treated with three drops of freshly prepared (1:1) mixture containing 1% potassium ferricyanide and 1% ferric chloride solution. Observation was made to see if blue or green colour appeared (Robinson, 1983).

Test for saponins

Dried powder sample was introduced into a test tube followed by the addition of distilled water and the mixture was vigorously shaken for a few minutes. Observation was made to see if frothing took place (Shriner, *et al.*, 1980).

Test for steroids

The dried powder sample (3g) was refluxed with pet-ether and the solvent was removed by distillation under reduced pressure. Acetic anhydride (3 drops) was added and the mixture was shaken. Then a few drops of concentrated sulphuric acid were carefully added and shaken. Observation was made to see if the solution turned to blue colour (M-Tin Wa, 1972).

Test for terpenoids

The powdered sample (1 g) was extracted with chloroform (20 mL) for 30 minutes and filtered. There filtrate was evaporated to dry in desiccator and the residue was dissolved in ethanol (2 mL). The solution was transferred to watch glass and the solvent was evaporated to dryness on a water bath. The residue was dissolved in acetic anhydride, using a glass rod. The solution was treated with a drop of concentrated sulphuric acid. Observation was made to see brick-red colour (Vogel, 1956).

Test for tannin

Dried powdered samples 1g was boiled with distilled water 10 mL for about 20min and filtered. The filtrate was treated with a few drops of gelatin and 1% FeCl3. Observation was made to see if precipitate were performed (Marini-Bettlo, 1980).

Test for starch

Dried powdered samples 1g was boiled with distilled water 10 mL for about 30 min. It was then filtered and two drops of iodine solution was added to the filtrate. Observation was made to see if bluish-black precipitate were performed (Robinson, 1983).

Test of reducing sugars

1 g of dry powder sample was boiled with 10 mL of distilled water for about 20 minutes and filter. 1 mL of water extract was treated with 2 drops of Benedict's solution. Brick- red precipitate indicated presence of reducing sugars.(M.Tin Wa, 1972).

Test for organic acids

5 mL of water extract of the selected sample were taken and treated with a few drops of bromocresol green indicator. The appearance of blue colouration indicates the presence of organic acids. (Robinson, 1983)

RESULT AND DISCUSSION

Preliminary Phytochemical Investigation of Selected Plant Extracts by Test Tube Methods

In order to know the types of phytoconstituents, the phytochemical investigation was preliminarily carried out by test tube and TLC methods. According to the experimental results, alkaloids, $\propto -$amino acid, carbohydrates, flavonoids, glycosides, phenolic compounds, reducing sugar and steroids were observed in the selected plant leaves. However, starch, tannins, saponins and terpenoids were not observed in it. The results obtained from these experiments were summarized in Table (1).

Preliminary Phytochemical Investigation of Selected Plant Extracts by TLC Methods

In this work, TLC method was used for qualitative determination of phytoconstituents of PE and 70% ethanol extracts. The solvent system was optimized in order to get maximum separation on plate. The presence of various phytochemicals was detected by the use of different spraying reagents and visualized under UV light at 365 nm wavelengths. It was observed that steroids, terpenoids, alkaloids, essential oils and phenolic compounds were present in petroleum ether and 70% ethanol extracts of selected plants using solvent system (PE:EtOAC,1:1) and spraying agents (5% H_2SO_4, Δ, Mayer reagent). The results are shown in Figures 2 and 3.

Antioxidant Activity of Selected Plant Crude Extracts

The antioxidant activities of crude extracts for leaves of selected plants were studied. Extracts of petroleum ether and 70% ethanol obtained were qualitatively determined by using DPPH- radical scavenging method.

According to the experiments, petroleum ether extract and 70% ethanol extract were investigated on its antioxidant activity. These extracts also showed antioxidant activity as shown in Figure 4 and 5.

Table 1. Preliminary Phytochemical Test on Selected Plant Extracts by Test Tube and TLC Methods

No	Test	Extract	Test Reagent	Observation	Leaves (Thin Baw)	Leaves (Tha khut)
1.	Alkaloids	1%HCl	Wagnar's reagent	Brown ppt	+	+
			Sodium Picrate	Yellow ppt	+	+
			Mayer reagent	Cream color ppt	+	+
2.	α-amino acid	H_2O	Ninhydrin reagent	Violet spot	+	+
3.	carbohydrates	H_2O	10%α-napthol $+H_2SO_4$	Red ring	+	+
4.	Flovanoids	EtOH	Mg ribbon, conc:HCl	Brown solution	+	+
5.	Glycoside	H_2O	10%Lead acetate	White ppt	+	+
6.	Phenolic compound	H_2O	1% $FeCl_3$ 1% K_3 $Fe(CN)_6$	Deep blue solution	+	+
7.	Recuding sugar	H_2O	Benedict's solution	Blue ppt	+	+
8.	Saponins	H_2O	H_2O	No frothing	-	-
9.	Starch	H_2O	1% I_2	No deep blue	-	-
10.	Steroids	PE	Acetic anhydride H_2SO_4	Deep blue	+	+
11.	Terpenoids	Chloro form	Acetic anhydride H_2SO_4	No pink colour	-	-
12.	Tannins	H_2O	1%$FeCl_3$,gelatin	No deep colour	-	-

(+) = present (-) = absent

a=petroleum ether extract, b=70%ethanol extract,

a b a b solvent system=PE:EtOAC,1:1,

Figure 2. Thin layer chromatograms of petroleum ether extract and 70% ethanol extract of *Carica papaya*

a=petroleum ether extract, b=70% ethanol extract,

c d c d solvent system=PE:EtOAC,1:1,

Figure 3. Thin layer chromatograms of petroleum ether extract and 70% ethanol extract of *Dolichandrone spathacea*

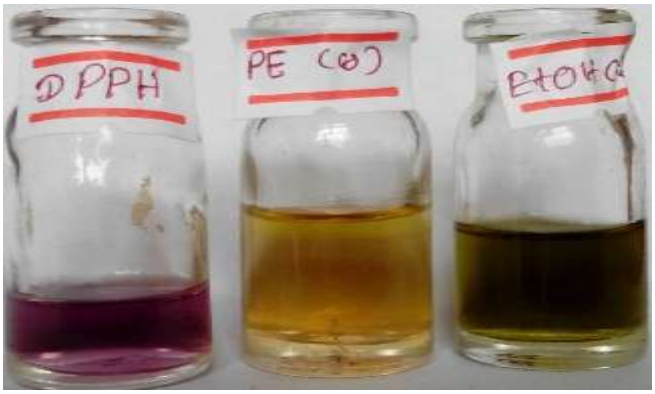
a b c

(a) Colour of DPPH

(b) Colour dimished after scavenging with pet ether extract

(c) Colour diminished after scavenging with 70% ethnol extract

Figure 4. Observation of antioxidant activity of pet- ether extract and 70% ethanol extract from *Carica papaya*



c d e

(c) Colour of DPPH

(d) Colour dimished after scavenging with petroleum ether extract

(e) Colour diminished after scavenging with 70% ethanol extract

Figure 5. Observation of antioxidant activity of petroleum ether extract and 70% ethanol extract from *Dolichandrone spathacea*

CONCLUSION

From the present work, the following inferences may be deduced.

The phytochemical tests indicated that the leaves of selected plants similarly contain alkaloids, α- amino acids, carbohydrates, flavonoids, glycosides, phenolic compounds, reducing sugars, saponins, organic acids, steroids, tannins and terpenoids.

According to the screening by thin layer chromatography methods, chemical constituents of petroleum ether and 70% ethanol extracts from selected plants leaves may be steroids, terpenoids and alkaloids. Antioxidant activity examination of petroleum ether extracts and 70% ethanol extracts from selected plant leaves were also carried out by DPPH assay.

Significant antioxidant activity was observed in all extracts which showed scavenging DPPH radical. All petroleum ether extracts of selected plant leaves showed a weak antioxidant potential but all 70% ethanol extracts showed a great antioxidant activity.

ACKNOWLEDGEMENTS

I would like to thank Dr. Myint Swe, Principal of Taunggoke Degree College, for his permission to write this article in Taunggoke Degree College Research Journal. I would like to express Daw Khin Kay Thi Han and Daw Nyunt Nyunt Htay, lecturers, Depaitment of Chemistry, Tounggoke Degree College, for encouragement, helpful advice, and comments.

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EVALUATION ON MORPHOLOGICAL CHARACTERS AND YIELD CHARACTERS OF CHINESE WHEAT AND ZALOTE 2 WHEAT LINE

Ohn Maung[1] , War War Aung[2] , Than Than Htet[3] , Su Thet Yee[4]

ABSTRACT

In this paper, the local hexaploid wheat cultivar *Triticum aestivum* L. cv Zalote 2 and Chinese wheat cultivar collected from Zalote agricultural research farm in Monywa, Sagaing Region were compared and studied. Occurrence of tillers per plant, length of spike, spike density, spikelet per spike, number of seeds per spikelet and number of seeds per spike of hexaploid wheat Zalote 2 were significantly superior than the Chinese wheat. Although the above mentioned six characters of the plants were significantly different, four characters of the number of florets per spikelet, fertility of first and second florets, 100 seeds weight (micro-test weight) and individual seed weight were not much different from another plants.

INTRODUCTION

Human beings will have to face an unprecedented challenge in the next century, they need to be more than double of the world's food supply due to the rising population and the increasing income. Bread wheat *(Triticum asetivum* L.*)* is cultivated under various agroclimatic situations. The diverse genotypes in winter and spring wheat ecotypes cultivated in different regions are very low yielded and easily affected by the rusts and powdery mildew.

Many scientists around the world have already reported the effect of chemical composition, deficiency in nutrient , soil texture on both vegetative and yield characters of different kinds of plants from different point of view in order to improve the plant characters. Hsan (1990) also stated that the transformation in mitotic chromosome, meiotic pairing and yield characters of wheat and triticale are largely influenced by the environmental condition such as light, temperature, availability of water and nutrition in the cultivated soil.

The objective of the present study was to compare the yield characters of Zalote 2 and Chinese wheat grown in Zalote Agricultureal Research Farm.This research was carried out to compare the morphological characters and the yields of hexaploid wheat Zalote 2 and Chinese wheat. This paper aims at giving the information to farmers for their economic income and to those researchers for their further studies.

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MATERIALS AND METHODS

Materials

Tiller numbers, spike characters and seed weight for the present study were obtained from the hexaploid wheat cultivar Zalote 2 (*Triticum aestivum* L.) and Chinese wheat collected from Zaloke research farm in Monywa, Sagaing Region.

Methods

Data collecting for tiller numbers and spike characters

After all the plants were fully matured, number of fertile tillers from 25 individual plants were counted. Similarly, 25 primary spikes (i.e. first appearing spike) from plants were harvested and labeled separately for studying the spike and seeds characters. Spike length, density of spikelet, number of spikelets per spike, number of florets per spike, fertility of first and second floret (i.e genetically control character) of each spike, number of seeds per spikelet, number of seeds per spike, individual seed weight (25 seeds) and micro test-weight (i.e 100 grains weight, weighting for 10 times) were also measured and recorded to compare the morphology and yield characters.

RESULTS AND DISCUSSION

(i) Tiller number

Number of tillers per plant of hexaploid wheat *Triticum aestivum* L.cv. Zalote 2 was occurred highest number of 2.97 and Chinese wheat was occurred the lowest number of 2.36. Zalote 2 exhibited significantly superior in occurrence of fertile tillers per plant than Chinese wheat.

(ii) Spike length

The longest spike length of hexploid wheat Zalote 2 observed 17.75 cm in mean length and it length is significantly superior than the Chinese wheat which is the shortest length of 13.83 cm in mean length was resulted.

(iii) Spike density

The spike density result of hexaploid wheat Zalote 2 possessing 2.93 spikelets per 1 cm of spike in mean value, while the variety of Chinese wheat have the least dense spikelet with 2.67 spikelets per 1cm of spike.

(iv) Spikelets per spike

The highest number of spikelets per spike was observed on hexaploid wheat Zalote 2 plant possessing 28.22. The lowest number with 21.26 in number occurred in Chinese wheat.

(v) Number of florets per spikelet

No significantly different from one to another in number of florets per spikelet. Generally uniformly 3 to 5 number of florest per spikelet were observed.

(vi) Fertility of first and second floret

Hexaploid wheat Zalote 2 plant was not significantly different in fertility of first and second floret from the Chinese wheat.

(vii) Number of seeds per spikelet

The number of seeds per spikelet of hexaploid wheat Zalot 2 was 2.98 seeds per spikelet in mean value significantly superior than the Chinese wheat which was possessed 2.31 seeds per spikelet in mean value.

(viii) Number of seeds per spike

The mean seeds per spike of Zalote 2 was 62.26 significantly superior than the Chinese wheat which was occurred 42.25 mean number of seed per spike.

(ix) Individual seed weight

Individual seed weight of hexaploid wheat Zalote 2 was 0.0402 gm which was no significantly superior than the seed from Chinese wheat plant was 0.0399gm.

(x) 100 seeds weight (Micro test-weight) (Plate 3)

The 100 seeds weight of the Zalote 2 wheat and Chinese wheat ranges between 4.623 and 4.203 gm respectively and no significantly different from one to another.

Fig 1. Zalote 2 Wheat Plants grown in randomized design

Fig 2 Chinese Wheat Plants grown in randomized design

Fig 3. Zalote 2 Seeds

Fig 4. Chinese Wheat Seeds

Fig 4. Spikes Characters of Zalote 2

Fig 4. Spikes Characters of Chinese Wheat

Fig 7. Spike Characters of Zalote 2

Fig 8. Spike Characters of Chinese Wheat

Fig 9. Spikelet characters of Zalote 2

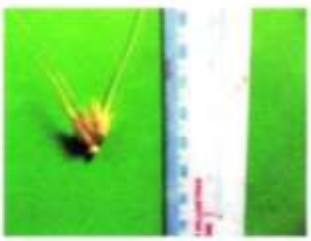

Fig 10. Spikelet Characters of Chinese Wheat

CONCLUSION

Environmental conditions such as soil type, texture and mineral and nutrients component of the soil had influenced on the morphological characters as well as the yield and cytological characters of the crops (Hsan and Shigenaga, 1989.)

In the present study, it was observed that tiller number per plant, length of spike , density of spike , spikelet per spike , number of seed per spikelet and seed per spike characters of hexaploid wheat cultivar Zalote 2 and Chinese wheat were significantly different from each other.

For the micro test weight character, individual seed weight, number of florets per spikelet , fertility of first and second florets obtained from Zalote 2 wheat and Chinese wheat were not significantly from different each other. Under the same environmental condition, the cultivar of hexaploid wheat cultivar Zalote 2 is as good as that of Chinese wheat.

The objective of the present study is to compare the morphological characters and seeds characters of hexaploid wheat cultivar Zalote 2 and Chinese wheat. This research is to give the information to the farmers and to those researchers for their further studies. The yield stability of wheat check is governed not only by its genes but also by the environmental or the soil nutrients factors.

ACKNOWLEDGEMENTS

We would like to express our deep gratitude to Dr Myint Swe, Principal of Taunggoke Degree College for his encouragement, and valuable comments related to this research paper.

We also thank to Professor Dr. Ohm Mar Htwe, Head of Botany Department , University of Pakokku , for her valuable guidance throughout this research paper.

We gratefully acknowledge to Daw Aye Aye Win, General manager, Zaloke Agricultural Research Farm in Monywa Township, Sagaing Region, Myanmar for her kind help and permission to use the materials from her farm.

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Studying Reading Activities in "Straightforward" and Evaluating the Critical Thinking Levels in Respective Assessment

Thin Thin Wai [1] and Khin Thida Zaw [2]

Abstract

Nowadays, critical thinking skills play a vital role in academic field. According to Vyncke (2012), critical thinking is arguably one of the central requirements and desired outcomes. However, students are either unaware of the importance of argumentation in writing or lack understanding of what is meant by the concept of argument, evaluation and analysis (Jones 2007, Wingate 2011). Moreover, Paul argues for educational reform that better addresses our contemporary need for developing critical thinking skills. A recent survey on a group of students indicates their need for these skills. "Straightforward" series have been used in Arts & Science universities and colleges, and the course-book writers asserted that high levels of critical thinking skill are included in their materials. These materials especially their reading activities and respective questions are critically analyzed by employing a matrix of Bloom's Revised Taxonomy and Webb's DOK Model to find out the scope and contribution of them in the activities and in the assessment. Bloom's Revised Taxonomy categorizes the cognitive skills required of the brain when faced with a new task. Therefore describing the type of thinking processes is necessary. On the other hand, the DOK model relates more closely to the depth of content understanding. This can be seen clearly in the comparison between table 1-2 and table 3-4 which points out the fact that reading activities in the old questions are at the lower levels of thinking. It can be regarded as an important issue to solve this problem in this present century.

Introduction

Educational reform has been implementing and, that of educational standards and assessments becomes a major theme in Myanmar. According to Linda Darling (2014), students need to be able to find, evaluate, synthesize, and use knowledge in new contexts, frame and solve non-routine problems, and produce research findings and solutions. It also requires students to acquire well-developed thinking, problem-solving, design, and communication skills. In other words, they will certainly be proficient in 21st century skills. A recent survey on a group of students indicates their need for these so-called 21st century skills.

Since 2003, "Straightforward" series have been used in Arts & Science universities and colleges, and the course-book writers asserted that high levels of critical thinking skill are included in their materials. The researchers, therefore, want to analyze these materials especially their reading activities and respective questions by employing Bloom's Revised Taxonomy and Webbs' DOK Model and find out the scope and contribution of them in the assessment. As it is a mini-research, only the reading activities in Level 3B and those in the last three years' question papers are critically analyzed.

Aim and objectives

This paper aims to analyze reading activities in "Straightforward" and evaluate the levels of thinking in respective assessment.

Its objectives are:

- to study the reading texts in "Straightforward" Level 3B to evaluate the reading activities that follow, and those in the last three years' question papers by employing Bloom's Revised Taxonomy and Webbs' DOK Model and find out what levels of thinking these activities and questions reflect in the assessment.

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Literature Review

Definition of Critical Thinking

Bloom (1956) defines critical thinking as the ability to gain knowledge through the exploration of ideas.

Bloom's Taxonomy

In 1956, with the purpose of upgrading the teaching learning process from the lower level of rote-learning and memorization to the higher level of analysis, evaluation, creativity and problem-solving approach, Dr. Benjamin Bloom, together with Max Englehart, Edward Furst, Walter Hill and David Krathwohl suggested a theory. Originally, the cognitive domain was based on these six stages: knowledge, comprehension, application, analysis, synthesis and evaluation (Bloom, 1956). Moving from lower degree to the higher degree.

During the mid-nineties, Lorin Anderson, along with David Krathwohl revised the cognitive domain with a new approach and added three changes as shown in Figure1. They rearranged the categories, changed their names from noun to verb form and created a process and a level of knowledge matrix (Anderson, Krathwohl & Blooms, 2001).

Revised Bloom Process Dimensions (2005)

Remember

Retrieve knowledge from long-term memory, recognize, recall, locate, identify

Understand

Construct meaning, clarify, paraphrase, represent, translate, illustrate, provide examples, classify, categorize, summarize, generalize, infer a logical conclusion (such as from examples given), predict, match similar ideas, explain, compare/contrast, construct models (e.g., cause-effect)

Apply

Carry out or use a procedure in a given situation; carry out (apply to a familiar task) or use (apply) to an unfamiliar task

Analyze

Break into constituent parts, determine how parts relate, differentiate between relevant and irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for bias or point of view)

Evaluate

Judge based on criteria, check, detect inconsistencies or fallacies, judge, critique

Create

Combine elements to form a coherent whole, reorganize elements into new patterns/structures, generate, hypothesize, design, plan, construct, and produce for a specific purpose

Webb's DOK model

In "Depth of knowledge (DOK)," Norman Webb (1997, 1999), compelled states to rethink the meaning of test alignment to include both the content assessed in a test item and the depth to which students are expected to demonstrate understanding of that content.

Webb's depth-of-knowledge (DOK) levels (Webb 1997, 1999)

Level	Description
DOK-1	Recall & Reproduction — Recall a fact, term, principle, or concept; perform a routine procedure.
DOK-2	Basic Application of Skills/Concepts — Use information, conceptual knowledge; select appropriate procedures for a task; perform two or more steps with decision points along the way; solve routine problems; organize or display data; interpret or use simple graphs.
DOK-3	Strategic Thinking — Reason or develop a plan to approach a problem; employ some decision-making and justification; solve abstract, complex, or non- routine problems, complex. (DOK-3 problems often allow more than one possible answer.)
DOK-4	Extended Thinking — Perform investigations or apply concepts and skills to the real world that require time to research, problem solve, and process multiple conditions of the problem or task; perform non-routine manipulations across disciplines, content areas, or multiple sources.

As these teachers discovered, identifying the DOK levels of questions in tests and class assignments helps articulate how deeply students must understand the related content to complete necessary tasks. As examples, students need a greater depth of understanding to explain how or why a concept or rule works (DOK-2), to apply it to real-world phenomena with justification or supporting evidence (DOK-3), or to integrate a given concept with other concepts or other perspectives (DOK-4).

Descriptors of DOK Levels for Reading

Level 1 requires students to use simple skills or abilities to recall or locate facts from the text. The focus is on basic initial comprehension, not on analysis or interpretation. Items require only a shallow/ literal understanding of text presented and often consist of verbatim recall from text, or simple understanding of a single word or phrase.

Level 2 requires both initial comprehension and subsequent processing of text or portions of text. Important concepts are covered, but not in a complex way. GLEs/items at this level may include words such as paraphrase, summarize, interpret, infer, classify, organize, collect, display, and compare, and a phrase such as determine whether fact or option. Literal main ideas are stressed. Items may require students to apply skills and concepts that are covered in Level 1.

Level 3 requires deep knowledge. Students are encouraged to go beyond the text and are asked to explain, generalize, or connect ideas. Students must be able to support their thinking, citing references from the text or other sources. Items may involve abstract theme identification, inferences between or across pages, students' application of prior knowledge, or text support for an analytical judgment made about a text.

Level 4 requires complex reasoning, planning, developing, and thinking most likely over an extended period of time, such as comparing multiple works by the same author or from the same time period. The extended time period is not a distinguishing factor if the required work is only repetitive and does not require applying significant conceptual understanding and higher-order thinking. Level 4 assessments should be done only at the local level.

Webb's Depth of Knowledge Guide: Career and Technical Education Definitions

Webb (1997) developed a process and criteria for systematically analyzing the alignment between standards and standardized assessments. This body of work offers the Depth of Knowledge (DOK) model employed to analyze the cognitive expectation demanded by standards, curricular activities and assessment tasks (Webb, 1997). The model is based upon the assumption that curricular elements may all be categorized based upon the cognitive demands required to produce an acceptable response. Each grouping of tasks reflects a different level of cognitive expectation, or depth of knowledge, required to complete the task. The term knowledge, here, is intended to broadly encompass all forms of knowledge . The following table reflects an adapted version of the model.

DOK Level

DOK Level	Title of Level
1	Recall and Reproduction
2	Skills and Concepts
3	Short-term Strategic Thinking
4	Extended Thinking

DOK level are assigned to each course objective the following served as general guidelines for developers:

- The DOK level assigned should reflect the level of work students are most commonly required to perform in order for the response to be deemed acceptable.
- The DOK level should reflect the *complexity* of the cognitive processes demanded by the task outlined by the objective, rather than its *difficulty*. Ultimately the DOK level describes the kind of thinking required by a task, not whether or not the task is "difficult".
- If there is a question regarding which of two levels a statement addresses, such as Level 1 or Level 2, or Level 2 or Level 3, it is appropriate to select the higher of the two levels.
- The DOK level should be assigned based upon the cognitive demands required by the central performance described in the objective.

Webb (1997) suggested that the objective's central verb(s) alone is/are *not sufficient* information to assign a DOK level. Developers must also consider the complexity of the task and/or information, conventional levels of prior knowledge for students at the grade level, and the mental processes used to satisfy the requirements set forth in the objective.

LEVEL 1 – RECALL & REPRODUCTION

Curricular elements that fall into this category involve basic tasks that require students to recall or reproduce knowledge and/or skills. The subject matter content at this particular level usually involves working with facts, terms and/or properties of objects. It may also involve use of simple procedures and/or formulas. There is little transformation or extended processing of the target knowledge required by the tasks that fall into this category. Key words that often denote this particular level include: list, identify and define. A student answering a Level 1 item either knows the answer or does not; that is, the answer does not need to be "figured out" or "solved."

POSSIBLE PRODUCTS

- Quiz — List — Vocabulary Quiz
- Definition — Label — Googling
- Fact — Reproduction — Recitation

- Worksheet
- Test
- Explanation
- Blog
- Commenting
- Social networking
- Workbook
- Example
- Outline
- Podcast
- Bulleting
- Searching
- Categorizing/Tagging
- Collection
- Show and Tell
- Social bookmarking
- Highlighting
- Wiki

ROLES

TEACHER		STUDENT	
Directs	Tells	Responds	Absorbs
Shows	Examines	Remembers	Recognizes
Questions	Evaluates	Memorizes	Describes
Demonstrates	Listens	Explains	Translates
Compares	Contrasts	Restates	Demonstrates
Examines		Interprets	

Level 2 – Working with Skills & Concepts

Level 2 includes the engagement of some mental processing beyond recalling or reproducing a response. This level generally requires students to contrast or compare people, places, events and concepts; convert information from one form to another; classify or sort items into meaningful categories ; describe or explain issues and problems, patterns , cause and effect, significance or impact, relationships, points of view or processes. A Level 2 "describe or explain" would require students to go beyond a description or explanation of recalled information to describe or explain a result or "how" or "why." The learner should make use of information in a context different from the one in which it was learned.

Elements found in a curriculum that fall in this category involve working with or applying skills and/or concepts to tasks related to the field of study in a laboratory setting. The subject matter content at this particular level usually involves working with a set of principles, categories, heuristics, and protocols. At this level students are asked to transform/process target knowledge before responding. Example mental processes that often denote this particular level include: summarize, estimate, organize, classify, and infer.

POSSIBLE PRODUCTS

- Photograph
- Illustration
- Simulation
- Sculpture
- Cracking Codes
- Dairy Blog
- Journal Blog
- Linking Relationship
- Mashing
- Testing (Alpha/Beta)
- Presentation
- Interview
- Performance
- Reverse-Engineering
- Demonstrating
- Commenting
- Reflecting
- Mind Maps
- Moderating
- Validating

ROLES

TEACHER		STUDENT	
Shows	Facilitates	Solves problems	Demonstrates use of knowledge
Observes	Evaluates	Calculates	Compiles
Organizes	Questions	Completes	Illustrates
		Constructs	

LEVEL 3 – SHORT-TERM STRATEGIC THINKING

Items falling into this category demand a short-term use of higher order thinking processes, such as analysis and evaluation, to solve real-world problems with predictable outcomes. Stating one's reasoning is a key marker of tasks that fall into this particular category. The expectation established for tasks at this level tends to require coordination of knowledge and skill from multiple subject-matter areas to carry out processes and reach a solution in a project-based setting. Key processes that often denote this particular level include: analyze, explain and support with evidence, generalize, and create.

POSSIBLE PRODUCTS

- Graph
- Spreadsheet
- Checklist
- Chart
- Outline
- Survey
- Database
- Abstract
- Animation
- Wiki-ing
- Evaluating
- Conclusion
- Mobile
- Report
- Video cast
- Publishing
- Film
- Panel
- Debate
- Investigation
- Program
- Podcast

ROLES

TEACHER		STUDENT		
Probes	Guides	Discusses	Uncovers	Argues
Observes	Evaluates	Debates	Thinks deeply	Tests
Acts as a resource	Questions	Examines	Questions	Calculates
Organizes	Dissects	Judges	Disputes	Compares
Clarifies	Accepts	Assesses	Decides	Selects
Guides		Justifies		

Level 4 – Extended Strategic Thinking

Curricular elements assigned to this level demand extended use of higher order thinking processes such as synthesis, reflection, assessment and adjustment of plans over time. Students are engaged in conducting investigations to solve real-world problems with unpredictable outcomes. Employing and sustaining strategic thinking processes over a longer period of time to solve the problem is a key feature of curricular objectives that are assigned to this level. Key strategic thinking processes that denote this particular level include: synthesize, reflect, conduct, and manage.

POSSIBLE PRODUCTS

- Film
- Story
- Project
- Plan
- New Game
- Song
- Newspaper
- Media Product

ROLES

TEACHER		STUDENT	
Facilitates	Extends	Designs	Formulates
Reflects	Analyses	Takes risks	Modifies
Evaluates		Proposes	Creates
		Plans	

Previous studies

In "Improving Assessment and Teaching- Learning Process," Chandio, et al. (2017) studied the last five years' question papers used by the Board of Intermediate and Secondary Education (BISE), Karachi, Hyderabad Sukkur at secondary level for the subject of English, and they critically analyzed the scope and contribution of Bloom's Taxonomy in both assessment and teaching-learning process. In the study, the questions were classified and analyzed applying Bloom's Taxonomy to the prevailing assessment system at the level of secondary education in Sindh to determine whether the present assessment system focuses on the lower degrees of learning.

The findings of this study will help to improve both assessment and teaching-learning process, which will hopefully uplift the learner from the sheer practices of description, rote-learning and memorization to the profound level of analysis, evaluation and creativity.

Since Bloom's Taxonomy is the benchmark for developing tests and assessments; therefore, there is a need to conduct a meticulous survey of these subjective and objective question papers to evaluate the degree of Blooms Taxonomy incorporated in them. These question papers do not systematically assess the gradual stages of learning proposed in Bloom's Taxonomy leading from the lower degrees like remembering, understanding, applying, to the higher degree such as analyzing, evaluating and creating. Hence, the undertaken study critically analyzes the prevailing assessment practices by employing Bloom's Taxonomy for suggesting reforms in the teaching-learning process with the help of improving assessment patterns.

In "Reading Activities to Develop the Critical Thinking Skills of Myanmar High School Students", an MA thesis submitted by Hsu Myat Mg Mg, the researcher analyses the prescribed activities to determine whether they meet the need for the development of the critical thinking skills of the students, using the criteria for critical reading questions suggested by Green and Wolf (2008). Then, she devises the reading activities that can promote the critical thinking skills of the Myanmar high school students. She points out the need of critical thinking skills in Myanmar.

Thin Nandar Aung modified and analyzed reading activities in "A study of Reading Activities for Developing the Critical Thinking Skills of Grade Ten Students in Myanmar" to enable the students to get engaged in critical thinking, and according to the findings, she claims that most of the questions in the prescribed text focus on knowledge level which is classified as lowest level according to Bloom's Taxonomy and can promote only a little for critical thinking.

Methodology

For many years, teachers used Bloom's Taxonomy and the revised Bloom's Taxonomy to formulate lessons that practice and develop thinking skills over a wide range of cognitive complexity. (Bloom, 1956) However, there are limitations in selecting test items and formulating questioning strategies in Bloom's Taxonomy because it uses verbs to differentiate taxonomy levels — many verbs appear at multiple levels and do not clearly articulate the intended complexity implied by the taxonomy. As Hess, et al. (2009) noted: "A new model of rigor, depth of knowledge (DOK), fills this void". The resulting combination of Bloom's Taxonomy and depth of knowledge — cognitive rigor — forms a comprehensive structure for defining rigor, thus posing a wide range of uses at all levels of curriculum development and delivery.

For analyzing instruction and enhancing teacher lesson planning, Hess, et al. (2009) in "Cognitive Rigor: Blending the Strengths of Bloom's Taxonomy and Webb's Depth of Knowledge to Enhance Classroom-level Processes" defined and introduced cognitive rigor (CR) matrix by superposing two widely accepted models — Bloom's Taxonomy of Educational Objectives and Webb's Depth-of- Knowledge (DOK) model. They suggest: "Educators should use the cognitive rigor matrix to align the content in their curricular materials to the instructional techniques used in classroom delivery". The researchers, therefore, made use of this CR matrix in the study.

Findings and Discussion

Table1. Analyzing Straightforward level 3B's workbook exercises according to Revised Bloom's Taxonomy

Assessment Types	Total No. of Questions	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Matching	50	_	44/88%	_	6/12%	_	_
True/ false	7	_	_	_	_	7/100%	_
MCQ	12	_	_	_	_	12/100%	_
Questions & Answer (short)	18	_	12/66.7%	_	1/5.6%	2/11.1%	3/16%
Question & Answer (long)	2	_	_	_	_	_	2/100%
Completion (Sentence level)	7	_	_	7/100%	_	_	_
Completion (Paragraph level)	14	_	_	8/57.1%	6/42.9	_	_
Vocabulary	13	1/7.7%	7/53.9%	_	1/7.7%	_	4/30.8%
Paragraph Writing	3	_	_	_	_	_	3/100%

Table 2. Analyzing reading comprehension questions of old questions according to Revised Bloom's Taxonomy

Assessment Types	Total No. of Questions	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Matching	10	_	10/100%	_	_	_	_
True/ false	15	_	15/100%	_	_	_	_
MCQ	_	_	_	_	_	_	_
Questions & Answer (short)	–	–	–	–	–	–	–
Question & Answer (long)	–	–	–	–	–	–	–
Completion (Sentence level)	–	–	–	–	–	–	–
Completion (Paragraph level)	–	–	–	–	–	–	–
Vocabulary	5	_	5/100%	_	_	_	_
Paragraph Writing	_	_	_	_	_	_	_

As shown in table 1, it is found that there are 9 major assessment types for reading activities in the workbook. They are matching, True/False, multiple choice, question and answer (short), question and answer (long), sentence completion, completion paragraph, vocabulary and writing paragraph.

There are altogether 50 questions on matching, 44 are under the category of understanding and 6 are under analyzing. 12 out of 18 items in short questions and answer are at understanding level, 1 is at analyzing level, 2 are at evaluating level and 3 are at creating level. For paragraph completion, 8 out of 14 questions are at applying level and the rest are at analyzing level. For vocabulary, there are 13 questions. 1 is at remembering, 7 are at understanding level, 1 is at analyzing level and 4 are at creating level.

On the other hand, table 2 shows that there are only 3 assessment types of questions for reading comprehension in 3 sets of old questions for Third year(semester 2). They are True/False, matching and vocabulary. They all are at understanding level.

Table3. Analyzing Straightforward level 3B's workbook reading exercises accordingto Webb's depth of knowledge

Revised Bloom's Taxonomy	1	2	3	4
1	0.79%			
2	2.38%	34.13%	3.97%	9.53%
3	5.56%	6.35%		
4	0.79%	5.56%	4.76%	
5			15.08%	1.59%
6	5.56%		0.79%	3.17%

Depth of knowledge (DOK)

In table 3, Straightforward level 3B's workbook data comprises 126 items of reading exercises and in table 4, the old questions data comprises 30 items of reading questions. Among 126 items of workbook data, 77 are at the lower levels of depth of knowledge and 49 are at the higher levels of depth of knowledge. Bloom's Revised Taxonomy levels appear fairly among the items.

In old questions data, all samples are at the lower levels of depth of knowledge. And Bloom's Revised Taxonomy levels do not reach the higher levels.

So table 3 indicates that Straightforward level 3B's workbook reading exercises contain Bloom's Revised Taxonomy according to their levels but table 4 shows that reading comprehension questions of old questions are rather luck of remembering, applying, analyzing, evaluating and creating levels. Besides, all items are at the lower level of depth of knowledge.

Table 4.Analysing old questions' reading activities according to Webb's depth of knowledge

Revised Bloom's Taxonomy	1	2	3	4
1				
2		100%		
3				
4				
5				
6				

Depth of knowledge (DOK)

Conclusion

This paper presents two main points important for both teachers and students to get high goals in education in the 21st century. Firstly, both Revised Bloom's Taxonomy and Webb's depth of knowledge serve important function in education reform in terms of standards development and assessment alignment. According to Linda Darling (2014), students need to be able to find, evaluate, synthesize, and use knowledge in new contexts, frame and solve non-routine problems, and produce research findings and solutions. As Obama stated that assessment that don't simply measure whether students can fill in a bubble on a test, but whether they possess 21st century skills like problem-solving and critical thinking, entrepreneurship and creativity (cited by Linda Darling (2014).Therefore teachers must provide all students with challenging tasks and demanding goals to reach high goals for both surface and deep learning of content to meet the challenges of these skills. Secondly, this paper shows the comparison between the percentages of workbook reading activities in Straightforward level 3B and reading activities in old questions according to Revised Bloom's Taxonomy and Webb's depth of knowledge. It is obvious that Reading activities in the old questions are at the lower levels of both Revised Bloom's Taxonomy and Webb's depth of knowledge. It is, therefore, a challenging problem for teachers and it will lead researchers for further studies.

Acknowledgements

We'd like to express our heart-felt thanks to Sayagyi Dr. Myint Swe, Principal of Taunggoke Degree College for his encouragement to do this research. We also want to give credit to Dr. Mya Zin Oo (Assistant Lecturer, Department of Zoology) for her technological help.

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Geographical Analysis on Urban Land Utilization in Taunggoke, Rakhine State

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Abstract

Like other townships of Taunggoke Town, merchants depend on fishing and retail & wholesale economic activities which are a major economic activity of the area, in Rakhine State. Area of favourable conditions because of fishing ground encroached into the surrounding channel area as a change into spatial structure of favourable resources of their region. To study presents the field observation which was thoroughly done by intensive interviewing the local expert person, staff of government administrative department and authorities concerned. The survey was distributed to urban and village tracts selected as samples to know the increase in area of landuse and their uses. The objectives of the paper are to find out existing geographical factors that affect urban land utilization change and pattern to explore the pattern of urban land use change and to predict future prospect on urban land utilization.

Key words: urban landuse, land utilization change & pattern, socio-economic conditions

Introduction

Land utilization is a form on human activity as an effort to give certain purpose in result or service and realized space design in keeping the environment function survives (Soefaat, 1997, p-76). Land utilization change over time is an inevitable phenomenon occurring globally due to both temporary and permanent interest of the inhabitants in a particular area (Eludoyin, 2010). And then the pressure of population on the land and its resources is a major factor affecting sustainable development of an area and land utilization changes are taking place at an accelerating rate (Giri and Shrestha, 1996). Land utilization change is known as a complex process which is caused by the mutual interactions between environmental and social factors at different spatial and temporal scales (Valbuenaet al. 2008; Rindfusset al. 2004).Taunggoke Township is located in the middle part of Rakhine State. Although there are many economic activities, fishing and retail & wholesale economic activity plays an important role in economy of the area. In the area, the conversion of agricultural land into urban landuse and dominated in and surrounding suburban are as a major agricultural land use and forested area people mainly engage on it. But Residential landuse was noticeably increased from 2016-17 statistic records. Because some forested lands existing in the northern part of town were transformed into the residential landuse areas.

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Research Problem
Why do areas of Urban Land Utilization increase in Taunggoke Town?

Aims and Objectives
The aim of the paper is:
- To give suggestions that support the urban land utilization of the study area.
- The objectives of the paper are:
- To find out existing geographical factors that affect urban landuse change
- To explore the pattern of urban land utilization
- To predict future prospect on urban landuse

Study Area
Taunggoke Township is one of the townships which are located in Rakhine State. Taunggoke Township (including Ma Ei)has an area of (2057.25) sq.miles (1316641) acres and composed of eight ward and 52 village tracts which include 207 small villages coverage of the area, for only Taunggoke Sub Township is composed of four wards and 42 village tracts which include 146 small villages covering the area (Figure 1, 2 and 3). Taunggoke Town has an area of 1.62 sq. miles (4.2) sq .kilometer which represents (0.08%) percent of the total total Taunggoke Township and comprised five wards. Although the Kaing She village upgrade to define as a urban area from the local people, but there is not assigned from the government site. The shape of township is fairly compact and ellipsoid in shape. As a consequence, area of land utilization changed in Taunggoke Town. Total population was 32209 persons in 2017-18 records. Taunggoke Town is about 105 miles away from Pyay City.

Source of Data and Methodology
Primary data were collected by interviewing with the local people.Taunggoke Township is composed of an urban area comprising five wards and 42 village tracts. Among urban and village tracts discuss with administrator and peace and development council to know the causes and consequences of urban landuse change. Staff of government office and residents are also interviewed to get detailed understanding on it. Secondary data are obtained from books, various department such as Settlement and Land Records Department, General Administration Office, Township Administration Department,online sources, maps and satellite images. GIS methods were used on change analysis & descriptive to preparing and producing maps. Research writing will be done according to following steps.

Research Plan and Conceptual Framework

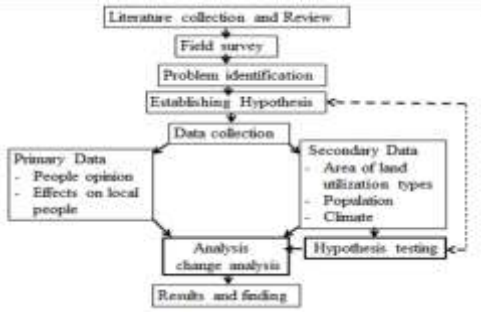

Chart Flow (1) Research Design

Chart Flow (2) Conceptual Framework on Change of Land Utilization

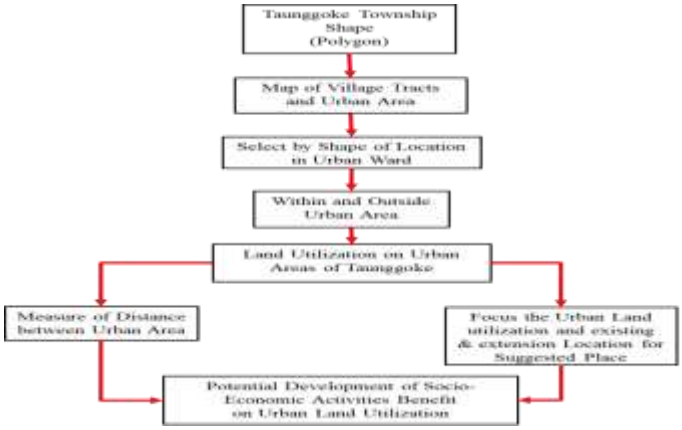

Chart Flow (3) Research framework for Analyzing on Land Utilization of Taunggoke Town by Classification Method
Source: Research Ideas from Field Observation in 2018

Results and Findings

Physical Background of Taunggoke Town

Taunggoke Township is one of the townships in the middle part of Rakhine State. It is situated between the Rakhine Yoma and the Bay of Bengal . It is located between north latitudes 18˚ 37 ' and 19˚ 32 ' and also between east longitudes 94˚ 46 ' and 94˚ 95 Figure (1.a & b & 2). It has an area of 1173.39 sq.miles (3039.07 sq.km). It is the second largest township of Rakhine State which represents 13.42 percent of the total Rakhine State's area. There are Ma Ei and Taunggoke Township composed of eight ward and 52 village tracts which include 207 small villages coverage of the area, for only Taunggoke Township is composed of five wards of urban , 42 village tracts which include 146 small villages covering the area (Figure 3). Although the Kaing She village upgrade to define as a urban area from the local people, but there is not assigned from the the government site. Taunggoke Town covers an area of about (4.2) square kilometer or (1037) acre The shape of township is fairly compact and ellipsoid in shape. As a consequence, area of land use changed in Taunggoke Township.

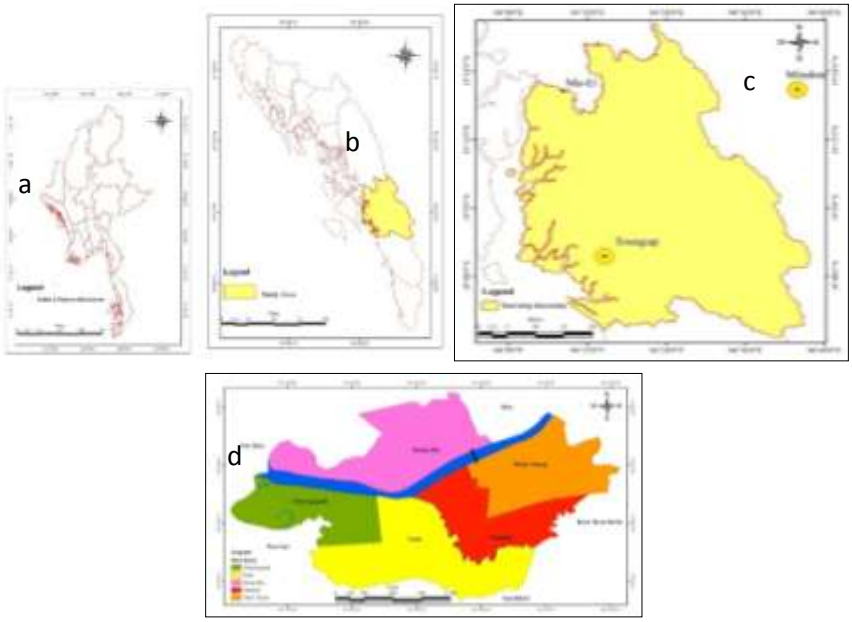

Figure 1(a,b,c and d): Rakhine State in Myanmar and Taunggoke Township in Rakhine State
Sources: UTM Map:1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Landsat TM image: L71334047-0472010010DEM, ASTGTM2_N18E094, N19E094_DEM

Relief and Drainage

The physical conditions are mainly affected by the Rakhine Yoma and the sea. So, it is a series of mountain ranges and spurs. The relief of Taungoke Town can be divided into two parts, the eastern ranges and the western coastal plains.The eastern most part is the highest with an elevation of (1219.2) meter, about (4000 feet) and the lowest part with about 18 feet above sea level. In general, the alignment of these ranges is from northwest to southeast. Then, the elevation gradually decreases into the western part. The Moehte-taung serve of the source of the Taunggoke Chaung. Existing topographic conditions about (75.83%)is covered to forest and drainage and land area are about (10.37%), cultivated area is about (14.20%). But the drainage is not barriers for human occupancy due to low land.

Climate

Taunggoke Township lies in the rolling nature of the topography zone. According to climatic data (2014-2018), The mean annual temperature is 25.6ºC. The warmest month is May; the average temperature is 28.9ºC. The coolest month is January with the mean temperature of 21.1ºC. The annual range of temperature is 10ºC. The annual normal rainfall of Taunggoke Township is 5436 mm and the annual number of rainy days is 126 inches.According to Koppen's climatic classification, Taunggoke Township experiences the Tropical Monsoon Climate (Am) type. The climatic conditions are a suitable area not only for human occupancy but also for economic activities.

Natural Vegetation

Topographically, Taunggoke Township is highly in the north, northeast, east and southeastt portion. Lowland plains mostly occupy in the middle portion. With the expectation of land utilization for agriculture and residences the remaining areas are covered with reserved and unreserved forests. The types of vegetation generally vary with relief, climatic conditions, soils and underlying material. The Tidal forests, Evergreen forests, Mixed Deciduous forests and Hill forest are found in Taunggoke Township.

Soils

Although there are four types of soils of which saline swampy mangrove forest soil occupy the areas near the river mouths and along the coastal. Meadow soil (Gleysols) which are favourable for crop cultivation such as paddy, jute, corn, sugarcane, cotton, groundnut, Seamus, chilly, beans and vegetables. Generally, exiting soils in the area support for crop cultivation. Red brown forest soils (Xhodic Ferrosols) and yellow brown forest soil (Xanthic Ferralsols) in taunggoke Township, covering by deciduous forests and the land is used as forest and orchards. Therefore, generally, such existing physical conditions as location, topography, drainage, climatic conditions natural vegetation and soils support primary economy especially the land utilization patterns of socio-economic activities in Taunggoke Township.

Socio-economic Bases of Taunggoke Town

Population Growth

Table (1) Population Growth and Sex Composition of in Taunggoke Town

Ward	2014-15			2015-16			2016-17			2017-18		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Guta	3493	3958	7451	3334	3847	7181	3386	3896	7282	3429	3926	7355
Kanpine	3691	4121	7812	4366	4766	9043	4389	4700	9089	4456	4747	9203
Chaung gauk	2283	2523	4806	2441	2746	5187	2472	2800	5272	2500	2844	5344
Thein Taung	2339	2449	4788	2228	2551	4779	2284	2594	4878	2283	2595	4878
Kaing She	1827	1966	3793	2645	2766	5411	2645	2766	5411	2648	2781	5429
Total			28596			31601			31932			32209

Sources: Township administration department.

Population Growth in Taunggoke Town

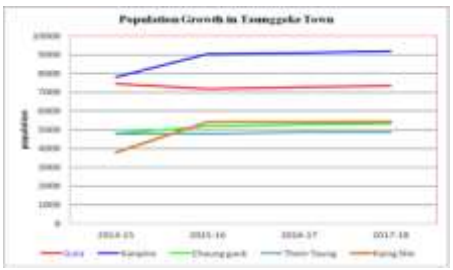

Figure (5 and 6) Population Growth and Growth Rate (Percent)in Taunggoke Town,
Sources: Based on Table (1)

According to the population data, Taunggoke town has 25345 persons in1995 and had increased to 30092 in 2005 and had decreased 28596 persons in 2014-15 and the number of population increased to 32209 persons in 2017-18. Due to upgrade to transportation, communication and productive agricultural lands & channel ground and favourable economic conditio.The most population growth increased 25.5% in Guta and the least was 18.7% in Kaing She in 2014-15. The dense population of urban area is Kanpine and Guta. This is suitable for agriculture activities. The most growth populated areas are found in Kaing She .In 2014, the household of the whole town was 5667, family was 5928 and the total population was 28596 people in 2014-15 and to 32209 persons in 2017-18. The number of male was 15316 persons and female was 16891 persons.

Table (2) Growth of House and Households in Taunggoke Town

Ward	2014-15		2017-18	
	House	Household	House	Household
Guta	1460	1430	1487	1492
Kanpine	1552	1650	1697	1707
Chaung gauk	997	1135	1018	1029
Thein Taung	868	903	897	900
Kaing She	790	810	938	906

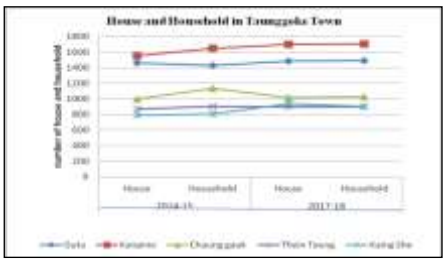

Figure (7) House and Household in Taunggoke Town

Population Distribution and Density

Population distribution of Taunggoke Town depends largely upon the regional topographical condition and prosperity of the region. The most populations of this town favor the merchants, retailers, cultivators and fishery job.The distribution of population is dense in places where land is commercial and good communication, along the main road. The largest population was Kanpine and Guta ward. Khing She ward has the least and the population was 3793 in 2014. Now, Thein Thaung ward has the least and the population was 4878 in 2018 records. Taunggoke Township covers an area of about 4.2 square kilometer or 1037 acre. In 2014, it had been settled in 28596 persons. Taunggoke Town population density was 6354.5 persons per square kilometer in 1995 and population density increased to 6939.5 in 2000 and 7164.7 persons per square kilometer in 2005. The population density decreased to 7114.04 persons per square kilometer in 2013 and 6821.4 persons per square kilometer in 2014-15 and 7668.8 persons per square kilometer in 2017-18. The coverage of landuse in Taunggoke Towns is 1.95 square kilometer of urban area and 46.43% of the town area.

Figure (8) Population Distribution and Density

Existing Ethnic Groups in Taunggoke Town

Most of the inhabitants of Taunggoke Town are Rakhines from the earliest times and they form the largest ethnic group in the township. In 2013, it was 28250 Rakhines, 98.45 percent of total population. The second largest group consists of 353 Burma, 1.23 percent of the total population. The third largest groups are Chin with a total of 77 persons, 0.27 percent. The ethnic nationals consist of 7 Kayins, 3 Shans, 3 Mons, 3 Kachins. The major region professed in Taunnggoke is Buddhism. Others are Christians in 2014-15 statistics.

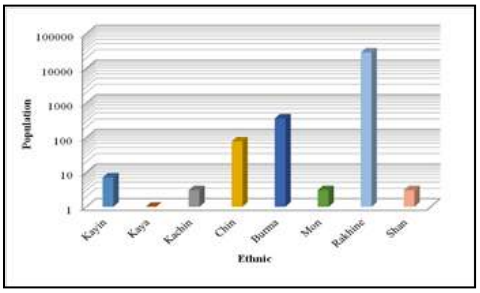

Figure (9) Ethnic Groups of Taunggoke Town (2014 -15)

Education Facilities in Taynggoke Town

Education becomes the most important role of human resource development and improve of the living standard. Due to these improvements, health, knowledge, skill and other level are improving. There were eight Basic Education High School, 5 branch high school to high school were opened during 2005 to 2015. In 2016, 18 branch middle school to middle school, 27 post primary school to branch middle school, 107 the primary schools and 15 branch primary school to primary school and 3 monastic education school can be extended in during 2016- 2018 statistics. In Taunggoke, three high school and one branch high school, two post primary school and one branch primary school. Now, according to these increasing of the schools help from the government site, this is of great help to human resources for the students.

Health Facilities in Taunggoke Town

Health is the most important sector for everybody. Everybody must be careful aware of the unforeseen disease which can happen every time and everywhere. During the year 1995 - 2000, There are three hospitals, six rural health care centers, three clinics, one traditional health care centre, one Maternal and Child Welfare Association and (31) sub-rural health care centers. In 2016-17 records, one 100 beds hospital, three clinics, one traditional health care centre, one Maternal and Child Welfare Association are in Taunggoke Town. Social infrastructures are most important requirements for township developments and it social infrastructures are related to socio-economic conditions, as a development factors. Therefore, health support was built up as social infrastructures that used for become improvement of living standard for residents in there.

Economic Factor

The Primary Sector mainly includes agriculture land (750970) acres and channel ground area (589.04) acres in 2016. Of these, total cultivate areas of Taunggoke are 363 acres. The main crops are

paddy, sesamum, groundnut, pulses and sugarcane, sunflower. Marine products are Lates fish(Cal Calcarifer), Penaeus(monodon), Moulted Shell Crab and Carcinus Crab breed in channel ground area. Secondary sector includes rice mills, saw mills, oil mills, soft drinks factories, purified drinking water factories, food processing and electrical appliance. Saw mills, rice mills, and oil mills also can be found in some villages of Taunggoke Township. Existing agro-based industries (traditional rice noodles), somehow support agriculture in the area. Most of the people are merchants, retailers, cultivation and fishing job. Second important job is transaction. Other economy are livestock, retailer, daily wages, farming and cultivation the vegetable. Taunggoke are at a distance of about 105 miles away from Pyay City. Therefore, agriculture & marine products from the Taunggoke Township are easily carried to Pyay, Yangon, Mandalay and other parts of Myanmar.

Land Utilization Pattern of Taunggoke Township

General land use of Myanmar is classified into eight types. They are (1)Residential landuse, (2) Landuse for primary production , (3)Industrial Landuse, (4)Commercial Landuse,(5)Landuse for Services, (6)Landuse for Public and Government Departments, (7)Transportation landuse and (8) Unclassied landuse. Area of urban land use increased in the study period and it unfolds the importance of land utilization sector in the areas.

Figure (10) Land use types in Taunggoke Town

Sources: UTM Map:1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(1)Residential Land Utilization

In Taunggoke Township, land utilization change is mainly caused by government policy. Among land uses types of Taunggoke Town, area of forested land and unclassified land due to encroaching into urban area and suburban area and to relocate the people of living in other areas. Taunggoke town is composed with the five wards which are Guta, Kanpine, Chaung Gauk and Thein Taung .Now, Kaing She as urban wards, Although Khaing She is concerning from local people to in inside area of urban ward, but it not yet assigned from the government site. Residential landuse was noticeably increased from 421 acres in 2002 to 481 acres in 2014 and about 500 acres in 2018.Because of the increase in residential landuse is mainly the result of government policy and high price of land area as commercial value to extent new wards. Before 1995, Taunggoke town has four wards but after 2014 Kaing She ward began from village to urban ward defined by local people. Kaing She well developed as potential as a urban ward. Current situation of Kaing She have potential area of rural economy, because posses of high potential social infrastructure (Taunggoke Degree College)area. Some agricultural lands existing in the northern part and western part of surrounding of hospital area of the town were transformed into the residential landuse areas.

According to 2013-2014 data, the household densities are respectively 7 household per acre in Guta ward, 12 household per acre in Kan Pine and 21 household per acre in Chaung Gauk wards, 12 household per acre in Thein Taung ward and 52 household per acre in Kaing She ward. According to 2013-2014, Kaing She is the highest density of household and Guta ward has the least density of 11 household per acre. Out of total area of 1037 acres in Taunggoke town, residential land cover about 481 acres accounting to 46.38 percent of the town area. Guta ward has a residential landuse area of 217

acres, composing about 21 percent of the town total lands. Kan Pine ward has a residential landuse area of 131 acres composing about 12.6 percent of the whole town landuse. Chaung Gauk and Thein Taung wards have a residential land area of 70 acres, composing about 4.6 and 6.7 percent respectively of the total town landuse. Kaing She ward has a residential land area of 15 acres, composing about 1.4 percent of the total town landuse. Guta ward is the largest residential land and Kaing She wards is the lowest number of residential lands. The increase of residential landuse area depend upon the functions of a town' infrastructure. The dense population ward are Kanpine, and Guta(Figure 11). The most populated areas are found on the nearly flat plain which is suitable for agriculture activities. These areas possess large residential areas if near social infrastructure have and the lands in the areas will be suitable for commercial landuse near future, because Taunggoke area is very narrow.

Figure(11) Residential landuse in Taunggoke Town

(2) Land Utilization for Primary Production

Agricultural lands of le, ya, plantations, orchards, nursery fields and animal breeding of cattle pigs- poultry (husbarndries) are included in this category. Some agricultural lands were transformed into the residential. So, the total landuse for primary production is decreased from 401 acres in 2002 to 362 acres in 2004. In Chaung Guak, Guta, Kanpine and Kaing She ward of the agricultural land are transformed into residential area. Guta ward has the most of the agricultural land use and Chaung Gauk and Kaing She has a small scale areas of the agricultural land use. Other primary production are garden land, animal husbandry and nursery land use.

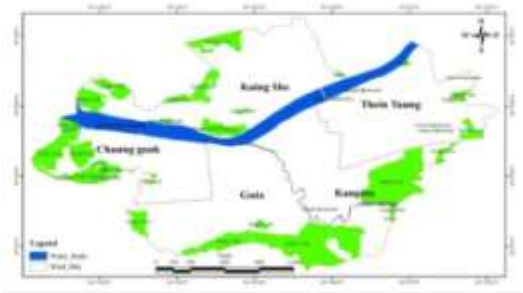

Figure (12) Landuse for Primary Production in Taunggoke Town

(3) Industrial Land Utilization

Major industrial Landuse items, which occupied in the residential areas of Taunggoke Town are not large- scale enterprises. Actually, they are small- scale rice mills, saw mills, blacksmith, timber work, printing, machine workshops, household industries and other domestic productions including foodstuffs and purify drinking water industries. Industrial landuse occupies the area of 3 acres and the total area of 0.64 percent. There are two purify drinking water industries, Weitharli Oo Purify drinking water industry and Shwe Pyi Rakhine Purify drinking water industry, which are the largest concentration areas are located at the Kaing She ward.Saw mills are located at the Kanpine and Chaung Gauk ward. Most of the saw mills are found in the Chaung Gauk ward. They lie along the side of Taunggoke Chaung. Rice mills are found everywhere in the town. Large rice mills are located along Taunggoke Chaung in the Kaing She ward. Some of the small cottage industries are found everywhere in the town.

Figure (13) Industrial Land use in Taunggoke Town

(4) Commercial Land Utilization

In Commercial landuse in the town increased significantly in early 2013. Because of Taunggoke College was built in Taunggoke Town in 2012 and after the Taunggoke Degree College, that area will improved as a potential commercial landuse. Some residential houses in down town area are moved into the commercial area and locational advantage of good transportational area as a utilization of commercial landuse. There are extended due to population growth and chance of higher economic activities on main road for the residents in there(e.g . big Myoma Sibinthar Market) . Transportation and communication play a vital role in town economic development. With the population growth and higher economic status of the residents, the commercial landuse area are extended. Some residential houses are changed into commercial landuse in 2013.

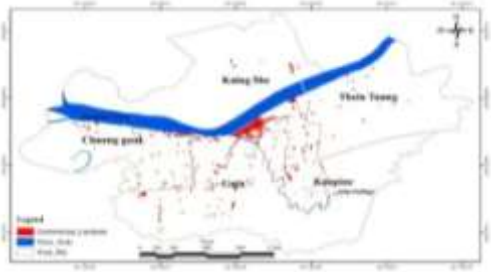

Figure (14) Commercial landuse in Taunggoke Town

(5) Land Utilization for Services

The landuse for services had increased due to the development of motorcycle repair, bicycle repair, beauty parlor, restaurant, private clinics, tailoring shop, private bank, etc.

Figure (15) Landused for service in Taunggoke Town

(6) Land Utilization for Public and Government Departments

Among the public and government department's landuse there are school, township administrative office, ministries, churches, hospital, fire station, telecommunication and post office, township development committee office, educational status and police office and etc.Most of the public and departmental office are found in Thein Taungand the small scale are found in Kaing She ward.

Figure (16) Landuse for Public and Government Departments

(7) Transportation Land Utilization

The land area used for roads, street, high way terminal is classified as transformational land. The construction of new roads, upgrading of former roads in Taunggoke Town had resulted in the increase of land under transformational landuse. At present, the existing roads are extended and upgraded because extending the resident areas result in increasing the population in the town.

Figure (17) Transportation Landuse

(8) Unclassified Landuse

In recent period, as regards unclassified land, there is vacantional land that is no use for arable landuse, but there will be potentially used for residential area or industrial area or cultivated area or commercial area and others in there. Most of the unused land is waste land, no building area, forest area. Most of the building area has Kaing She and a few are other wards. Part of the formerly unused land in Taunggoke is transformed into residential land and other landuse area. This is meaning for residential area that increasing amount of population pressure & growth rate and social infrastructures. These social infrastructures created improvement of major economy, this is effected toward of minor economy within Taunggoke Town from the above facts, it is need to trace on the further study. But landuse for primary production (agriculture land) and unclassified land are decreased to the expense of residential land. Due to not only population growth but also government policy& high level land prices and socio-economic potentialities in urban land utilization both pattern and amount has changed throughout in the study periods in 2018.

Figure (18) Unclassified Land

FINDINGS AND DISCUSSIONS

Taunggoke Township is one of the townships in Rakhine State. It lies on the Rakhine Yoma . Astronomically, it is located between north latitudes 18˚ 37'and 19˚ 32' and also between east longitudes 94˚ 46'and 94˚ 95'. It has an area of 1173.39 sq.miles (3039.07 sq.km). It is the second largest township of Rakhine State which represents 13.42 percent of the total Rakhine State's area. Unlike other regions of the country, is manifested by the extension towards the east from the west, separation of the region between Rakhine Yoma and Bay of Bengal which run as barrier from north to south. All these conditions more or less affect the landuse change of Taunggoke Town and which are also supportive to the socio-economic development of the township.

The population of Taunggoke Town gradually increased from 25,345 persons in 1995 to 29146 persons in 2000, 30092 persons in 2005 and to 28650 persons in 2014-15, to 32209 persons in 2017-18. More shelters and more food as basic needs are needed for the increasing population which resulted in the increase of residential land. Due to not only population growth but also government policy and socio-economic potentialities the utilization of urban land is changed throughout the study periods both in amount and pattern. The decrease of forest land in Rakhine Yoma in 2010-2012 was due to the extension of settlement land over the degraded forestland, as it is mostly converted to residential land and Governmental land use. There are still some new residential land and landuse for Government Departments (esp; Taunggoke Degree College) located in the upland area of the east and they may be turned into rolling land due to government policy. It is composed of urban five wards and 42 village tracts which include 146 small villages covering the area. This research work is studied by classifying eight different types of land use from the geographical standpoint. During the period under study, i.e. from 2014-15 to 2017-18, the changes are observed in agricultural land use, residential land use, forest land use, governmental land use, as well as unclassified land and other lands. Based on these land utilization of different types were described and explained.

Residential land area has somewhat increased, but at the expense of forested land. Such change has both positive and negative impact on the local inhabitants. As the population of the study area has been increasing steadily, the local populace needs more food and land for residing. However, the extension or encroachment of settlement land over the forestland can render such negative effects as environmental quality deterioration, widespread and serious floodings, intense heat due to lack of moderating and cooling effects of forest and limited availability of timber and firewood. The decrease of recreational land is undesirable, as the urban children has no ground to play freely for their enjoyment and healthy body growth. For the elders, they need places for recreation, particularly for relaxation of stress caused by urban congestion. Lack of suitable places for stress relaxation may lead to the increase in the number of alcoholics and drug addicts, as well as the crime rate.

The location of Taunggoke City gives impetus to socio-economic growth of the city in the foreseeable future. Its physical layout, tourism development potential with ancient some long history Pyu image inside mountainous area and a lot of mountains as high potentiality, all enhance its development potential which is somehow related to best means of land use. The pattern and it changes of land use, in fact, are largely the manifestation reflected by the decisions of government or responsible persons of the departments concerned. Very little change has been caused by the local inhabitants. Therefore, the authorities concerned should learn the comprehensive understanding of the entire physical and social attributes of the township and intelligibly weigh the pros and cons of the change in the land use types before making decision. There still remains a limited area of culturable waste land and unclassified lands. They can be changed into any other useful land, but great care should be taken in the change of already used land into another type to maximize the benefit that may come out of a unit area of land. In order to gain better insight of the different land use types of the study area, other fields of study such as forestry, urban planning, transportation, industry and tourism should conduct further researches, for the multi-displinary approach is indispensable achieve the best means of land utilization.

The area of agricultural land and residential land further increased in 2011-12 to 2015-18 . Due to the increase in utilization of agriculture, residential land public and government department, commercial land by the conversion of other types of land use, the area of culturable waste land further decreased in 2012(e.g Taunggoke Degree College). The increase of cultivated waste land area somehow helped benefit the local inhabitants and capacity building of social infrastructures. This social infrastructure will be created to improvement of economic activities for local inhabitants. In 2015-2018, some urban area gained more chance of economic activities and agricultural land in residential landuse, on the other hand, due to the degraded forestland with some are changed to low elevation as a le land.The increase of rolling topology in Taunggoke Area including urban and village tracts was in account of the reclamation of virgin and the decrease in the culturable waste land area was due to conversion into residential land and public and government departmental landuse. The depletion and degradation of forest land enhances the intensity of flooding and the impact of global warming.Land use is mainly related to the optimum use of the limited land between the alternative major types of land use (R.B Mandal, P-3, 1981).

According to 2014-2018 data, the urban landuse area is likely to increase in the future in response to the increasing population pressure and social infrastructures development momentum.The agricultural land area has also somewhat increased due to the expense of forestland. Moreover, culturable waste land decreased and area of residential land increased in the study period. Such change has both positive and negative impact on the local inhabitants.

In land utilization encourage extending residential area, consequently governmental areas increased to a great extent. In some areas, the merchants and fishing activities and their associated families and groups operated near their water channels as the natural giving environment. This trend gave much advantage to the area with income generated economy activities can create as well as for improve of economy.Nowadays the fishermen have much knowledge on the channel pattern, they carefully chose the fish and prawn according to demand, market and prices. On the other hand, merchants (expert traders) are now considered for grouping or consolidated ways for secure condition in the future. In Taunggoke Township, Trader Association gave much advice and guidelines for promotion of more profitable fish and prawn in the area.The demand and market in inland and abroad, the specialization of fish and prawn would be prospects in the area. Some fishes and prawn, such as kakatit, pazon kyar, become an export item and the area's production will be increasing in the future from the giving natural environment.

In the land type of other lands, unclassified land area has remained constant, while the unclassified land has somewhat increased. The change in the area of other lands has little or residential landuse and transportation landuse, landuse of Public and Government Departments effect key on the socio-economic development of the local inhabitants, as a key factor in Taunggoke Town.

CONCLUSION

Taunggoke Township is one of the townships between Rakhine Yoma and Bay of Bengal. Astronomically, it is located between north latitude 18˚ 37 'and 19˚ 32 ' and also between east longitude 94˚ 46 'and 94˚ 95 '. It has an area of 1173.39 sq.miles (3039.07 sq.km).This research work is studied by classifying eight different types of land use from the geographical stand point. During the period under study, i.e. from 2014- to 2018, the changes are observed in agricultural land use, residential land use, forest land, governmental land use , as well as culturable waste land and other lands. Based on these land use types, the utilization of different land use was described and explained.

The residential land and public and governmental area has somewhat increased. Such change has both positive and negative impact on the local inhabitants. As the population has been steadily increasing, the local populace needs more food and land for residing. However, the extension or encroachment of settlement land over the forested land can render such negative effects as environmental quality deterioration, widespread and serious flooding, intense heat due to lack of moderating and cooling effects of forest and limited availability of timber and firewood. The decrease of primary production land is undesirable, as the urban children has no ground to play freely for their enjoyment and healthy body growth. For the elders, they need places for recreation, particularly for relaxation of stress caused by urban congestion. Lack of suitable places for stress relaxation may lead to the increase in the number of alcoholics and drug addicts, as well as the crime rate.

The notable decrease in the land area used by recreational landuse was due to the recombination of Gayunar Dam to as a single recreational landuse at Taunggoke City. This can somehow retard the dynamic force that initiates and gives impetus to socio-economic growth of the city in the foreseeable future. And the location of physical layout, development potential of topology with Rakhine Yoma and fair accessibility, it enhances its development potential for near future if upgrade transportational landuse which is somehow related to the moderate means of land use. The pattern and the changes of land use, in fact, are largely the manifestation reflected by the decisions of government or the responsible persons of the departments concerned. Very little change has been caused by the local inhabitants. Therefore, the authorities concerned should learn the comprehensive understanding of the entire physical and social attributes of the township and intelligibly weigh the pros and cons of the change in the land use types before making decision. There still remains a limited area of culturable waste land and unclassified lands. They can be changed into any other useful land, but great care should be taken in the change of already used land into other types to maximize the benefit that may come out of a unit area of land.

In order to gain better insight of the different land utilization types of the study area, other fields of study such as forestry, urban planning, transportation, industry, commercial and potential tourism sites(Kathan mountain, Gyidu mountain, Sanwin mountain, Khar-taung-nga mountain, Myinmadin mountain, Moehte –Taung, Taung-kon-gyi-Taung, Padat-tar-taung and Ran-khwar-Taung and etc) should conduct further researches, for the multi-displinary approach is indispensable to achieve the best means of land utilization pattern . It can be said that with the gradual improvement of economic status for urban ward, it will get further progresses and prospects of the socio-economic activities affected in the giving environment and utilization pattern for the near future. Therefore, urban Land Utilization Change pattern need to systematic constructive alignment with Topology Conditions(Alignments) and Physical Conditions(Relief, Drainage System,Climate, Soils, Forested Area(Natural Vegetation) as good extension Urban Land Utilization Pattern to near Future for Taungoke Township from the above facts.

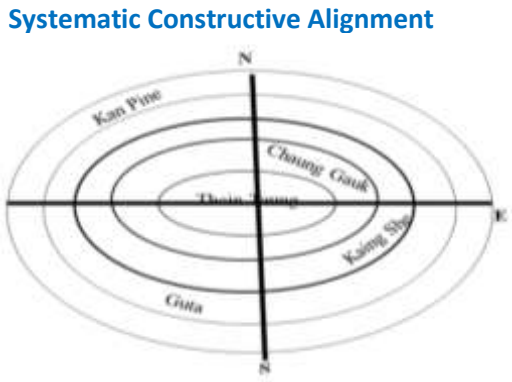

Figure (19) Systematic Constructive Alignment,
Sources: Based on the above facts

ACKNOWLEDGEMENT

We are greatly indebted to Rector Dr. Myint Swe, Taunggoke Degree College for his permission and guidance on this researchWe would like to express my special thanks to Dr Thida Aye, Professor and Head of Geography Department, Taunggoke Degree College, for her valuable advices and works of encouragement.We also thank to all of departmental persons who helped and provided the valuable informations, also wish to thank to admin staff in General Administrative Department, in Taunggoke Township.

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Myanmar Proverb and Their Ethical Foundations of Myanmar's Way of Living

Hla Hla Maw[3], Yin Yin Aye[4]

ABSTRACT

A society grows through a network of relationship , which is mutually intertwined and interdependent. Moral conduct is important for good social relationship. Every race or nationality must obey their respective disciplines, moral laws and moral duties. The moral laws and duties point out the difference between the evil deeds and good deeds or vice and virtue. It also suggests that each person should do good things and avoid evil things. It is morality and moral behaviour that maintains peace, stability and harmony in society. Myanmar Proverbs exphasize on the ethical culture of philosophy. In other words, Myanmar ethical foundation is based on the ethical principle of "Reciprocity". This foundational principle is the most important aspect in Myanmar moral thought.

Key Words: Moral conduct, Moral law, Moral Dutie, Warmony, Ethical Foundation:

INTRODUCTION

Everybody needs to take into consideration the welfare of the others who belong to the group. That is why, there are laws governing the society. But more than that, there are more or moral rules that guide and control each person's behavior which are more fundamental than the stated earlier. Hence, there is a great need for the understanding of these moral rules and guidelines and the underlying concepts and their terms.

Morality in general and moral rules and conduct were founded upon moral terms and they are the essence of cultural and moral life. They clarify the ethical values. Moral conduct is the principle of human behavior that promotes and orderly peaceful existence in a community. Rules of moral conduct are found every society.

THE ROLE OF PROVERB IN MYANMAR TRADITION

Myanmar literature has historically been a very important aspect of Myanmar life. The Myanmar culture has been heavily influenced by Buddhism. Historically, Myanmar culture was based on Buddhist religious norms and Buddhist ethics.

Throughout the age's philosophers, religious leaders, visionaries and others of influence have left their mark on the world. Many have provided us with inspiration and words of wisdom. Some of these words of wisdom are in the form of proverbs. Proverbs are timeless saying that make us ponder life, the universe, human life and the many wonders of the world.

The word " proverbs" mean in Myanmar " sagabaunj". It means " similar saying". A proverb may have more than one implication, depending on the circumstances in which it is used. A proverb is a short pithy saying in general use, stating a general truth or piece of advice. This short listing features most of the famous proverbs in Myanmar culture. Myanmar proverbs are essentially similes or parables, are unique. Some Myanmar proverbs are influenced by the very rich cultural values and the strong belief of Buddhism. Myanmar still use these sayings frequently, whether in formal speech or in daily conversation. Myanmar proverbs express the views of

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man about their fellow men and about human life in its various aspects. A Myanmar proverb throws light on diverse' characteristics of human beings. Myanmar proverbs reveal the human character, human behavior, and human relationships. They also refer to the moral essence in Myanmar ethical thought.

The Proverbs Concerning "Evil Deeds"

There are various usages of moral terms in Myanmar proverb. The moral term in Myanmar proverb represents Myanmar ethical norms and Myanmar cultural values. The following Myanmar proverbs are concerned with the Myanmar moral manner.

For example,

1.To shave off a spot on the already bald head.

2.One usually feels jealous upon the other who out scores.

3. One cannot see the exudation of his own eyes, but he can see that of others.

The above Myanmar proverbs are concerned with the ethical concepts of "evil deeds" of "ducaritas" , " labha" or " greed" and " dosa" or " anger" . These concepts are opposites of " Mettā" , " Karunā" and "Khanti".

These proverbs give three principal moral lessons

1. Myanmar ethics is not concerned with the egoistic outlook.
2. Myanmar ethics is concerned with the optimism.
3. Myanmar ethics is also practical in their outlook.

Thus "Mettā" , "Karunā" and "Khanti" are key terms for Myanmar ethical foundations.

The Proverbs Concerning "The Role of Verbal Action in Myanmar Life"

In Myanmar ethical life, verbal action is also important. So some Myanmar proverbs refer to this ethical idea. The following are concerned with the role of verbal action in Myanmar ethical life.

For example,

1. If one talks a lot, some words may disclose the true mentality of the speaker.
2. Making too serious a promise, one may become a slave.
3. Eat up all the rice, but not speak out all to say.

The above proverbs can explain the morality of verbal action in Myanmar life. These proverbs suggest not to speak too much and to control speech.

The Proverbs Concerning " Good Deeds"

In Myanmar social and cultural tradition, Good Deed" is the essential moral conduct for Myanmar's life. The following Myanmar proverbs are expressing the Myanmar ways of life.

For example,

1. The existence of a small midriver island depends on the net work of roots of the reeds, and the everlasting growth of the reeds depends on the firm existence of the island mass.
2. A deed, both subsistent and meritorious.
3. If the crow shows respect to the crow-pheasant, then the latter will do the same to the crow.
4. Behave modestly and keep higher ambitions.
5. Behave like a banyan tree, as well as like a cat.
6. Don't let the wet hand become dry.
   Don't turn your friends into foes.
7. One may be killed if he creeps underneath an old tree.
   But, one may never be killed if he succumbs to a person.

These selected Myanmar proverbs represent " Morally good person". According to Myanmar tradition, by willing moral good a person becomes good. As for Myanmar tradition, to

strive for the moral good is life's purpose and our obligation. These Myanmar proverbs provide the following ethical principles.

In the above proverbs, Good Deed (okp&dwf) is to make a goodness or to guide every person ways of life. Good Deed (okp&dwf) is reflects the MettāSpirit, KarunāSpirit. These terms makes pay respect for Myanmar social life. To makes "gentleness" for Myanmar personality. "Harmony", "Unity" and " Sympathy" are the basic social reality for Myanmar ethical life. This moral term gives harmony and unity for human life. So Good Deed (okp&dwf) is guiding principle for Myanmar peoples.

The Proverbs Concerning "The Value of Khanti in Myanmar Life"

In Theravāda Buddhist tradition, " Khanti Pārami" is also important. As for Myanmar cultural life, "Khanti" minded is very important in our daily life. The following Myanmar proverbs refer to the concept of" Khanti".

For example,

1. If one accepts the law of Karma, one can easily dispell one's fury."
2. If one entertains fury or begins with fury, he will make mistakes.
3. The fury of a wise man does not peep out.
4. Tolerance leads to Nirvana.
5. The rudeness should be conquered by gentleness.

The following moral lessons can infer from the above Myanmar proverbs.

1. For Myanmar, the concept " Khanti" is not only Buddhist term but also the key term of Myanmar moral conduct.
2. The " Khanti practice" is to support the ultimate aim of "Nivana" for all Buddhist.
3. The moral concept " khanti" can produce the other moral concepts" kindness", "gentle", "sympathy". So the concept " khanti" is a key term for Myanmar moral thought.

The Proverbs Concerning " The law of Kamma in Myanmar Life"

The Law of Kamma is important in Theravada Buddhism. Theravada Buddhism is the basic foundation for Myanmar Ethics. In Myanmar Buddhist tradition, physical action, verbal action and mental action are three main actions in human life.

The Following Myanmar proverbs are concerned with the law of Kamma.

For example,

1. The result or Karmic effects of one's own deeds.
2. Do the injustice, comes the unhappy end.

The following principles are deduced from the above Myanmar proverbs.

1.The Law of Kamma is important in Theravada Buddhism and Buddhist Ethics.

2. In this human world everyone can create his own karma just as he pleases.
3. Every human perform these Kamma or three actions at all waking hours.
4. The law of Kamma is a moral law in Myanmar society.

The Proverbs Concerning "Human Nature"

Some of the Myanmar proverbs explain the human conduct and their ethical life.

For example,

1. The value of a flower plant is the blossom.
   The value of a person is the character.
2. The son of a fool behaves haughtily.
   The son of a wise person behaves politely.
   The behaviour of a person reflects on his off springs.
3. The person who really endears you is your relatives.
   The dish which savours well is a best dish.

These proverbs express the social reality in Myanmar ways of life.

The following moral lessons come from the above Myanmar proverbs.

1. The environment condition is important for Myanmar ethics.

2. These proverbs represent the " good man" , bad man", "good deed", evil deed" and the idea of " what ought to be done".

The Proverbs Concerning " The Value of Gratitude"

In Myanmar cultural tradition, the concept of "Gratitude" is very important for all human beings. The following proverbs show the power of gratitude.

For example,

1. If one wishes to beat the watch-dog, he should take into consideration of its master's favour.
2. Even for a mouthful of food eaten, one owes gratitude to the host.

These Myanmar proverbs are influenced by the very rich cultural values and the strong belief of Buddhism. English word gratitude in pāli in Katannuta.

The word Katannuta consists of two parts: "kata" and " annuta" . Katannuta means knowing or recognizing what has been done to one , that is to say knowing and recognizing what has been done to one for one's benefit. Gratitude is rather more emotional but the connotation of katannuata is rather more intellectual, more cognitive. It makes it clear that what is called gratitude involves an element of knowledge-knowledge of what has been done to one or for one for benefit. If a person does not know that something has been beneficial there will be no gratitude.

The above proverbs give the following principles.

1. The moral concept " Gratitude" is important for social life.
2. The concept means in Myanmar "Gratitude" is a positive emotion or attitude in acknowledgment of a benefit that one has received or will receive.
3. To know gratitude is value of human being.

Thus the term "Gratitude "(aus;Zl;w&m;)is important for Myanmar society.

The above selected Myanmar proverbs show that Myanmar personality, Myanmar national spirit, and Myanmar culture and Myanmar philosophical thought. So Myanmar proverbs may be regarded as the moral criteria for Myanmar moral thought.

CONCLUSION

Myanmar proverbs contribute to spiritual development for Myanmar people. They can give guidance on how man should live socially, morally and spiritually to strengthen harmony in society. Illustrations of some Myanmar proverbs have the ethical principles they give. For instance, the their Myanmar moral concepts "Mettā" and " Khanti" are essentially useful principles in a Myanmar Buddhis's life. Because they provide him/her certain guidelines to be a useful member of the social group with its code of moral conduct. In other words "Loving-Kindness or Mettā" and " Patience of Khanti " provides some guidelines on how to be a morally good person and good member of society.

Another moral term "Sympathy" ," Gartitude" , "Compassion or Karuna" , " Care" can build up the Myanmar ethical foundation. They make effective principles for Myanmar moral life. These principles guide a man as an end in himself and the need to do one's duty which can be found as the basic principle of conduct in Myanmar society.

Thus, Myanmar moral terms, "Loving-kindness or Mattā (arwÅm) " , " Patience or Khant (onf;cHrI)", " Sympathy (pmemrI)", "Gratitude (aus;Zl;w&m;)", " Compassion or Karuna(u½kPm)", and " Care (umuG,fapmifha&Smufjcif;)", had focused on the value of life.

In this way, Myanmar proverbs stand as the building bricks of the foundation of Myanmar moral thought. It may be concluded that the study of Myanmar proverbs leads to the sound understanding of the ethical foundations of morality in Myanmar culture and society.

ACKNOWLEDGEMENTS

My special thanks go to the Principal, Dr Myint Swe, Taunggoke Degree College, for his kind help, valuable guidance and sharing knowledge.

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rrwvcsiawmiwaeaomt&mrsm;jzi erwwabmirsm;? uav;acsm uAsmrsm;tjzpzew;vsu jynoltmabmtjzp yaqmiay;cluon [qEiyg on/ pmay,Oaus;r e,y,u csUxiay;Eion ee;wi;rnl\ OmPaw;uAsm? &cijynowl\ pum;y? pum;0u? pum;w;? Zr;pum;? ye;0upum;? pum;0u ypm? ya[Vto;rsm;uvn; &cia&ajr a'o? acwumv0e;usi? jynorsm;lum;r ayguzm;vmjci;jzp&m þ&cib0aw;owlon Ewtqiqi vuqiur; o,aqmivmc& onouwr; umvrm ren;awmlyjzpalumi; awjri&ygon/ e*;

q&mawm t&ipuE\ þul;yr;&mazt m;xwrjzi &ciobm0aw; uAsmrsm;on pmeiayei rwwr;wieion tajctaeol a&mucllyjzpygon/ 4i;wteu aumi;E;&m&m aw;uAsmtcsl uom u@yi;jcm;um aumuEwavvm wijyxm; ygon/ &cib0aw;otcsUu azmxwavvmjci;jzi &ciwi;&i;om;wl\ "av½;&maw;uAsmrsm; raysmuysuap&e xe;or;ay;Eivrrn [,lunrygon/ acwumvrnrlyiajymi;vaomvn; om;acsm aw; uAsmrsm;qwoO;r &Ei rnrxiyg/ rciw&aeorl om;acsmaw;rsm;vn; &aelu rnomjzpayon/ jyno½axmi? jynor[e? &cib0aw;owjzi om;acsmaw;rsm; zew;um acw tajctae? &cijynowl\ OmPynm tqitwe;wlu wpaxmiwpae &mr r;armi;x;azmjycaom &cib0aw;owlum; jynorsm;tlum;ü ysUU&ioe aeclluonrmvn; txit&m; yijzpygon/ jyno½axmiraeí jynowl\ u,yir[e rsm;jzi zew;cluaom &cib0aw;owlu avvmjci;jzi wi;&i; om;wi; rrwl\ ,Oaus;rtartEprsm;u avvm xe;or;om;Eirn[vn; ,lunarlmvirygon/

usr;u;pm&i;

pausmxe;/(2000)/ *&ciuAsmEi/ taw;tac:/*&eue? &ciom;þu;pmay/

puE? t&i/(1999)/ *&ciobm0aw;uAsmrsm;/*'w,tþur/ &eue? r;ri;pmay? uvsmyEywu/

ri;Ei/(1965)/ *&ciaw;o/* &eue? ,Oaus;rXme/

jrxe;atmi/ (2000)/ *uveb0a&jyn&ci/* / &eue? &ciom;þu;pmay

တောင်ကုတ် ဒေသိယစကားများ

*အေးအေးမြင့်

စာတမ်းအကျဉ်း

ဤစာတမ်းသည် တောင်ကုတ်မြို့ပေါ်တွင် ပြောဆိုသုံးနှုန်းကြသောဒေသိယစကားများမှ ဝေါဟာရအချို့ကို သုတေသနပြုတင်ပြထားသောစာတမ်းဖြစ်ပါသည်။တောင်ကုတ်မြို့နယ်ကျေးရွာများတွင် ပြောဆိုသုံးနှုန်းသော ဒေသိယစကားများမဟုတ်ဘဲ မြို့ပေါ်ရပ်ကွက်များတွင် ပြောဆိုသုံးနှုန်းသော ဘာသာစကားကို အလေ့လာခံအဖြစ်ထားကာဝေါဟာရအသုံးအနှုန်းများကို နာမ်ဝေါဟာရ၊ ကြိယာဝေါဟာရ၊ အထွေထွေဝေါဟာရဟူ၍ အပိုင်းများခွဲခြားလေ့လာတင်ပြထားပါသည်။ တောင်ကုတ်ဒေသိယစကားနှင့်ဒေသခံတို့၏ ဓလေ့ထုံးစံအတွေးအခေါ် အယူအဆများကို သိမြင်နိုင်ပါသည်။

သော့ချက်ဝေါဟာရများ- ဒေသိယ၊ တောင်ကုတ်ဒေသိယ၊ နာမ်ဝေါဟာရ ၊ ကြိယာဝေါဟာရ၊ အထွေထွေဝေါဟာရ၊ စကားသံ၊

နိဒါန်း

ဘာသာစကားသည် ပြောဆိုသူတို့၏ နေရာဒေသကိုလိုက်၍ ကွဲပြားမှုများရှိပါသည်။ ယင်းသို့ကွဲပြားသော ဘာသာစကားကို ဒေသိယစကား ဟုခေါ်သည်။ တောင်ကုတ်မြို့တွင် ပြောဆိုသုံးနှုန်းသောစကားသည် မြန်မာဘာသာစကား၏ အသွင်ကွဲဒေသိယစကား ဖြစ်ပါသည်။ တောင်ကုတ်မြို့နယ်တစ်ခုတည်း၌ပင် မြို့ပြတွင်နေထိုင်သူများနှင့် ကျေးလက်တွင်နေထိုင်သူ တို့၏ပြောဆို သုံးနှုန်းသော စကားများသည် တူညီမှုရှိသကဲ့သို့ ကွဲပြားမှုလည်း များစွာရှိသည်ကို တွေ့ရပါသည်။ ဤစာတမ်းတွင် တောင်ကုတ်မြို့နယ်အတွင်း ကျေးရွာအလိုက် အသီးသီး ကွဲပြား နေသော စကားသံ၊ စကားလုံးတို့ကို စိစစ်လေ့လာခြင်းမျိုး မဟုတ်ဘဲ တောင်ကုတ်မြို့ပေါ်တွင်သာ သုံးနှုန်းပြောဆိုသော စကား အသုံးအနှုန်း ဝေါဟာရအချို့ကို လေ့လာတင်ပြသွားပါမည်။ ဤစာတမ်း ပြုစုရန်အတွက် မြို့နယ်အထွေထွေ အုပ်ချုပ်ရေး ဦးစီးဌာနမှ ထုတ်ဝေသောစာစောင်များ၊ မြို့နယ်ဆိုင်ရာစာအုပ်များ၊ ဒေသိယစာအုပ်များ ဖတ်ရှုခြင်း၊ ဒေသခံပုဂ္ဂိုလ်များအားမေးမြန်းခြင်း တို့ကိုပြုလုပ်ခဲ့ပါသည်။ တောင်ကုတ်ဒေသိယစကားများကို လေ့လာရာတွင် စံမြန်မာစကားနှင့် နှိုင်းယှဉ်လေ့လာတင်ပြ သွားပါမည်။

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*ဒေါက်တာ၊ တွဲဖက်ပါမောက္ခ၊ တောင်ကုတ်ဒီဂရီကောလိပ်။

၁။ တောင်ကုတ်မြို့နယ်၏ တည်နေရာအကျယ်အဝန်းနှင့်ဖွဲ့စည်းပုံ

တောင်ကုတ်မြို့နယ်သည် ရခိုင်ပြည်နယ်တောင်ပိုင်းတွင်တည်ရှိပြီး မြောက်လတ္တီကျူ (၁၈) ဒီဂရီ (၃၇)မိနစ်မှ (၁၉)ဒီဂရီ (၃၂)မိနစ်အကြား၊ အရှေ့လောင်ဂျီကျူ(၉၄)ဒီဂရီ(၅၄)မိနစ်မှ (၉၄)ဒီဂရီ (၄၈)မိနစ်အကြား တွင်တည်ရှိပြီး ပင်လယ်ရေမျက်နှာပြင်အမြင့် ၁၂ ပေရှိပါသည်။ မြို့နယ်၏ အရှေ့ဘက်တွင်ပန်းတောင်းမြို့နယ်၊ တောင်ဘက်တွင်သံတွဲမြို့နယ်၊ အနောက် ဘက်တွင်ဘင်္ဂလား ပင်လယ်အော်၊ မြောက်ဘက်တွင် အမ်းမြို့နယ်တို့နှင့် ထိစပ်လျက် တည်ရှိပါသည်။ ၄င်းမြို့နယ်များနှင့် တောင်ကုတ်မြို့နယ်အကြားတွင် ရခိုင်ရိုးမတောင်တန်း၊ မြစ်၊ ချောင်းများ ဆက်သွယ်ရေး လမ်းကြောင်းများဖြင့် နယ်နိမိတ်ပိုင်းခြားထားသည်။ တောင်ကုတ်မြို့နယ်သည် အရှေ့မှအနောက် သို့(၄၂)မိုင်၊ တောင်မှ မြောက်သို့ (၇၉)မိုင် ရှည်လျားပါသည်။ တောင်ကုတ်မြို့နယ်၏ အကျယ် အဝန်း ဧရိယာမှာ (၁၃၁၆၄၁)ဧကရှိပြီး (၂၀၅၇၂၅)စတုရန်းမိုင် ကျယ်ဝန်းပါသည်။

တောင်ကုတ်မြို့နယ်ကို မြို့ (၂)မြို့၊ ရပ်ကွက် (၈)ရပ်ကွက်၊ ကျေးရွာအုပ်စု (၅၂) အုပ်စု၊ ကွင်းပေါင်း (၂၆၀)ကွင်းဖြင့် ဖွဲ့စည်း ထားရှိပါသည်။

၂။ ဒေသိယစကားဟူသည်

"ဘာသာစကား[၁] တစ်ခုကို အသုံးပြုသူတို့သည်နေရာဒေသချင်း ဝေးကွာသွားသည့် အခါ အသုံးပြုသည့် ဘာသာစကားမှာလည်း တစ်နေရာနှင့် တစ်နေရာ ပြောင်းလဲကွဲပြားသွား တတ်ပါသည်။ ထိုသို့ ဒေသ ကွာခြား မှုကြောင့် ပြောင်းလဲသွားသော ဘာသာစကားတစ်ခု၏ အသွင်ကွဲ[၂] ကို "ဒေသိယစကား"[၃] ဟုခေါ်သည်။"[၄]

ဒေသိယစကားသည် သီးခြားဘာသာစကားမဟုတ်ဘဲ "ဘာသာ စကားတစ်ခုမှ ကွဲပြား သွားသော အသွင်ကွဲစကား"[၅] သာဖြစ်ပါသည်။ အသွင်ကွဲများကို ဒေသိယစကား အဖြစ် သတ်မှတ်ပါသည်။ ဒေသိယစကားတို့သည် စံစကားနှင့်အသံထွက်အားဖြင့် လည်းကောင်း၊ သဒ္ဒါအားဖြင့်လည်းကောင်း၊ ဝေါဟာရအသုံးအနှုန်းအားဖြင့် လည်းကောင်း ကွဲပြားနိုင်ပါသည်။ စံစကားနှင့် လေယူလေသိမ်းအားဖြင့် ကွဲပြားလျှင် ဒေသိယလေသံဟု ဆိုနိုင် ပါသည်။

ဘာသာစကားတစ်ခုတွင် ဒေသိယစကားအများအပြား ရှိနိုင်ပါသည်။ သာဓက အားဖြင့် မြန်မာဘာသာစကားသည်ပြောဆိုသူတို့၏ နေရာဒေသကိုလိုက်၍ ရွှေဘိုဒေသိယ စကား၊ အင်းလေး ဒေသိယစကား၊ မော်လမြိုင်ဒေသိယစကား၊ မြိတ်ဒေသိယစကား၊ ထားဝယ်ဒေသိယစကား၊ တောင်ကုတ်ဒေသိယစကား စသည်ဖြင့် ဒေသိယအမျိုးမျိုး ကွဲပြားသွားပါသည်။

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[၁] language

[၂] variety

[၃] dialect

[၄] အောင်မြင့်ဦး၊ ဒေါက်တာ ၊ ၂၀၁၀ ၊၂၂၆ ။

[၅] - ယင်း - ၊ ၂၀၁၅ ၊ ၈-၉ ။

ဒေသိယစကားတို့သည် စံစကားနှင့်အနည်းနှင့် အများကွဲပြားမှု ရှိပါသည်။ စံစကားဆိုသည်မှာ ဘာသာစကားတစ်ခုကို ပြောဆိုအသုံးပြုသူများက စံအဖြစ် သတ်မှတ် သောစကား ဖြစ်သည်။ တစ်နည်းအားဖြင့် ပုံမှန်အသံထွက်[၁]၊ ပုံမှန်သဒ္ဒါ[၂]၊ ပုံမှန် ဝေါဟာရ[၃] အသုံးအနှုန်းတို့ဖြင့် ဖွဲ့စည်း ထားသော ဘာသာစကားဖြစ်ပါသည်။ ပုံမှန် ဆိုသည်မှာလည်း အများသဘောတူ သတ်မှတ်ချက် အရသာဖြစ်ပါသည်။ ဘာသာစကား တစ်ခုတည်း ဖြစ်စေကာမူ ပုံမှန်ကွဲပြားလျှင် ယင်းကို ဒေသိယစကားအဖြစ် မှတ်ယူနိုင်ပါသည်။ ယေဘုယျအားဖြင့် မြန်မာဘာသာစကား၏ စံစကားကို မြန်မာစာအဖွဲ့ကထုတ်ဝေသော မြန်မာ အဘိဓာန်တွင် ဖော်ပြထားသည့် ဝေါဟာရစာရင်း၊ ဝေါဟာရအသံထွက် တို့နှင့် ညှိနှိုင်းသတ်မှတ်နိုင်ပါသည်။

တောင်ကုတ်ဒေသိယစကားများကို တင်ပြရာတွင် စကားသံများကို အများ အလွယ်တကူ နားလည်နိုင်စေရန် အများသိရှိပြီးဖြစ်သည့် အရေးအကွရာဖြင့်လည်းကောင်း၊ ပိုမိုတိကျစွာ လေ့လာ နိုင်စေရန်နှင့် အရေးအကွရာ မသိရှိသူများနားလည်နိုင်စေရန် သဒ္ဒဗေဒအကွရာဖြင့် လည်းကောင်း အသံဖလှယ်၍ဖော်ပြထားပါသည်။

၃။ တောင်ကုတ်ဒေသိယစကားများ

တောင်ကုတ်ဒေသိယစကားများကို နာမ်ဝေါဟာရများ၊ ကြိယာဝေါဟာရများ၊ အထွေထွေ ဝေါဟာရ များဟူ၍ ခွဲခြားတင်ပြပါမည်။

၃၊ ၁။ နာမ်ဝေါဟာရများ

တောင်ကုတ်ဒေသတွင် အမည်ခေါ်ဝေါ်မှုမှာ စံဘာသာစကားနှင့် တူညီမှု ရှိသကဲ့သို့ကွဲပြားမှုများ လည်းရှိပါသည်။ ထိုသို့ကွဲပြားမှုရှိသော အမည်များကို မျိုးတူစု၍ အစားအသောက် ဆိုင်ရာ ဝေါဟာရများ၊ အသုံး အဆောင်ဆိုင်ရာဝေါဟာရများဟူ၍ ခွဲခြားကာ လေ့လာတင်ပြသွားပါမည်။

၃၊ ၁၊ ၁။ အစားအသောက်ဆိုင်ရာဝေါဟာရများ

တောင်ကုတ်ဒေသိယဝေါဟာရ	**စံမြန်မာဝေါဟာရ**
မုန့်လုံး / moũ ˋloũ /	မုန့်ကြာစိ
ပျင်းမမုန့် /ˋbjĭ mà moũ /	ငှက်ပျောသီးဖက်ထုပ်
မုန့်ပွဲတော် / moũ ˋpwé -dɔ /	မုန့်ကြာခွက်
အိုးကြီးမုန့် / ˋo ˋdʒi moũ /	ထည်က်ဘိန်းမုန့်
မုန့်ခွက်ချက် / moũ kweʔ ɕɛʔ /	မုန့်ပျားသလက်
ကောင်းညှင်းပေါင်း /ˊkaũ ˋhjĩ ˋbaũ /	ကောက်ညှင်းပေါင်း
တိုဘူးသုတ် / tōˋbu ðouʔ /	တို့ဟူးသုတ်
ထည်က် / thə jɛʔ /	ကြံသကာ

[၁] pronunciation

[၂] grammar

[၃] vocabulary

အညင်းသီး / ə `ɲĭ `ði /	ဒညင်းသီး
ဂျင်းခါးသီး /`dʒĭ `kha `ði /	ကြက်ဟင်းခါးသီး
မြေပုံသီး / mjē -boũ ` ði /	ခရမ်းချဉ်သီး
ဝါးဥ /`wa ʊ́ /	အာတာလွတ်ဥ
ကပ္ပလီဥ / kaʔ pə - li ʊ́ /	ပီလောပီနံဥ
ပဲပြားသီး /`pɛ`bja `ði /	ပဲပုစွန်
ဗုံလုံသီး / - boũ -loũ `ði /	ပဲလင်းမြွေသီး
ချောချောသီး /`ɕɔ `dʒɔ `ði /	ရုံးပတီသီး
ကိုင်းငရုတ်သီး/`kaĭ ŋə jouʔ `θi /	ငရုတ်သီးအတောင့်ရှည်
တောင်ယာသီး / -taũ jā `ði /	ငရုတ်သီးအပု
ကျောက်ကျော / tɕauʔ tɕɔ̀ /	ရေမှော်ပင်
သခမသီး / θə khə má `ði /	သခွားမွေး
မှန်ဂလာသီး / -hmã gə lā `ði /	မာလကာသီး
ဆားဖြူသီး /`sha bjū `ði /	ဧီးဖြူသီး
ပဲသီး /`pɛ`ði /	ပဲတောင့်ရှည်
ဂေါ်ဖီထုပ် / -gɔ̄ -bi douʔ /	မုန်လာထုပ်
မုန့်တီစိမ်း / moṹ đi `zĕi /	မုန့်ဖတ်
ဟင်းခါးရည် /`hĭ `ga jē /	မုန့်တီအရည်
တမယ် / tə mē /	မုန့်ဟင်းခါး
ငါးသတစ် / ŋə ðə diʔ /	ကကတစ်
ငါးယုဇနား / ŋə jú zə `ŋa /	ငါးမုတ်
ငါးရင်းဂုံး / ŋə `jĭ `goũ /	ငါးရောင်
ငါးကင်ဂျင်း / ŋə -kĭ `dʒĭ /	ငါးကြင်းလုံး
ငါးလက်ခွာ / ŋə lɛʔ khwā /	ကကူရံ
ငါးညို့ / ŋə ɲó /	ငါးကွန်းရှပ်
ငါးဇရိုင်း / ŋə zə `jaĭ /	ငါးစင်ရိုင်း
ငါးသရွဲ / ŋə θə `jwɛ /	ငါးတံခွန်
သင်ပေါင်းထိုး / -θĭ `baũ `do /	ငါးရွှေ
ရေကြက် / jē dʒɛʔ /	ပြည်ကြီးငါး
ပါပရာ / pā pə rā /	ငါးမုန့်

၃၊ ၁၊ ၂။ အသုံးအဆောင်ဆိုင်ရာဝေါဟာရများ

တောင်ကုတ်ဒေသိယဝေါဟာရ

သံပုရာပိုင်း / θã bə jā `baĭ /

ဒုံ / -doũ /

လက်ခု / lɛʔ khứ /

ဆပ်ပြာကြုတ် / shaʔ pjā dʒouʔ /

ဖြုတ် / bjouʔ /

ဆာလာအိတ် / shā lā eiʔ /

ဂျက် / dʒɛʔ /

မီးအိုး / `mi `o /

စဉ့်စီတုံး / sĭ́ -zi `doũ /

ခွင် / -khwĭ /

ရေဗုံး / jē `boũ /

ရေမှုတ် / jē hmouʔ /

တစ်တာ / tiʔ tā /

ဆောင်းဒူ /`shaũ dū /

စက်ဆိုင် / sɛʔ -shaĭ /

ပေသာ / pē θā /

တန်းလျား /`tã `ja /

စပါးယိုင် / zə bə jaĭ /

အုန်းတော / `oũ `dɔ /

ဇာဂရာ / zā gə jā /

ချွေးခံအင်္ကျီ /`tɕhwe -gã `ĭ -dʒi /

ထမိန် / thə -meĭ /

ဆောင်းထပ်အင်္ကျီ / `shaũ daʔ `ĭ -dʒi /

တဘက် / də bɛʔ /

စံမြန်မာဝေါဟာရ

ဒယ်အိုး

ဇလုံ

လက်နှိုး

ဆပ်ပြာခွက်

သွားပွတ်တံ

ဂုန်နီအိတ်

မင်းတုပ်

မီးပူ

စဉ့်နှိုတုံး

မီးဖို

ရေပုံး

ရေခွက်

သေတ္တာ

ထင်းရှူးသေတ္တာ

အပ်ချုပ်ဆိုင်

ပိုက်ဆံ

ထိုင်ခုံရှည်

စပါးကျီ

ခနိတော

ဂါဝန်

မိန်းမဝတ်အတွင်းခံအင်္ကျီ

လုံချည်

အနွေးထည်

မျက်နှာသုတ်ပုဝါ

၃၊ ၂။ ကြိယာဝေါဟာရများ

ကြိယာဝေါဟာရဆိုသည်မှာ တောင်ကုတ်ဒေသခံတို့၏ အတွေးအမြင်၊ အပြုအမူများကို ဖော်ညွှန်း သော ဝေါဟာရများဖြစ်ပါသည်။

တောင်ကုတ်ဒေသိယဝေါဟာရ	**စံမြန်မာဝေါဟာရ**
ခေါင်းရိတ်သည် / `gaũ jeiʔ -θi /	ကတုံးတုံးသည်
ဆောင်းပါးထည့် / `shaũ `ba thé /	လူကြုံပါး
ဝါတယ် / wā dē /	လိမ်ညာတယ်
ရေသောက်ငတ်တယ် / jē θauʔ ŋaʔ tē /	ရေသောက်ချင်တယ်
တန်တယ် / -tã dē /	ဈေးသင့်တယ် ။ တော်တယ်(ဆိုဒ်)
ခေါင်းငြိုးတယ် / `gaũ `ɲi dē /	ခေါင်းကိုက်တယ်
ဒလမန်းကြမ်း / də lə `mã `tɕã /	ရှုပ်ပွသည်
လွန်တယ် / -hlũ dē /	ကဲတယ်
သွားဖို့ရာ / `θwa bó jā /	သွားတော့မယ်
ဆံပင်ကိုက် / zə -bĭ kaiʔ /	ဆံပင်ညှပ်
ကန်တယ် / -kã dē /	ဆုံတယ်
စိတ်ဆာတယ် / seiʔ shā dē /	ဒေါသထွက်သည်
မီးအိုးတိုက် / `mi `o taiʔ /	မီးပူထိုး
ဝဲပလိုက် / `wɛ pə laiʔ /	လွှင့်ပစ်လိုက်
လျှာရည်ကျသည် / ɕā jē tɕá -ði /	သွားရည်ကျသည်
တစ်နာရီတီးပြီ / tə nā -ji `ti -bi /	တစ်နာရီထိုးပြီ
ဝက်ညိုကိုက်တယ် / wɛʔ ɲō kaiʔ tē /	ဖားဥစွဲတယ်
သွေ့တယ် / θwé dē /	ခြောက်တယ်
တိန်းနေတယ် / `teĭ nē dē /	တိတ်တိတ်နေတယ်

၃၊ ၃။ အထွေထွေဝေါဟာရများ

တောင်ကုတ်ဒေသိယဝေါဟာရ	**စံမြန်မာဝေါဟာရ**
လာရာ / lā jā /	လာပြီ
စားပြီးရာ / `sa `pi jā /	စားပြီးပြီ
မနက်ခါ / mə nɛʔ khā /	မနက်ဖြန်မှာ
မနက်ထ / mə nɛʔ thá /	နံနက်
စောစောက / `sɔ `sɔ gá /	ခုနတုန်းက
နေ့ခင်း / né `giñ /	နေ့လယ်

ဘာတောင်မသိ / bā -taũ mə θĭ /	ဘာမှလည်းမသိ
မစားရာ / mə `sa jā /	မစားတော့ဘူး
နင်ရို / -ñĭ jó / ၊သူရို / θū jó /	နင်တို့ ၊သူတို့
နပ်ယောင်ကား / naʔ -jaũ `ga /	လူလည်
သမီးမျောက်သား / θə `mi mjauʔ `θa /	မောင်နှမသားသမီး
အမေကြီး / ə mē `dʒi /	အဖွား
ကြီးတော် / `dʒi dɔ̄ /	ကြီးကြီး
တော်တော်လေး / tɔ̄ tɔ̄ `le /	ဒေါ်လေး
အရီး / ə `ji /	အန်တီ
မချေ/ má ɕē /၊ မောင်ချေ/ -maũ ɕē /	မလေး ၊မောင်လေး
ဟုတ်တယ်ပ / houʔ tē paˊ /	ဟုတ်တာပေါ့
စွတ်ကရာတေ / suʔ kə jā dē /	မဟုတ်တာတွေ
စက်ဆုပ်ပလိ / sɛʔ shouʔ pə lĭ /	ရွံစရာ
ခဲဝါ / `khɛ wā /	ခွေးအ
ဇလိပ်ရှော / zə leiʔ `ɕɔ /	ကင်းလိပ်ရှော

ခြုံငုံသုံးသပ်ချက်

ဤစာတမ်းတွင် တောင်ကုတ်ဒေသိယစကားများကို နာမ် ဝေါဟာရ၊ ကြိယာဝေါဟာရ၊ အထွေထွေဝေါဟာရဟူ၍ ခွဲခြားလေ့လာ တင်ပြခဲ့ပြီးဖြစ်ပါသည်။ တောင်ကုတ်မြို့သုံးအချို့ ဒေသိယစကား များသည် အခြားသောရခိုင်ဒေသိယစကားများနှင့် စကားသံအားဖြင့် ကွဲပြားပါသည်။ တောင်ကုတ်ဒေသိယ စကားကို စံမြန်မာစကားနှင့် နှိုင်းယှဉ်ရာတွင် အဓိပ္ပါယ်ကွဲပြားသော ဝေါဟာရ၊ အဓိပ္ပါယ်တူ စကားလုံးကွဲပြားသော ဝေါဟာရများကို တွေ့ရှိရသည်။ စံမြန်မာစကား တွင် “ဆောင်းပါး”ဟူသောဝေါဟာရသည် စာပေပုံသဏ္ဌာန်အမျိုးအစား တစ်ခုကိုခေါ်ဝေါ်ခြင်း ဖြစ်သော်လည်း တောင်ကုတ်ဒေသိယ စကားတွင် “လူကြုံပေးလိုက်သောပစ္စည်း” ကို ခေါ်ဝေါ်ခြင်း ဖြစ်ကြောင်း၊ အဓိပ္ပါယ် ကွဲပြားစွာသုံးနှုန်း ပြောဆိုသည်ကိုတွေ့ရပါသည်။ စံမြန်မာ စကားတွင် အရသာကို ရည်ညွှန်းသော “ခရမ်းချဉ်သီး”ကို တောင်ကုတ် ဒေသိယစကားတွင် အသီးသီးပုံကို ရည်ညွှန်း ၍ “မြေပုံသီး” ဟုခေါ်ဝေါ်ကြောင်းတွေ့ရသည်။ ထို့အတူ “ ပြည်ကြီးငါး” ကို “ရေကြက်”၊ “ မုန့်ဟင်းခါး”ကို “တမယ်”၊ “ထင်းရူးသေတ္တာ”ကို “ဆောင်းဒူ”၊ “သွားပွတ်တံ”ကို “ဗြုတ်” စသည်ဖြင့် အသုံးအနှုန်း ကွဲပြားသောဝေါဟာရများကို တွေ့ရှိရပါသည်။

ထို့ပြင် အချို့တောင်ကုတ်ဒေသိယစကားများသည် စံမြန်မာ စကားနှင့်အနက် အဓိပ္ပါယ် တူပြီး အသွင်ကွဲပြားသည်ကိုတွေ့ရပါသည်။ စံမြန်မာစကားတွင် “မီးပူ”ကို တောင်ကုတ်ဒေသိယ စကားတွင် “မီးအိုး”၊ “စဉ့်နှီတုံး” ကို “စဉ့်စီတုံး”၊ “ဒေါ်လေး”ကို “တော်တော်လေး”၊ “ကြီးကြီး” ကို “ကြီးတော်” စသည်ဖြင့် အနက်တူ အသွင်ကွဲ၊ ကြောင်းတူသံကွဲ ဝေါဟာရ များကိုလည်း တွေ့ရှိရပါသည်။

ဤသို့ဖြင့် တောင်ကုတ်ဒေသိယစကားများသည် စံမြန်မာစကား နှင့်အသုံးအနှုန်း တူပြီး အဓိပ္ပါယ်ကွဲပြားသောဝေါဟာရများရှိသကဲ့သို့၊ အဓိပ္ပါယ်တူအသုံးကွဲသောဝေါဟာရများလည်း ရှိသည်ကိုတွေ့ရပါသည်။ ဤသို့ဖြစ်ရခြင်းမှာ တောင်ကုတ်ဒေသသည် ယခင်က လမ်းပန်း ဆက်သွယ်ရေးခက်ခဲခြင်း၊ ရေမြေဒေသကွဲပြားခြင်း၊ မိမိတို့နှုတ်အာလျှာ အလျှောက်လွယ်ကူစွာ သုံးနှုန်းပြောဆိုကြခြင်းကြောင့် ဖြစ်နိုင်ပါသည်။ တောင်ကုတ် ဒေသိယစကားကို လေ့လာခြင်းဖြင့် တောင်ကုတ်ဒေသခံတို့ အသုံးပြုသော ဘာသာစကားနှင့် ဓလေ့ထုံးစံ အတွေးအခေါ် အယူအဆ တို့ကို သိမြင်နိုင်ပြီဖြစ်ပါသည်။

နိဂုံး

ဒေသိယစကားသည် လေ့လာသင့်သောနယ်ပယ်တစ်ခုဖြစ်သည်။ ဘာသာစကားသည် နေရာဒေသအလျောက် ကွဲပြားလျက်ရှိရာ တောင်ကုတ်ဒေသိယစကားသည်လည်း စံဘာသာစကား နှင့် ကွဲပြားမှု ရှိပါသည်။ တောင်ကုတ်ဒေသိယစကားကို လေ့လာခြင်းအားဖြင့် တောင်ကုတ်ဒေသခံ တို့၏ ပြောစကားများ၊ ပြောဟန်လေသံများကို အလွယ်တကူသိရှိနိုင်ပါသည်။ တောင်ကုတ်ဒေသ နှင့်လူမှုဆက်ဆံရေး အဆင်ပြေချောမွေ့စေပြီး ထိုဒေသ၏ဓလေ့ထုံးစံအမူအရာများကို ချစ်ခင် စိတ် ဖြစ်စေပါသည်။ ထို့ပြင်ဒေသခံနှင့် ဆက်စပ်သူတို့အတွက် စီးပွား ရေးအဆင်ပြေမှုကိုပါ အထောက် အကူဖြစ်စေပါသည်။ ဒေသိယစကား ကြောင့် တိုင်းရင်းသားအချင်းချင်း ချစ်ခင်ရင်းနှီးမှု လူမျိုးတစ်မျိုးနှင့် တစ်မျိုးတို့၏ ချစ်စရာဓလေ့စရိုက်နှင့် စကားသုံးတို့ကို တန်ဖိုးထားတတ် မှု ရရှိစေရန်ရည်ရွယ်၍ ပြုစုခဲ့သောဤစာတမ်းသည် တောင်ကုတ်ဒေသ ဖွံ့ဖြိုးမှု၊ မြန်မာစာပေ မြန်မာဘာသာစကား ထိန်းသိမ်းမှုအတွက် အထိုက်အလျောက်အားဖြင့် အထောက်အကူ ပြုနိုင်လိမ့်မည်ဟု ယုံကြည်မိပါသည်။

ကျမ်းကိုးစာရင်း

ထွန်းမြင့် ၊ ဦး ။(၂၀၀၇) ။ ***သဒ္ဒဗေဒ*** (ဒု-ကြိမ်)။ ရန်ကုန် ၊ ရာပြည့်စာအုပ်တိုက်။

ဖေမောင်တင်၊ ဦး ။ (၁၉၈၅)။ ***ဘာသာလောကကျမ်း***၊ ရန်ကုန်၊ စာပေဗိမာန်ပုံနှိပ်တိုက်

ဘုန်းသွေးခိုင် ။ (၁၉၉၄)။ ***တောင်ကုတ်မြို့နယ်ပထဝီဝင်***။ ရိုးမလှိုင်း တောင်ကုတ် မဂ္ဂဇင်း၊ ဇွန်လ။

မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန။(၂၀၁၇)။ ***တောင်ကုတ်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ***။

မြန်မာစာအဖွဲ့။(၂၀၀၈၊သြဂုတ်လ)။ ***မြန်မာအဘိဓာန်*** (ဒု-ကြိမ်)။ရန်ကုန်၊ မြန်မာစာအဖွဲ့ဦးစီးဌာန။

ဝေသာ(ဘာသာပြန်သူ)။(၂၀၁၆)။***အန္တရာယ်ကျရောက်နေသောဘာသာစကား***။

ဒွါရာဝတီ စာပေယဉ်ကျေးမှုအနုပညာမဂ္ဂဇင်း၊ အမှတ် - ၇ ၊ မေ။

အောင်မြင့်ဦး၊ ဒေါက်တာ ၊ (၂၀၁၀)။ ***ဘာသာစကားသုတေသန***၊ ရန်ကုန်၊ ပညာတန်ဆောင် ပုံနှိပ်တိုက်။

အောင်မြင့်ဦး၊ ဒေါက်တာ ၊ (၂၀၁၅)။ ***အင်းလေးဒေသိယစကား***(ဒု-ကြိမ်)။ ရန်ကုန် ၊ ဧရာဝဏ် စာပေတိုက်။

The Study on UNDP' Activities Relating to Community Water Supply in Myanmar, Especially Dry Zone (1994-2001)

Dr. Aye Aye Thit *

ABSTRACT

Water and Sanitation is one of the primary drivers of public health. Water, Sanitation and Hygiene are linked to health. The lack of water and poor hygiene practices leads to the prevalence of water borne diseases. Thus, saving drinking water supply and adequate sanitation facilities are essential to public health and economic development of the nations. Generally, Myanmar is a rich country in water resources. But the availability of water supply is not similar in every region due to weather and geographical location. In central Myanmar, the dry zone is an arid region with an annual rainfall of less than 40 inches (1000mm). Two-thirds of Myanmar population live in rural areas. Water Supply and Sanitation are most significant for development of economic, social, health, education and living standard of the rural population. The Government of the Republic of the Union of Myanmar is implementing the priority of the development of rural areas. The United Nations Development Programme (UNDP), particularly with regard to how the water supply is installed in its project areas. Especially, it is noted that the Government had been providing the water supply and sanitation in the Dry Zone, Ayeyawady Delta (Delta Region), and Shan State with the assistance from 1994 to 2001.

INTRODUCTION

Water is the most essential element for men, animals and plants. Water is not only essential for health and growing up of all organic matters but also the source of energy, communication path and habitat of countless organism. The two third of the area of world surface is covered with water. But the great portion of water is in saline and fresh water consists of only 3%.

At present, the supply of fresh water suitable for human consumption is the universal problem for environment and human beings. The one fifth of the world population not assessable for suitable clean water for consumption and half of the mankind do not have suitable sanitation for their health. Supply of fresh and clean water and the habit of hygienic sanitation for growing up of organism are essential for public health and economic development of the state.

As Myanmar is situated Tropical Moonson area, and it is rich with Moonson rain and water resources. Due to the condition of geographical control factors such as, the distance from the sea, the altitude of land etc, the rainfall is uneven and in some areas, especially the central Myanmar is usually facing with water shortage problems. Traditionally people used to consume the water from rivers, creeks, wells and ponds as it is without treatment. Those waters are more or less infected with bacteria and chemical etc are polluted.

Though the current in "Sinnthe" and "Daungthe" creeks in Magway District in central Myanmar is strong enough to kill the strong elephant and the peacock which can fly away during the rainy season, in summer time they became spring where a man has to wait and collect to get a pot of water for many houses. The housewives and children have to collect water by spending an ample amount of time. The water resources are quickly dried out due to deforestation also and the

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trouble faced for water supply is growing larger day by day. In comparasion with the world standard or with the standard of the neighbouring countries, the percentage of the population who have the clean water supply and sanitation facilities in our country is still in a very low State.

To overcome such situation Myanmar heartly welcomed the United Nations (UN) aid for tropical zone region development. Since the time of Independence the United Nations has continued to assist Myanmar for political development and social aids. In present Myanmar there are the UNDP, UNICEF, UNOPS, FAO, UNAIDS, WHO and UNIC agencies etc. are stationed in Myanmar. In 1994, the UNDP implemented the Co Plan for Initial Social Development in Myanmar. The UNDP has began to begin to implement the play consisting water supply and sanitation based on the reign. The organizations constituted in the Community Water Supply and Sanitation are the Water Resources Utilization Department of the Ministry of Irrigation, Ministry of Development of Border Areas and National Races and the Central Hygienic Education Bureau under Ministry of Health. The plan was able to supply of safe drinking water and suitable sanitation for Dry Zone, Delta Region and Southern Shan State in Myanmar 1994 to 2001.

The Study on UNDP' Activities Relating to Community Water Supply in Myanmar, Especially Dry Zone (1994-2001)

The Community Water Supply and Sanitation (CWSS) project is one of the project in Myanmar funded by the UNDP under its Human Development Initiative (HDI). The project focuses on helping communities improve drinking water supplies, sanitation facilities and practices, natural hazard protection and other essential community facilities and infrastructure.[5]

Firstly, according to the record the randomly selected project areas of HDI are the eleven townships such as Chaung U, Kyaukpadaung, Magway, Bogalay, Laputta, Mawlamyinegyun, Ywangan, Pindaya, Kalaw, Nyaungshwe and Pinlaung within three zones namely Dry Zone, Delta Region and Shan State.[6] (See Map 1)

The illustrated project areas chosen by HDI-project are the areas in which water supply and sanitation is really essential. Because the towns of Chaung U, Kyaukpadaung and Magway are in the dry zone and the areas which get only 40 inches of rain annually. (See Figure 1) Only the Single town of Kyaukpadaung is included in the Nine Districts Greening and Refreshment project though it is the watershed and diverging area of the mount Popa range, and scarcity of water is annually faced in the villages for away from mount Popa.

Bogalay, Laputta and Mawlamyinegyun townships are included in Delta Region and situated close to the mouth of the river and the town into which most of saline water enter and the town of where the clean and fresh water is very scarce. As it is the Delta are in which above 100 inches of rainfall in recived only a few weathy families were able to store the rain water in large 100 viss capacity glazed earthern jars round the year. The ordinary poor destituter people home to rely on the use of river and creek water.

As physical features the area of Shan State is a place where limestone is abundant, the villages from Yuangan, Nyaungshwe, Pindaya, Kalaw, Pinlaung townships to drink the water rich with limestone. People are faced with water shortage because water seeps into the ground. So, the selection of areas as the project area for water supply and sanitation project of HDI is presumed to correct.

HDI-I was implemented from 1994 to 1996, the HDI-II from 1996 to 1998 and the HDI-III from 1999-2001 by schedules. In such implementation, the United Nations Center for Human Settlements (UNCHS) had provided with main aids and the Government Agencies also cooperated. The HDI project had implemented with three objectives. The objectives of this project were as follows:

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5 Project Document, Human Development Initiative Phases III, Yangon, UNDP in Myanmar, 1999

6 Final Progress Report, Community Water Supply and Sanitation, MYA/99/002, Yangon, UNDP in Myanmar, 2001, p. 1

(a) To improve access and quality of community water supply, sanitation and hygiene practices in the poorest and most water deprived villages within the project townships;
(b) To achieve sustainability of services through demonstrated community management and demand driven activities; and
(c) To strengthen local support capacities for community focused water and sanitation sector development.[7]

Mainly construction of rain water storage tanks, sinking of deep and shallows tube wells, digging village ponds construction of spring water pumping station were implemented in every project area. It is learnt as follow about the number of water supply installation and the number of population benefited from the implementation of the HDI-I, II(HDI-E), III CWSS project as follows. (See Table 1,2,3)

Table 1 HDI-I, MYA/93/025: Community Water Supply and Sanitation Project, Benefited Population in the Dry Zone (1994-1996)

No	Township	Number of water supply installation	Total Expenditure (kyat)	Total Population	Benefited Population	
					Number	%
1.	Kyaukpadaung	113	12,073,409	260922	66963	25.66
2.	Magway	75	6,116,251	269825	70513	26.13
3.	Chaung U	74	3,784,782	185780	60609	32.62
	Total	**262**	**21,974,442**	**716527**	**198085**	**27.65**

Source: Terminal Report, (MYA/93/025), UNDP in Myanmar, Yangon

Table 2 HDI-II(HDI-E), CWSS Project, Total Number of Benefited Population in Dry Zone (1996-1998)

Project Area	Water Supply Installation		Total Installation	Implemented Village Tracts	Total Population	Beneficed Population
	New	Renovation				
Kyaukpadaung	200	213	413	76	260922	113544
Magway	211	117	328	57	269825	161658
Chaung U	191	43	234	27	185780	69872
Total	**602**	**373**	**975**	**160**	**716527**	**345074**

Source: Terminal Report, MYA/96/002, UNDP in Myanmar, Yangon

Table 3 HDI-III, MYA/99/002: Community Water Supply and Sanitation Project Water Installation in Dry Zone, Delta Region and Shan State (1999-2001)

No	Water Installations	Dry Zone			Delta Region			Shan State					Total
		KPD	MGY	CHU	LPT	BGL	MLG	YNG	NSE	PDY	KLW	PLG	
1	Deep Tube well	26	36	11	8	-	-	-	3	-	1	1	86
2	Shallow Tube well	40	-	240	-	1	-	-	116	-	-	-	397
3	Hand – Dug well	85	215	5	94	12	-	11	65	8	10	3	508
4	Village Pond	28	41	6	138	140	26	-	1	3	21	4	408
5	Rain water Collection	605	443	120	112	80	354	50	22	87	544	224	2617
6	Pipe water Supply Schemes	7	5	1	-	-	-	41	38	48	56	83	279
7	Sub-Surface Dam and weirs	6	2	-	-	-	-	-	1	-	1	17	27
	Total	**797**	**742**	**383**	**352**	**233**	**380**	**102**	**276**	**146**	**633**	**332**	**4376**

Source: Terminal Report, (MYA/99/002), CWSS Project, UNDP in Myanmar, Yangon.

[7] *United Nations, Assessment of UNDP Human Development Initiative Myanmar, Brief Assessment of the 15 projects of HDI (1994-1996)*, Yangon, UNDP in Myanmar, 1997, p.5

According to the illustrations in the schedule, there is no detail illustration of people beneficial from the HDI-I and HDI-II projects but it only showed the total installions in 3 zones only.

I, myself, the writer himself had gone on study tour of the Magway township in the torrid zone area, out of 11 townships in project areas, from 6-5-2012 to 16-5-2012 with an intention to witness and description of how beneficial in the result of the HDI Community Water Supply and Sanitation Project on the villages of the project areas.

Kyitsonepwe village under project is situated on Magway-Kanpya-Naypyitaw-Yangon high way side at a distance of 12 miles from Magway. Before 2001, it was far away from town, had to walk for more than one hour from the Magway-Yangon high way into the village. In kyitsonepwe village tract, there were Kyitsonepwe and Bogone villages with 1105 houses, 1210 house-holds and more than 3900 population. The main occupation of the villagers is agriculture and some of them do the palm tree related works. It is a village where the water supply is scarce, as it falls within dry zone and has less rainfall, water could be available only by sinking of tube wells up 680 and 700 feet depth and absence of electricity to drive water pumps. There is no tube well. As the place is far away from Ayeyawady river and Yinn creek. Shallow tube wells also could not be used. Out of four ponds namely, Ahtet pond, Meibu pond, Alei pond and Kanthitgyi for arrival consumption and washing the only kanthitgyi is able for use nearly throughout the year. As other ponds, wells and springs begin to dry in *Pyatho* (January) it is a village faced with shortage supply of water.

Four rain water collection tanks of 3000 and 5000 gallon capacity provided by the Community Water Supply and Sanitation Project, HDI-II (HDI-E) are found at the village Dispensary, Additional High School, Village Head Monastery and Theinkyaung. It is impossible to supply enough drinking and general use water for more than 3000 people in Kyitsonepwe village tract for the year round. Therefore water from spring is to be used in summer. Though spring water good for drinking, it is necessary to get a bucket or a load of water as the output is low and consumption is high. Those who are unable to collect water by themselves had to buy at a high price at 2500 kyats per drum. But the water as the water from spring also is contaminated drinking. (See Figure 1)

It is learnt that the people from Kyitsonepwe village tract are in need of organizations or donors who could solve the shortage of water supply problem for them. More over the Kyitsonepwe village is the one which had suffered a total of three fire disasters full moon day of Tagu in 1337 (1965), 1st waxing of Tagu, 1337 (1975) and full moon day of Tabodwe, 1357 (1990). As the majority of houses are built up of bamboo, palm frond and thatch it is easy to catch fire in hot season. Due to insufficient supplies to extinguish fire in the rainy season it was failure in the fire disaster prevention. Though the CWSS Project, HDI –II (HDI-E) had provided with is filled up in those tanks due to shortage of water and lack of far sight of the villages.

Similarly the Phayapyo village tract under project is situated on the Magway-Kanbya-Naypyitaw-Yangon highway, and have to walk about 40 minutes it sough sand paths to get into the village. There are four villages namely Minywa (north), Gwaydauk san, Phayapyo (north) and Phoyapyo (south). There are 681 houses, 760 families and more than 3500 population in Phayapyo village tract. Generally live on hillside farming. Pulses and sesame are mainly grown. There are no larges ponds in Phayapyo village tract as in Kyitsonepwe village tract. There were no artisan wells till 2005. Though rain water shortage tanks provided by CWSS Project HDI- II (HDI-E) are found at the post primary school and Village Dhama Hall, there is absolutely no water in the rain water storage tanks. Water stored in the tanks are not sufficient till the end of rainy season.

Out of the villages reported above, Kyitsonepwe village tract and Phayapyo village tracts are lying on highland and far away from the river and so far there is no private artisan well. Therefore in such villages, apart from the rain water storage tanks, fire disaster tanks, hand pump wells, deep tube wells which could be used for long period should mainly be sunk for village welfare. Though it is reported that 24 deep tube wells under HDI-II and 36 deep tube wells under HDI –III in the project villages in Magway Region it is found not to fit in with practical finding.

No deep tube well are found in practical study, and it is only found that the artisan well, sunk under the village water supply plan of State Government were renovated and extension of water shortage tanks near the tube wells at Naku, Magyikan, Sherpinhla, Aungmyekone, Lyaungdaw Oo, Tatkone, Kanthakyi, Kanthalay and Sibintha villages.[8]

To avoid such discrepancies and to implement the projects objectives fully those who are heading the project should implement specifically according to the allotted budget. As project promoters also should give priority to implement water installation which could serve rural population in long term to overcome the water supply shortage problems during the project period. In such implementation also should be exercised enthusiastically based on the skill and good experiences for best accomplishments.

CONCUSION

Under practical experience, the project objectives are found to be only implemented little or no implementation at all and the illustration of ample results are found to be just misstatements and in reality the practical false informations. Therefore the responsible UN Agencies and Myanmar Authorities who co-operated with UN, should conduct timely inspections to reveal the real situations. On the part of Myanmar also, should act to submit the complete and correct data of UN activities if asked for to implement the project to fulfill the states needs with UN Sanctioned budges. If there were in complete function in the implementations, it should also be reported legally. Such malfunctions not only make to suffer own state but also it is harmful for the donor states in the UN. In this case, it informed that there are weakness on both parties who implemented and who recognized and accepted the false results. It should be more careful not to repeat such malfunctions in future projects.

As for the rural population, they had overcome seasonably from the troubles of lack of water supply with the implementation of CWSS Projects. Therefore the village population should take responsibility to maintain the water installations for long term use. It is found in my study for that the defective water installations and kept without repair and maintenance but long for the next implementation and ask for when it will come.

ACKNOWLEDGEMENTS

I would like to express my thanks and deepest appreciation to Dr. Margaret Wong, Professor and Head of the Department, Department of History, University of Yangon for giving valuable time for achievement of my dissertation.

I am deeply grateful to my supervisor Dr. Khin Maung Nyunt, Part-time Professor, Department of History, University of Yangon for providing proper suggestion and supervision to my dissertation.

Moreover, I would like to special thanks U Ko Ko Win and U Sein Myint, Zonal Manager, CWSS Project, UNDP in Myanmar, U Sein Myint, Deputy Director, General Administration Department, Nay Pyi Taw and Daw Khin Nyo, Township Education Officer, Kyaukpadaung Township for their valuable helps to get important documents.

Special thanks to Mr. Prafulla Man Singh Pradhan, Project Agency Manager, HDI-II, CWSS Project, UNDP in Myanmar for your kindly help essential project documents sent from E.mail.

[8] (a) Interview with U Shwe Lone, Village Administrator, Lyaungdaw Oo Village, 10 May 2012
(b) Interview with U Maung Zaw, Project Manager, UNDP, Magway Township, Magway Region, 11 May 2012

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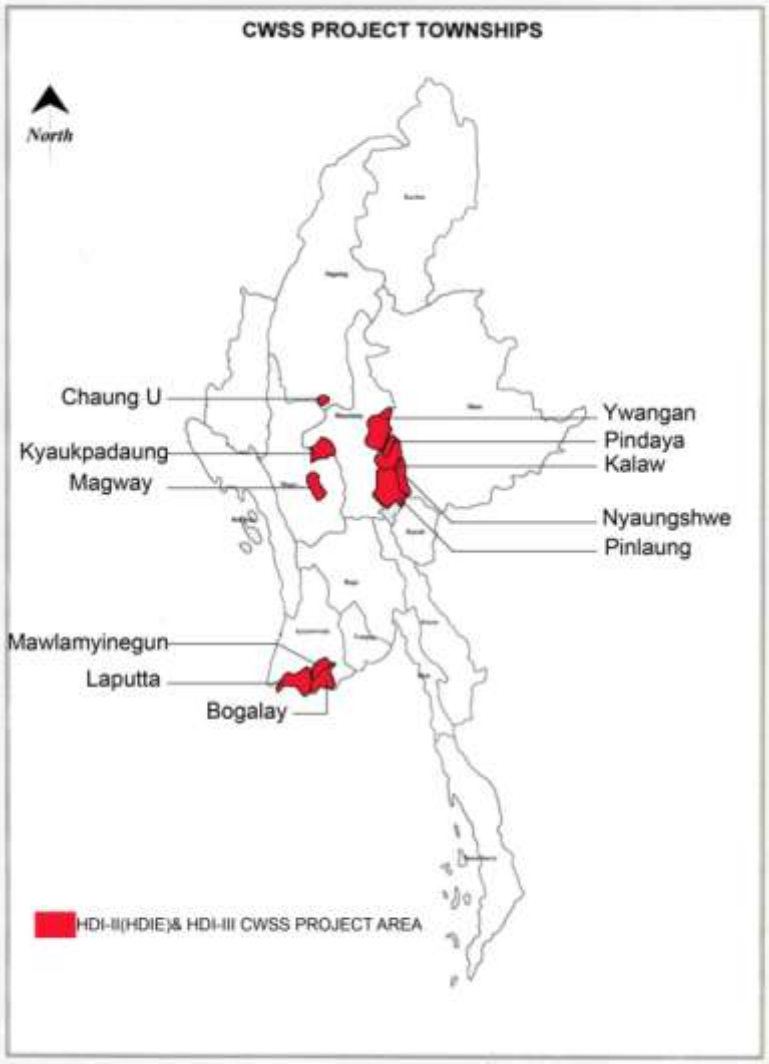

Map No. 1

Community Water Supply and Sanitation Project,

MYA/96/002 and MYA/99/002, HDI-II & III, (11) Project Townships

Source: Introduction to CWSS Porject, MYA/99/002, UNDP in Myanmar

Fig No. 1 Water Collection at the Dried up Pond and Water Collection at Sand Well of a Stream

Source: U Sein Myint, Programme Officer (infrastructure), Livelihoods and Food Security Trust Fund (

Fig No.3 Spring Water

Source: Village Health Centre, Kyit Sone Pway Village, Magway Township, Magway Region, Photo Taken by author

The ancient bricks inscribed in Brahmi alphabets and Pyu alphabets found in Taunggoke township

Ye Min Tun*

Abstract

The ancient bricks on which Brahmi alphabets and Pyu alphabets were inscribed and were found in Taunggoke township in Rakhine state are mentioned in this paper. (1) The ancient bricks on which Brahmi alphabets "ဋ္ဌ" (Hta-Win-Bee) and "ထ" (Hta-Sin-Htoo) and Pyu alphabet "ဥ" (Oo) were inscribed, found before collapsing and after collapsing of Si-Kai-Taung Dar-Tu pagoda at Nut-Mao village in Taunggoke township. (2) The ancient finger-marked bricks and the ancient broken bricks on which Brahmi alphabet "ဖ" (Pha) "ထ" (Hta-Sin-Htoo) and Pyu alphabet "ၐ" (which is called "ga-sha") but its real pronunciation is "သ" (tha) found at the ancient pagodas in the compound of A-ba-ya-khei-mi-kar-Rone monastery in Nut-Mao village. (3) The ancient bricks on which Brahmi alphabets "ဗ" (Ba-Htent-Chaing), "က" (Ka-kyi) Pyu number "၈၀" (Shis-see = 80) and Pyu alphabets "ဂ" (Ga-Ngee), "င" (Nga), "ဥ" (Oo), and "ပ" (Pa-Sout) were inscribed and which were found at the ancient Maung-Htaungt pagoda at Rwar-Ma village in Taunggoke township. (4) The ancient bricks on which Brahmi alphabets "ဗ" (Ba-Htet-Chaing), "ရ" "Ra" (Ra-Kauk) and Pyu alphabet "ထ" (Hta-Sin-Htoo) and which were found at the ancient pagodas in the compound of Rwar-Ma-Rwar monastery. (5) The ancient brick on which Brahmi alphabets "ဗ" (Ba-Htet-Chaing), "ရ" (Ra-Kauk), "က" (Ka-Kyi) and Pyu alaphabet "ထ" (Hta-Sin-Htoo) were inscribed and which were found at the ancient pagodas in the compound of Hi-ta-kar-ri monastery in La-mu-mao village in Taunggoke township. The ancient bricks on which Brahmi alphabets and Pyu alphabets were inscribed, above mentioned from No. 1 to 5, are mentioned with their locations. The found ancient brick-alphabets some of them are Brahmi alphabets and some are Pyu alphabets, they are compared with the ancient Indian Brahmi alphabets and the ancient Pyu alphabets and the original alphabets inscribed on the stone inscriptions. Besides, the ancient brick-alphabets found in RaKhine state are compared with the ancient Brahmi alphabets and Pyu alphabets inscribed on the ancient bricks which were found in the middle Myanmar, and the upper Myanmar- the main Pyu areas said by some scholars. Then, those ancient brick-alphabets of RaKhine are also compared with the ancient bricks on which Brahmi alphabets and Pyu alphabets were inscribed and found in Mon State, Kayin State and Tanintharyi Region which are located in the southern coastal region of Myanmar.

Key Word : Ancient Brick, Brahmi-alphabets, Pyu alphabets, Taunnggoke Township and Ancient Pagodas

Introduction

Nowadays, according to doing researches systematically and carefully on Pyu civilization an earliest civilization in Myanmar, expressing Pyu Kingdom, the area of Pyu emperor and the width and the length of the area at which Pyu civilization spread become important. Only the upper Myanmar and the middle Myanmar at which the ancient Pyu cities are located were referred when Pyu civilization was talked about in the part. Now, according to the local contemporary records, the contemporary Chinese records, the local chronicles, and the excavating of the Myanmar Archeological Department,

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the width and the length of the area of Pyu civilization spread not only the upper Myanmar and the middle of Myanmar but also some areas of the neighbouring countries beyond Myanmar present borders. When the width and the length of the area of a civilization is expressend, it will be more valid and more exact according to the way of History research, if there are findings excavated by Archaeology departments or archaeologists in addition to the contemporary written records on the concerning districts or regions. Among the findings by archeologists, the evidences of the ancient alphabets and the writing which show to be able to write and read in the ancient time well prove more clearly and more strongly than the other cultural antiques. At the present time, since the ancient bricks inscribed with the ancient alphabets-Brahmi and Pyu-which were used at the ancient pagodas and at the ancient buildings are found at their original sites and at their original buildings, those ancient inscribed bricks have been able to be used as the strong evidences for defining the most important interpretation of History of the era, the contents and the level of the ancient civilization which are shown by the inscribed alphabets as well as the era and the architecture of the ancient buildings.

The ancient bricks inscribed in Brahmi alphabets and Pyu alphabets found in Taunggoke township

Taunggoke township is located between North latitude 18º 30// and 19º 35// and East longitude 93º 58// and 94º 36// in Than-dwe district in the southern part of Ra-Khine state.[9]

It is approximately about 100 miles far from an ancient Pyu city, Srikhistra which is one of the main centres of Pyu civilization and which is located adjacent with Pyu city. Srikhistra, the ancient Pyu city of Pyu civilization, is located in the east of Taunggoke. The bay of Bangal and the historical sea route are in the west of Taunggoke township. Than-dwe (the old Dwar-rar-watty) is 44 miles far from Taunggoke. Than-dwe is in the south of Taunggoke. Kyauk-Taw township and Myauk-Oo Township which have old Da-Nya-Watty city and the old Wei-Thar-Li city which were the old capitals of the ancient Ra-Khine Kings are over 200 miles far from Taunggoke in the the north. And Ma-Ei township is about 40 miles far from the north of Taunggoke. Ma-Ei creek, La-Mu creek, Tan-Lwe creek and Taunggoke creeks which are significant for communication on land and in the sea flow through in Taunggoke township. The society in this township and the tangible remaining of the ancient culture are much connected with those creeks. Approximately the pagodas which are located on both the banks of the water communication- the creeks mentioned above- are the pagodas which have been maintained from the ancient eras to modern time.

The paper will mention the five places or sites at which the ancient alphabet-bricks are found from near (Taunggoke) as far as.

(1) Si-Kai-Taung-Dar-Tu pagoda

(2) The compound of A-ba-ra-khei-mi-kar-rone monastery at Nut-Mao village

(3) Maung-Htaungt pagoda at Rwar-Ma village

(4) The compound of Rwar-Ma monastery

(5) The compound of Hi-ta-kar-ri monastery at La-Mu-Mao village

(1) Si-Kai-Taung Dar-Tu pagoda

This pagoda is over one mile far away from Lamppost factory along the road in the east of that factory behind Taunggoke Degree Collage on the road of Am-Taunggoke from Taunggoke.[10]

[9] San Myint, U, Assistant Lecturer, Department of Geography, Taunggoke Degree College.

[10] Ye Min Tun, U, Nut-Mao Village and Si-Kai-Taung pagoda field report. (Hereafter cited as Ye Min Tun Nut-Mao)

Before collapsing of Si-Kai-Taung pagoda

After collapsing of Si-Kai-Taung pagoda

It is said that in Buddhist Sasanar year 1600, King Da-Tha-Rar-zar and his queen saw-Rammar-Dei-Wi built Si-Kai-Taung pagoda, putting the holy relies in the pagoda. King Da-Tha-Rar-zar was the son of king Kaw-li-ya and his queen Kommar-ri-Dei-Wi who founded the second Pa-Rain city.

Then, in 1238 M.E. (Myanmar Era) 1269 ME, 1298 ME, 1301 ME, 1354 ME and 1359 ME, the pagoda was (frequently) put up the new umbrellas.[11]Then, the pagoda was collapsed from the level of the bell to the bottom at 7:30 pm on 7 July, 2014. Then the ruined pagoda was rebuilt and put up the new umbrella again on 4 May, 2016.

I frequently did research before collapsing and after collapsing of the pagoda. Before collapsing of the pagoda, on 18 January, 2013, I went and did research again at the pagoda and I saw the two ancient bricks on which Pyu alphabet "ꩻ" (Hta-Sin-Htoo) were inscribed at the old brick-wall (at the slope) in the south-east of the pagoda.

On 3 February, 2014, I went to the pagoda and did research there again. I found a broken ancient brick on which Brahmi alphabet "𑀣" (Hta-Win-Bee) among the ancient bricks which were laid at the surface of the ancient brick-wall in the north of the pagoda.After collapsing of the pagoda, I did research at the pagoda again on 5 February, 2015. The inner pagoda was found under the collapsed pagoda when the villagers of Nut-Mao cleaned up the fallen and broken old bricks. The inner older pagoda remains between the bell shape and the 4 levels of bottom. When the villagers cleaned up the ancient broken bricks, the 3 ancient bricks each of which Pyu alphabet "ꩻ" (Hta-Sin-Htoo) was inscribed were found.

On 10 February, 2015, I went to the pagoda again. The masons rebuilt the pagoda. One of the masons found and kept an ancient brick on which Pyu alphabet "ꩾ" was inscribed. I saw that Pyu alphabet-brick.[12]On 18 February, 2015, I went to the pagoda again. The ancient unbroken brick on which Brahmi alphabet "𑀣" (Hta-Win-bee) was inscribed, the ancient broken brick being inscribe Brahmi alphabet "𑀣" and the ancient broken brick being inscribed Pyu alphabet "ꩻ" (Hta-Sin-Htoo) were found among the ancient bricks which fell down from the bottom of the bell shape in the east of the inner pagoda. When I did research the ancient bricks which fell down form the south and the west of the pagoda.[13]

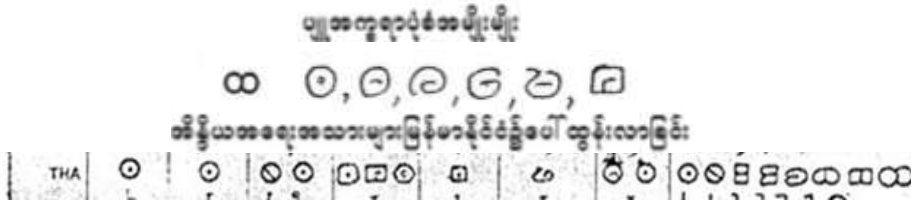
[11] Nyi Pu Ka Lay, U Si-Kai-Taung-Dar Tu pagoda abridge History
[12] Ye Min Tun Nut-Mao
[13] Ye Min Tun, U, Terracotta epigraphy in Southern Rakhine, Wai-thar-li Building in Yangon University, in 2015, (Hereafter cited as Ye Min Tun Southern Rakhine)

Brick with Pyu alphabet "ꩻ"

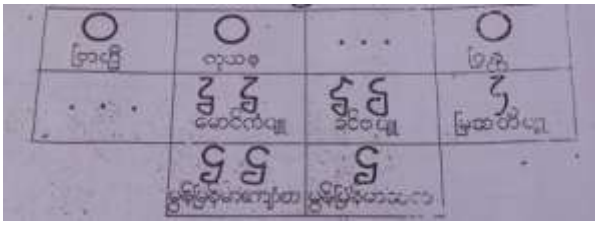
Brick with Pyu alphabet "ꩺ"

Brick with Brahmi alphabet "𑀳"

The numbers of the ancient bricks being inscribed and found at Si-Kai-Taung pagoda are totally 12. The kinds of alphabets are two-Pyu and Brahmi. Besides, Pyu alphabet "ꩻ" (Hta-Sin-Htoo) has the two styles or the two designs which were written. The other ancient bricks being inscribed unclearly are excluded from the list.[14]

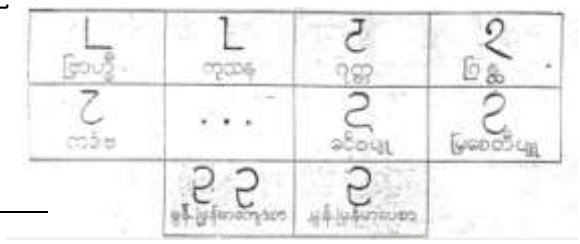


Firstly, I put up the ancient brick being inscribed Brahmi alphabet "𑀳" (Hta-Win-Bee) among the alphabet-bricks of Si-Kai-Taung-Dar-Tu pagoda at Nut Mao village. When we loot at that brick, we can see the alphabet "𑀳" an the brick as a mark or a stamp which was pressed to sink in the surface of the brick (before baking). When we look at the tables of the ancient Brahmi alphabets, we can see that Brahmi alphabet "𑀳" is the design of a circle.[15]



The ancient bricks being inscribed Brahmi alphabet "𑀳" and the ancient bricks being inscribed Brahmi alphabet "𑀳" with the other ancient alphabets have been found and compared with the ancient bricks being inscribed Brahmi alphabet "𑀳" which were found at Si-Kai-Taung-Dar-Tu pagoda.[16]

Secondary, I put up the ancient brick being inscribed Pyu alphabet "ꩺ" (Oo). The writing design of Pyu alphabet "ꩺ" can be seen clearly in the text of the history of Mon Myanmar alphabets by U Than Myat, the scholar of alphabets.[17] He puts up how to change the modern design of alphabet "ꩺ" from the ancient design of "ꩺ".



[14] Ye Min Tun Nut-Mao

[15] San Thar Aung, U , Alphabets used in Rakine in 6th Century AD and before, Yangon, Taut Taut Win Printing Press, 1974.

[16] Ibid

[17] Thar Myat, U, History of Mon-Myanmar Alphabets, 1955-1956. (Hereafter cited as U Thar Myat Mon-Myanmar)

It can be seen that the design of Pyu alphabet "ꦥ" of Si-Kai-Taung-Dar-Tu pagoda is similar to the design of Pyu alphabet "ꦥ" of being inscribed at Mya-Zei-Ti Pyu inscription.[18] The ancient Pyu alphabet "ꦥ" which are similar to Si-Kai-Taung-Dar-Tu pagoda "ꦥ" are found in Old Ta-gaung city, old Hamlin city and present day Mon state.[19] Thirdly, the ancient brick Pyu alphabet "ꦈ" (Hta-Sin-Htoo) of Si-Kai-Taung-Dar-Tu pagoda is one of the various designs of Pyu alphabet "ꦈ" of Pyu era.[20] The brick-Pyu alphabet "ꦥ" which is similar to Pyu alphabet "ꦥ" on the brick of Si-Kai-Taung-Dar-Tu pagoda in the design are found in the various regions of Myanmar.[21]

(2) The compound of A-ba-ya-khei-mi-kar-rone monastery at Nut Mao village

Nut-Mao village is located in the north of Chaung-Kauk quarter of Taunggoke town, parting with Taunggoke creek. A-ba-ya-khei-mi-kar-rone monastery which is called Nut Mao – Kyaung-Gyi in which 15 ancient ruined pagodas, an ancient Theim (holy building) and the other old brick-walls are located is situated beside the creek in the south-west of Nut-Mao village.

The ruined pagodas in the A-ba-ya-khei-mi-kar-rone Monastery compound at Nut-Mao village

The 15 ancient pagodas are parallaly located being adjacent with Taunggoke creek in the south of the compound of A-ba-ya-khei-mi-kar-rone monastery.

Firstly, the group of the ancient 8 pagodas, parting with the ancient brick-wall will be put up. The row of the ancient pagodas was built parallaly with the other row of the other ancient pagodas. Counting in the west, the two pagodas of the second row were built with and stones which were ancient pagodas. Counting in the west, the two pagodas of the second row were built with and stones which were cut as they were needed to build. Those 2 pagodas remain from the top part which is called Hnget-pyaw-phu to the bottom in original building well.[22]

The remaining 6 pagodas were built with bricks. They collapsed and remained from the bell shape (under the Nget-pyaw-phu) to the bottom. Each remains 10 feet high. The ancient bricks become smaller and smaller from the bottom to the top. The fences of the 8 pagodas were made with the ancient brick-walls. The lengths of the brick walls from the east to the west are 77 feet 4 inches long and the lengths of the brick-walls from the south to the north are 45 feet long. The brick-walls are about 2 feet high. Those brick-walls remain 9 layers on the ground. Each brick of the brick-wall is 13½ inches long and 8 inches wide and 2 inches high. The finger marked brick was found among the bricks of the wall in the south-east.

Outside of the west brick-wall, there are 2 ancient ruined pagodas. The southern pagoda of the 2 remains from the bell shape part to the bottom and is about 8 feet high. The northern pagoda of

[18] Ibid.
[19] Ye Min Tun, U, Upper Myanmar Field Report in 2015. (Hereafter cited as Ye Min Tun Upper Myanmar)
[20] Thar Myat, U, Pyu Reader, in 1964.
[21] Ye Min Tun Southern Rakhine
[22] Ye Min Tun Nut Mao

the 2 remains from the half of the bell shape part to the ground and is about 7 feet high. The 2 sizes of those 2 ruined pagodas are similar to the sizes of the ancient bricks of the ancient brick-wall.

There are 2 brick-mounds which are thought the ruined pagodas beside the northern brick-wall. The ancient brick being inscribed Pyu alphabet "ဂ္ဍ = ၈" (ga-sha) and the other ancient brick being inscribed Brahmi alphabet "ဖ" (Pha) were found in the eastern mound of the 2. There is no unbroken brick in that eastern mound at which the brick-alphabets were found. That mound may be the ruined ancient temple on which a pagoda was built because Thut-Oats (triangle shaped bricks) were found and the brick-frame which was built as arc was found at about 2½ feet high from the bottom.[23]

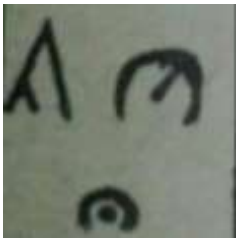
Brick with Brahmi alphabet "ဖ"

Brick with Pyu alphabet "ဂ္ဍ = ၈"

Brick with finger marks

It is seen that the ancient brick with Pyu alphabet "ဂ္ဍ" (ga-sha) changed from red-brown colour to black colour. The Pyu "ဂ္ဍ" being stamped or written on the brick is a little broken and the similar Pyu "ဂ္ဍ" alphabet on the bricks are seen in the other regions of Myanmar much.

It is easily seen that the design of Pyu "ဂ္ဍ" (ga-sha) of Nut Mao looks like Indian Western Kshatrapa alphabet "ဂ္ဍ" (ga-sha) design from BC 1C to AD 3C.[24]



The style of Pyu alphabet "ဂ္ဍ = ၈"

The second brick with alphabet is the brick being inscribed Brahmi alphabet "ဖ" (Pha). When the writing design and style of that alphabet "ဖ" is checked, it looks like Brahmi alphabet "ဖ" of Daili-inscription in BC 300-250 in India.[25]

It is remarkable that an ancient finger marked brick was found with the bricks being inscribed in the A-ba-ya-khei-mi-kar-rone monastery compound at Nut Mao village.

[23] Ibid.
[24] Higher Education Directorate, Department of Translation and Publication, Bagan, Inwa and Kong Baung, the style of stone inscription, University Lecture No. 19, Yangon, 1979.
[25] Ibid.

(3) Maung-Htaungt pagoda, Rwar-Ma village

The signboard of "To Rwar-Ma village" is located at the left-side of the road of Ann-Taunggoke. It is about 8 miles far from Taunggoke. The road which is shown with that sign board runs to Rwar-Ma village which is about 6 miles far from the signboard. Tan-Lwee creek is at the entrance of the village. Maung-Htaungt hill is beside Tan-Lwee creek. The pagoda of the arm relic is on the Maung-Htaungt hill.[26]

The records of the photos of the excavated Maung-Htaungt pagoda

The records of the donator who rebuilt Maung-Htaungt pagoda mentions the history of rebuilding the pagoda. It is recorded that U Pho Gyi and Daw Sai Oo, his wife, rebuilt Maung-Htaungt pagoda in 1275 ME and that they rebuilt 36 feet high of the pagoda and the bottom stage which is called "Pan-Tin-Khon" in Myanmat in 10 square feet.[27]Then, on full-moon day of Thi-Tin-Kyaut month (October) in 1367 ME, Bud-dan-ta U Kaw-Wi-Da, the head monk, rebuilt Maung-Htaungt pagoda which collapsed and remained the half of the bell shape building.

On 2 days after full-moon day of Tan-Saung-Mone, the site of the collapsed pagoda was cleaned up by the people. On 11th day after full-moon day, 5 relics of Lord Buddha were found in silver container in stone-box. On 13rd day after full-moon day, 7 ancient bronze statutes of Buddha and a stone statute of sitting Buddha which was 6 feet 3 inches high and weight about 3 tans was found in the square stone wall which was 15 feet and 6 inches wide. The stone statute of setting Buddha is the very ancient work.

Brick with Brahmi

Brick with Pyu

It is known that there were over 200 stone-plates at the "Gan-da-ku-Ri-taik" (the religious room or the worshiping room). Those stone- plates are sandstones. One or two or three ancient alphabets were inscribed on those

[26] Ye Min Tun, U, Maung-Htaungt pagoda and Ywar-Ma Village Field Report (Hereafter cited as Ye Min Tun Ywar-Ma)

[27] Record of repairing the pagoda on Maung-Htaungt Hill, Ywar-Ma village, Taunggoke Township.


Stone-plate with Pyu “ꩡ” (Nga)


Stone-plate with Pyu “ꩢ” (Oo)


Stone-plate with Pyu “ꩠ” (ga)

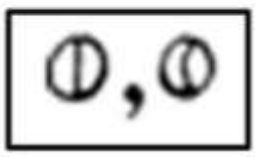
The stone plates.[28] When I went there on 12 February 2014, to do research, the two broken bricks on which Pyu number 80 were inscribed were found among the ancient bricks which were laid in front of a religious building being called ''Za Rut.'' The 3 ancient broken bricks on which ancient Brahmi alphabet “ဗ” (Ba-Htet-Chaing) were inscribed were found among the ancient bricks which were laid on the ground in the east of the pagoda. On 3rd January, 2014, I did research again at the pagoda and found the two broken bricks on which Brahmi alphabet “ဗ” among the ancient bricks at the bottom of the southern brick wall of the pagoda.[29]

The stone-plates with writing of Maung-Htaungt pagoda are the stone-plates on which inscribed one to three of the ancient alphabets.'' The stone plants being inscribed brahmi alphabet “ꩫ” (Ka-gyi), Pyu alphabet “ꩠ” (ga), Pyu alphabet “ꩡ” (Nga), Pyu alphabet “ꩢ” (Oo) and Pyu alphabet “ꩩ” (Pa). are clear and can be taken photographs.[30]


Stone-plate with Pyu “ꩩ” (Pa)


Stone-plate with Brahmi “ꩫ” (Ka-gyi)

The Brahmi alphabet “ဗ” (Ba-Htet-Chaing) which was stamped to sink on the surface of the ancient brick is found. One may see the tables of Brahmi alphabets to know the design and shape of Brahmi “ဗ”. It is seen at the tables of Brahmi alphabets that the original design of Brahmi alphabet “ဗ” is the square pattern which has 4 lines which are equal length.[31] (ပျူဂဏန်း “၈၀”)



[28] Ba Khin Gyi, U, Pagoda Trustee, Maung-Htaungt pagoda.
[29] Ye Min Tun Ywar-Ma
[30] Ye Min Tun Ywar-Ma
[31] San Tar Aung 6th Century AD

Pyu number "ၸဝ" (Shi-see = 80) being inscribed on an ancient brick of the pagoda is also found. That Pyu number "ၸဝ" can be seen in the text of Pyu reader by U Thar Myat.[32]

(4) The compound of Rwar-Ma monastery, Rwar-Ma Village

The compound of Rwar-Ma monastery is located beside the south of Tan-Lwee creek in the eastern part of Rwar-Ma village which is about one mile far from Maung-Htaungt pagoda. There are 6 pagodas in the compound of the monastery. There are 2 stone-stupas adjacent to the north-eastern brick wall, not inside, but outside. There is a pagoda which was rebuilt in modern design out of the south-eastern brick wall. The most northern pagoda of the row of 3 pagodas adjacent with Tan-Lwee creek in the eastern part of the compound of monastery is a ruined pagoda which remains about 80 feet high bell shape part. The ancient Brahmi alphabet "ဗ" written on an ancient brick was found among the ancient bricks being laid on the ground in the east of the pagoda.[33]

One of the ruined pagoda in Ywar-Ma monastery

Brick with Brahmi alphabet "ဗ" (Ba-Htet-Chaing)

Brick with Pyu alphabet "꧈꧈" (2 Hta-Sin-htoos)

Brick with Brahmi alphabet "ရ" (Ra-Kauk)

The middle pagoda of the row of 3 pagodas was built on the square brick-stage and has the cane. It is a ruined pagoda which remains 20 feet high bell-shape part. A broken brick on which 2 "ဗ" of Brahmi alphabet were written, A broken brick on which 2 "꧈" (Hta-Sin-Htoo) of Pyu alphabet were written , and a broken brick on which 1 "ဗ" of Brahmi alphabet was written were found among the ancient bricks being used around the base of bell-shape part.

There is a pagoda which has been rebuilt in modern style adjacent to the western brick wall in the compound. Some ancient bricks which appeared in rebuilding the pagoda scatter around the pagoda. An ancient broken brick on which Brahmi alphabet "ရ" (Ra-Kauk) was found among those bricks.[34]

Style of the various alphabet "ရ" (Ra-Kauk)

[32] Thar Myat Mon-Myanmar
[33] Ye Min Tun Ywar-Ma
[34] Ibid.

An ancient brick on which an alphabet was written but ruined and could not read was found at the brick-row/frame which remains in original pattern the worshipping building in the north of the pagoda.The two broken bricks on which Brahmi alphabet "ဗ" was inscribed, a broken brick on which Brahmi alphabet "ဗ ဗ" were inscribed, a broken brick on which Pyu alphabet "ꩻꩻ" (2 Hta-Sin-htoos), a brick which is not broken and on which Brahmi alphabet "ရ္" was inscribed and a brick on which unread able alphabet was inscribed were found in the compound of Rwar-Ma monastery of Rwar-Ma village.

(5) The compound of Hi-ta-kar-ri monastery, La-mu- mao village

La-mu-mao village is about 30 miles far from the north of Taunggoke. One can go to the village along Ann-Taunggoke highway road. La-mu-mao village is located beside the south warols of La-Mu-mao. The compound of Hi-ta-kar-ri monastery is beside La-mu-creek in the east of La-mu-mao village.

There are 9 ancient pagoda in the compound of Hi-ta-kar-ri. There are 3 groups of the pagodas according to their location. The first group is the group of 5 pagodas in the north of he main building of 5 pagodas, the 4 pagodas were built with bricks and the other pagoda was built with stones.

The southern most pagoda of the first group is a ruined mound which remains 10 feet high from the ground base to the top of bell-shape part. The 5 broken bricks on each of which Brahmi "ဗ" was inscribed were found among the ancient bricks which fell from the pagoda.

Another ruined pagoda which collapse to the bell-shape part and is 15 feet high is located in about 11 feet distance in the south of the above pagoda. The 7 ancient broken bricks on which Brahmi "ဗ" were inscribed were found at the second ruined pagoda.

One of the ruined pagodas in Hi-ta-kar-ri monastery

The most found brick-alphabet of those 2 ruined pagodas were Brahmi "ဗ" alphabets which were made to sink on the surfaces of the bricks.[35]

The second group of the 2 pagodas is located in the east of the main building. The northern pagoda of the 2 remains original and the southern pagoda have been rebuilt in modern style. The northern pagoda is 14 feet high from the base to the top of the bell-part is 11 feet and the width is 9 feet. It has arc-cave.

The two broken bricks on each of which Brahmi alphabet "ဗ" was inscribed were found among the old bricks at the base of bell–shape part in the west. A broken brick on which Brahmi "ဗ" was inscribed was found among the ancient bricks which fell down from the pagoda to the ground in the west.A broken brick on which Brahmi alphabet "ရ္" was inscribed was found among the brick-layers of

[35] Ye Min Tun, U, La-Mu-Mao Village Field Report (Hereafter cited as Ye Min Tun La-Mu)

the pagoda in the north. Similarly, the 4 broken bricks on each of which Brahmi alphabet "ရ" was inscribed were found at the pile of the ancient bricks which fell down in the east of the pagoda.

Brick with Brahmi alphabet "ဗ"

Brick with Brahmi alphabet "ရ"

A brick on which Brahmi alphabet "က" (Ka-gyi) was inscribed was found in the broken part of the bell-shape part. The eastern part of the pagoda collapsed and the broken bell-shaped remains.

The two bricks on each of which Pyu alphabet "ꩻ" was inscribed and brick on which the broken was inscribed but could not read were found among the ancient bricks which fell down on the ground.The bricks being inscribed alphabets which are most found are the ancient bricks on which Brahmi alphabets "ဗ" in the compound of Hi-ta-Kar-ri monastery of La-mu-mao village.[36]

Although the sizes and the designs of those brick-Brahmi alphabets "ဗ" which were made a rectangular mark sinking in the surfaces of the bricks are a little different from each other, the style of the basic design is similar.[37] Those brick-Brahmi alphabets "ဗ" are similar to the brick-Brahmi alphabet "ဗ" which were found in the various townships of Myanmar.[38]

The other brick-Brahmi alphabets which were found in the compound of Hi-ta-kar-ri are the brick-Brahmi alphabets "ရ" is similar to a straight stick.[39] The ones who are not familiar with the ancient Brahmi alphabets and the ancient brick-alphabets may be suspected whether the ancient brick which had such a mark of stick is really the brick on which Brahmi alphabet "ရ" was inscribed.

One will have to see and study the design of Brahmi "ရ" at the tables of Brahmi alphabets so that one will if reject his or her suspection on Brahmi alphabets "ရ.

It is difficult to accept that the stick-mark on the brick is Brahmi alphabet "ရ" if one finds only one brick with a stick-mark. But, finding 10 ancient bricks on each of which Brahmi "ရ" was inscribed at he ancient pagodas in the compound of Hi-ta-kar-ri[40] and comparing the ancient bricks being inscribed Brahmi "ရ" (in Hi-ta-kar-ri monastery) with the other ancient bricks being inscribed Brahmi "ရ" which were found in the various districts of Myanmar will make one understand the brick-Brahmi alphabet "ရ" .

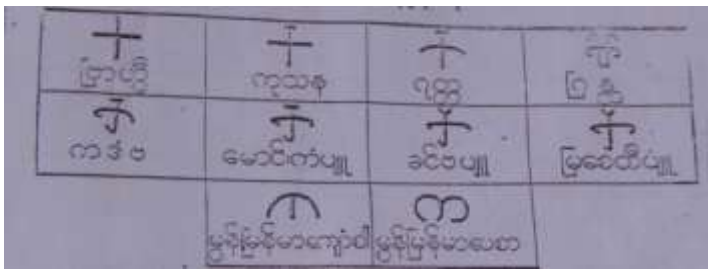
Brick with Pyu alphabet "ꩻ"

Brick with Brahmi alphabet "က" (Ka-gyi)

[36] Ye Min Tun La-Mu
[37] San Tar Aung 16th Century AD. (See Brahmi Alphabets Table)
[38] Ye Min Tun Southern Rakine
[39] San Tar Aung 16th Century AD. (See Brahmi Alphabets Table)

[40] Ye Min Tun La-Mu

Then, I put up the ancient brick on which Bramhi alphabet "ꣃ" (Ka-gyi) being found in the compound of Hi-ta-kar-ri of La-mu-mao village. We have to be and study the tables of Brahmi alphabet in order to know[41] and understand the original design of Brahmi alphabet "ꣃ".



The original design of ancient Brahmi alphabet "ꣃ" is the sign of "+". Which is mentioned on the tables of Brahmi alphabets when the original Brahmi alphabet "ꣃ" is was inscribed on the ancient bricks, not only the Brahmi "ꣃ" was inscribed as its original upright design but also the Brahmi "ꣃ" was inscribed like the sign of "×".[42] The similar bricks on which Brahmi alphabet "ꣃ" was inscribed were found in the other districts of Myanmar.[43]

Discussion and Conclusion

The bricks sealed with Brahmi and Pyu alphabets, the stone slabs inscribed with Pyu and Brahmi alphabets and the finger-marked bricks found in Tanggoke Township indicate the fact that it is the place where Srikhistra Culture had influenced and which had been one of the Pyu Empires.

To confirm these facts, in this paper, there are

(1) Physical feature and location,

(2) Pyu writings formally found there,

(3) The same bricks with Pyu Alphabet found in the Pyu centre, and

(4) The width of the area of the Pyus possession found in contemporary records

By looking at the location of Taunggoke, firstly the area is one hundred miles away from the strategic area of the Pyus, Srikhistra. There is no doubt that the Civilization of Srikhistra had influenced the area which is about one hundred miles away from Srikhistra and in the west there is an opening to the sea.

The second point is that there had been Pyu writing system according to the evidences found in Thandwe Pyu inscriptions.

The third point is that the evidence of bricks found in Taunggoke is the same as the bricks, alphabets and the way of writing found in other places in Myanmar and the strategic areas of Pyu.

The final point is that Taunggoke Township of today was included in the area of Pyu Empire according to three Chinese Contampory records.

According to the evident records "Htan Dynasty Old History Ad 946, The Governing Record of Htan Dynasty AD 961, and The New History of Htan Dynasty AD 1060", it is shown that the present[44] Srikhistra culture had influenced and which had been a part of the Pyu Empires.

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[41] San Tar Aung 16th Century AD. (See Brahmi Alphabets Table)

[42] Naing Win, U, Yar Mar Pu Ra (Mawlamyine) Myo-Haung and bricks on which Pyu and Brahmi alphabets Sar Dan, in 2012, Mawlamyine University.

[43] Ye Min Tun Southern Rakhine

[44] Yi Sein, U, Foreign Relation of Myanmar during the Pyu Era, Naing-gan Tha-Maing Research Journal IV, Yangon, Sar-Pay-Beik-Man Printing Press, in 1979.

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THE CONCEPTUAL SIGNIFICANCE OF NISHIDA'S SOCIO-EXISTENTIALIST ETHICS

Tun Pa May

ABSTRACT

Nishida discusses the problem of ethics, especially human conduct, the freedom of the will, and the good and personality. For him, the problem of morality is always in connection with the problem of truth or reality. The good is not merely the way of human beings. It is also the way of reality. The good is understood on the basis of reality. According to Nishida, truly good conduct has not to be objective. Men reach the purest and most perfect form of good conduct only when subject and object merge, self and things forget each other, and all that exists is the activity of the sole reality of the universe. This is the uniqueness of Nishida's understanding of the good and ethics, an understanding deeply rooted in the Asian tradition.

Key words: human conduct, good, reality, ethics

INTRODUCTION

In the Western philosophy, one of the general characteristics is that philosophy and religion occupy two different fields. It is said that philosophy is based on intellect and reason while religion is a matter of faith and practice. Western intellectual tradition is an attempt to study analytically between philosophy and religion, reason and faith. But Western philosophers have usually tried to make their philosophy to be independent from religion and have insisted upon the autonomy of human reason. That is the reason why logic, purely theoretical philosophy and science are unique to the Western Philosophy.

In the Eastern Philosophy, Japan like India and China, philosophy cannot be originally differentiated and separated from religion. For the east truth in knowledge is the same as truth in practice. This is why Nishida said "to be is to act". Generally logic and purely theoretical knowledge are scarcely found in the Eastern Philosophy. But in the nineteenth century Japanese thinkers who are steeped in Buddhism and Confucianism were attracted to the Western way of theoretical clarity and logical consistency. They have tried to generate a synthesis of Western thought and Eastern thought. Nishida's work ***An Inquiry into the Good*** which he has published in 1911 is the very first attempt to generate the need for this kind of synthesis.

Nishida's view is opposed to the ordinary understanding of personality because it is an understanding based on the subjective self-personality and is grasped as the infinite power of unity in terms of pure experience and is realized by forgetting the subjective self. Nishida maintains that the purpose of the good is not to obey the formal laws of morality as in Kant. It is not to seek for pleasure as in hedonism. For Nishida, the good has to fulfill one's deepest nature, to realize one's personality. This is why he bases his own ethics on his theory of self-realization. To realize the fundamental identity of the self and the universe is to realize this infinite reality as infinite truth, good, and beauty.

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CONDUCT AS A PHENOMENON OF CONSCIOUSNESS

Conduct must be distinguished from the following two kinds of movements: organisms' reflex movements that are goal-oriented but unconscious. It must also be distinguished from the instinctive action of animals which is goal-oriented and involves some consciousness, but in which the goals are not clearly known. For Nishida conduct is physical action in which the goal is clearly known in consciousness. Human beings have bodies so that they can make a variety of physical movements, including reflexive and instinctual actions. But the activity of the self is limited to conduct.

According to Nishida conduct is often accompanied by movement in the external world. Conduct is a physical action that arises because of a conscious goal and it is willed action. Hence the term conduct includes action in the external world, but the will mainly indicates internal phenomena of consciousness. Therefore for Nishida to discuss the phenomena of consciousness that is involved in conduct is to discuss the will.

Nishida explains how the will arise as follows:

> The human body is fundamentally constructed so as to make movements appropriate for preserving and developing its own life. Consciousness, arising together with these movements, is initially the simple feeling of pain or pleasure. But as ideas regarding the external world gradually become clearer and the activity of association becomes active, the initial movements no longer occur unconsciously in response to stimuli from the external world; rather, one first generates an idea of a result, then generates an idea of the movements that can serve as the means to the result, and finally shifts to actual movement. In this way, the will arises.[1]

Then, according to Nishida for the will to arise, there must be a physical or mental cause that initially determines the direction of movement or, in terms of consciousness, the direction of association. This cause appears in consciousness as a kind of impulsive feeling, which is called by Nishida the power of the will. Nishida asserts that the will is an internal phenomenon of consciousness, not the external actions. The will is the essential part of conduct. Even if actions do not occur while the will is present, it can be called conduct. On the contrary when the will is not sufficiently present, even if there are actions, it cannot be said that there is conduct. This means that the will as internal phenomena of consciousness precedes action. If there is pure consciousness, there will be good will that makes good action.

Nishida has discussed how the process of the will is a necessary part of conduct. He examines the view of the psychologist. From the perspective of psychology, the will is an activity that unifies ideas so that it must be a type of apperception. There are two types of activity which join ideas in consciousness. In one type, the cause of the union of ideas is found primarily in conditions of the external world. But the direction of the union is not clear in consciousness therefore it is felt to be passive. In psychology this type of activity is called association. In the other, the cause of the union of ideas is found in consciousness. In this type the direction of the union is clearly conscious. Therefore it is felt to be actively united. This second type of activity is called apperception.

According to Nishida, the goal of imagination is the imitation of nature and that the goal of the will is movement. When imagination unifies ideas, they accord with the true state of nature. When the will unifies ideas they accord with the desires of the self. So when man imagines something in nature, man must first become that thing and then think, because imagination is always concerned with external things with which one cannot be completely congruent, so that they are felt to be other than one.

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[1]Nishida Kitarō. (1990). **An Inquiry into the Good**. (Masao Abe and Christopher Ives. (trans.)New Haven and London: Yale University Press. p.88.

Nishida says that imagining a certain thing and acting on it seems to be different. However, the difference is a quantitative, not qualitative difference. Here Nishida gives an artist's imagination as an example. If someone attains to the realm of inspiration, he totally submerges the self in the thing. Consequently the self and the thing are in complete congruence, and felt as the action of the thing to be the activity of one's own will.

Nishida tries to analyze conduct. He has taken the will and action to be two different things, but their relationship is not one of cause and effect, for they are the two sides of one and the same thing. Action is the expression of the will, and that which is regarded from without as action can be regarded from within as the will.

THE FREEDOM OF THE WILL

Nishida explains that one cannot freely control all things in the external world. Even one's own body cannot be freely manipulated in any absolute sense. When one moves voluntarily it seems that one's muscles are free. But if one becomes ill one is no longer able to move one's muscles freely. Hence Nishida concludes that the only things men can freely manage are their own phenomena of consciousness. Even then, they do not have the freedom to create ideas anew. They do not have the freedom to recall at any time something they once experienced. They regard that they can unite, analyze and synthesize the ideas freely, and thus the union, the analysis and the synthesis of ideas are derived from the freedom of self. But there is an apriori law of functions in the analysis and synthesis of ideas, so they are not able to do as they please either.

Moreover, when a union of ideas stands alone or when a certain union is especially strong, they must fully obey it. So Nishida says that men possess total freedom of choice only in the context of the apriori law of the establishment of ideas. They are free only when of two or more ways to unite ideas and none has the strength to dominate. Nishida gives a remark that those who accept the freedom of the will base their arguments on the facts of experience in the internal world. According to them, man is free to select motives and has no other reason than him. They argue that decision is based on a type of mystical power called the will. The will is independent of both the various conditions in the external world and disposition, habit, and character in the internal world. In short, they posit a power that exists apart from the union of ideas while controlling it.

According to Nishida there are also those who expound deterministic theories of the will. They generally do on the basis of observations of facts in the external world. According to them, the phenomena of the universe do not occur by chance. Even extremely minute matters, necessarily possess a sufficient cause. With the development of science it becomes increasingly certain. They accept causes and effects of natural phenomena. Even the will, however, cannot escape from the great, unchanging laws of nature.

Nishida criticizes that even if modern Physiological Psychology advances to state the point that man can physically or chemically explain each and every function of the brain at the base of consciousness man cannot assert whether phenomena of consciousness are controlled by the mechanical law of necessity. Nishida gives an example of a bronze statue. Being its raw material is bronze it is determined by the law of mechanical necessity. But whether the meaning of bronze statue exists apart from those laws cannot be said. Nishida asserts that so-called spiritual meaning transcends the law of mechanical necessity.

For Nishida, the kind of will described by those who argue for the freedom of the will is a will that is totally without cause or reason. Nishida asserts that it does not exist. Such a contingent will would not be felt to be free; rather, it would be felt to be oppressive. The reason behind the will, however, is not a mechanical cause as described by determinists. Spirit contains a law governing its activity, and when spirit functions in accordance with its own law, it is truly free.

Thus, freedom has two possible meanings. First, freedom means being totally without cause. That is, fortuitous or contingent. Secondly, freedom means having no external restrictions and therefore functioning of and by oneself. The latter indicates autonomous freedom, and this is

the freedom of the will. Nishida points out that at this point, the following problem arises. If one assumes that freedom means to function according to one's character. So for example, there is the flowing of water and the burning of fire. In these cases only the will is considered to be free.

According to Nishida the occurrence of a phenomenon in the natural world is determined strictly by its circumstances. Only one, certain phenomenon and no others arises from a particular set of circumstances. Nishida calls it "blind necessity". However phenomena of consciousness do not simply arise, for they are phenomena of which one is conscious. They arise and known that they have arisen. Knowing something or being conscious of it includes other possibilities. To be conscious of taking something includes the possibility of not taking it. It also means that consciousness always possesses a universal character consciousness. Consciousness always includes an idealistic element. If it is not so it is not consciousness. That consciousness has such a character means that it harbors possibilities other than actual events.

Nishida believes that consciousness is free not because it functions fortuitously beyond the laws of nature, but rather because it follows its own nature. It is free not because it functions for no reason, but because it knows well the reasons behind it's functioning. Hence so far as one's knowledge advances, one becomes freer people. Even if one is controlled or oppressed by others, when one knows this one can free oneself from the oppression. If men go even farther and realize the unavoidable reason for the situation, then the oppression turns into freedom.

LAWS OF VALUE AND PERSONALITY

According to Nishida all phenomena or events can be examined in two ways. One is the investigation of their cause or reason. It is the investigation of how they occurred and why they must be as they are. The other is the investigation of goals. It is the investigation of the purpose for which they occurred. Here Nishida gives an example of a flower.

Concerning the question "how does it come into being?" the answer must be that it arises in accordance with botanical and environmental conditions and in accordance with the laws of physics and chemistry. But if someone asks about the purpose for which it occurred, the answer would be that it arises to produce fruit. The former approach constitutes theoretical inquiry into the laws of the establishment of things, whereas the latter constitutes practical inquiry into the laws of the activity of things.

Concerning the phenomena of the inorganic world, Nishida says that one can ask how they arise. But one cannot ask for what purpose they arise, because it must be said that they have no goal. However, one can argue that the goal and the cause in this case are identical. Nishida continues to give another example of a billiard ball. A billiard ball is hit with a certain force in a specific direction, it will undoubtedly roll in that fixed direction, but the ball has no goal. The person who hit the ball might have a goal, but it is not a goal internal to the ball. Nishida says that the ball is moved of necessity in accordance with causes in the external world. But he says that there may be another point of view. From another point of view, the ball moves in a fixed direction precisely because there is such a power of movement in the ball itself. In terms of the internal force of the ball, it can be viewed the movement as a purposeful activity of self-actualization.

Nishida asserts that some theorists may argue that what gives great pleasure has great value and contend that they have thus been able to derive the law of value from the law of cause and effect. But for Nishida it cannot be explained merely from the law of cause and effect why a certain result gives us pleasure and why another does not. What kinds of things people like and what kinds people hate are facts of direct experience and these are fundamentally different from the law of cause and effect.

Nishida states that all of our desires and demands are unexplainable, given facts. It is said that men eat in order to live, but "in order to live" is an explanation added after the fact. Man's appetite does not arise for such a reason. Here Nishida gives an example of the feeding of an infant. An infant's first drinking of milk is not so it can live: because the infant drinks for the sake of drinking. Man's desires and demands are not only unexplainable facts of direct experience but also, contrary to what one might think, the secret keys by which they are able to understand the true

meaning of reality. Hence Nishida remarks that a complete explanation of reality must explain not only how things exist, but also why they exist.

According to Nishida, there are two main theories of traditional ethics. They are heteronomous ethical theory and autonomous ethical theory. The heteronomous theory locates the standard of good and evil in authority. The autonomous theory locates the standard of good and evil in human nature. Besides these two main theories, there is another group of theories and it is called the intuitive theory.

Nishida investigates the problem of good approached by the autonomous ethical theory. According to autonomous ethics, the basis of morality is in human nature. There are three main types of autonomous ethical theory. The first one, based on reason is called the rational or intellectual theory. The second one, based on the feelings of pain and pleasure is called the hedonic theory. The third one, based on action of the will is called the activity theory.

According to Nishida the rational theory of ethics can go a step farther than heteronomous theory because it attempts to explain the good and terms of human nature. But Nishida says that only by basing on formal reason, one cannot solve the fundamental problem of why one must perform the good. For Nishida when one reflects deeply on the self, one can see feelings of pleasure and pain and willing which emerges from feeling. Hedonism, when it is compared to rational theory is closer to the reality of human nature. But for Hedonism the distinction between good and evil can be determined only according to the feeling of pleasure and pain. Hence it can never explain the imperative elements of moral goodness.

For Nishida, the good must be the goal of one's will. The good must be the standard that must determine the value of one's conduct. As the value judgments are found in one consciousness, the good must be articulated from the internal demands of consciousness not from without. According to Nishida, the ultimate standard of truth is found in the internal necessity of consciousness. For him, a moment of consciousness is not simple. It contains complex elements that are dependent on each other. Consciousness at a given time and also over a life time is organized into a system. Nishida gives the name for the system, 'the self', which means the unity of this whole. Hence for Nishida, the good is a coordinated harmony or mean between various activities. Consciousness for Nishida is not an assemblage of sequential actions. It is a single unified system.

According to Nishida the good refers to that which satisfies the internal demands of the self. The greatest demands of the self are the demands of personality. The demands of personality are the fundamental unifying power of consciousness. Hence to satisfy these demands and to actualize personality is the absolute good. According to Nishida one reaches the purest and most perfect form of good conduct only when there is no distinction between things and the self. Just as the objective world is the reflection of the self, the self is a reflection of objective world the self does not exist apart from the world that it sees. Hence good conduct is not a mere event inside consciousness. It is rather an action in which the goal is the creative results in the world of facts.

In the history of Western thought, the idea that harmony constitutes the good is started by Plato. Plato theorizes the good in terms of harmony in music. Aristotle says that the means is the good. For Nishida the view of Plato and Aristotle that the good is harmony or the mean does not clarify the meaning of the good. According to him no human can be satisfied by physical desires because ideas are always functioning in the human minds. According to Nishida, consciousness should be controlled by the activity of ideas. So the true good for man is to satisfy the demand arising from that activity. When men proceed further to inquire the activity of ideas men can reach the law of reason. For Nishida, the true person appears where the (subject) self has been forgotten. Personality is the unifying power of consciousness in the sense of immediate experience. The true personality comes forth when a person eradicates highly subjective hopes and forgets his or her self.

Nishida holds that the good of the individual is most important and it is the basis of all other goods. But this individual good differs from self-interest and selfish desires. Individualism and egoism are different. Egoism is selfishness that takes one's own pleasure as its goal. Hence this is the

opposite of individualism. For Nishida, when human live in communities social consciousness necessarily functions. Hence language, manners, customs, social systems, laws, religion, and literature are all phenomena of this social consciousness. Individual consciousnesses emerge from and are nurtured by it. They are single cells that constitute this great consciousness. Knowledge, morality, and aesthetic taste all have social significance, and even the most universal learning does not escape social convention.

Since individual consciousnesses are parts of social consciousness, most of individual's demands are social. If all altruistic elements are removed from man's desires almost nothing would remain. The center of the self is not limited to the interior of the individual. The self of a mother is found in her child, and the self of a loyal subject is found in the monarch. As one's personality becomes greater, the demands of the self become increasingly social. According to Nishida the development of social consciousness is not limited to the small group of the family because mental and physical life can develop in all of the various social groups. The nation which is next level beyond the family unifies the entirety of all conscious activity and expresses a single personality.

For Nishida individuals are entities that have developed as cells of one society. Hence the essence of the nation is the expression of the communal consciousness that constitutes the foundation of all minds. The nation is a unified personality, and the systems and laws of the nation are expressions of the will of this communal consciousness. Hence when a nation punishes an individual, it does so neither for revenge nor for the safety of society, but because personality possesses an inviolable dignity.

Nishida says that if one assumes that only phenomena of consciousness are the only reality then one's personality is the activity of the unifying power of the universe. For Nishida the good is the realization of this great power. The good refers to that which satisfies the internal demands of the self. Hence the demands of personality are the fundamental unifying power of consciousness. So to actualize or to fulfill one's personality means to become one with the unifying power. Then the nature of good conduct can be determined. For Nishida all good conduct takes personality as its goal. Personality is the basis of all values. Although there are various demands such as wealth, power, knowledge and art which are valuable, these lose all values if these are independent of personality. Wealth, health, honor, authority, skill and knowledge are not good in themselves. For Nishida conduct is a conduct which takes actualization of personality as its goal.

For Nishida, the good is the realization of ideals and the satisfaction of desires. The will is the deepest unifying activity of consciousness. It is the self itself at work. Hence the desires and the ideals that are the cause of the will arise from the self itself. Nishida also discusses the conditions of good conduct. First, good conduct is one which takes personality its goal. Another condition is sincerity. He says that sincerity is good not because of its results but because it is good in itself. Sincerity is the internal necessity of personality. Sincerity is a demand based on knowledge, feeling and volition.

According to Nishida to follow the sincere internal demand of the self does not mean to establish subjectivity as opposed to objectivity. For Nishida only when one can eliminate the subjective fancies of the self and unite with a thing one can see the true self. So the objective world is a reflection of his or her personality. Hence the sincere demands of each person coincide with the ideals which he sees in the objective world. Self-awareness of the true self comes about when the subject-object opposition is overthrown. This self-awareness comes about in seeing the self reflected in the objective world and the objective world reflected in the self. In one sense, each one's objective world is a reflection of that one's personality.

Nishida maintains that the purpose of the good is neither to obey the formal laws of morality as in Kant nor to seek for pleasure as in hedonism, but to fulfill one's deepest nature, to realize one's personality. This is why he bases his own ethics on energetism and his theory of self-realization. To realize the fundamental identity of the self and the universe is to realize this infinite reality as infinite truth, good, and beauty.

In this paper the research question is "how and why Nishida's epistemological concept precedes ethical concept" and it is already proved. For Nishida morality is not a search for

something apart from the self awareness of pure experience of *mu*. It is simply the discovery of something within the self consciousness of pure experience of personality. This is only one true good of personality after the knowing of pure experience of *mu*. This means that one's true self of self consciousness of *mu* makes one's personality.

According to Nishida the good refers to that which satisfies the internal demands of the self that makes personality. This means that the greatest demands of the self are the demands of personality and the demands of personality are the fundamental unifying power of consciousness. Hence Nishida said that to satisfy these demands and to actualize personality is the absolute good. For Nishida, one can reach the pure form of good conduct only when there is no distinction between things and the self or after realization of pure experience of *mu*. Just as the objective world is the reflection of the self, the self is a reflection of objective world the self does not exist apart from the world that it sees. Hence good conduct is not a mere event inside consciousness. It is rather an action in which the goal is the creative results in the world of facts. For these reasons, we can say that Nishida view on epistemological concept precedes his ethical concept.

CONCLUSION

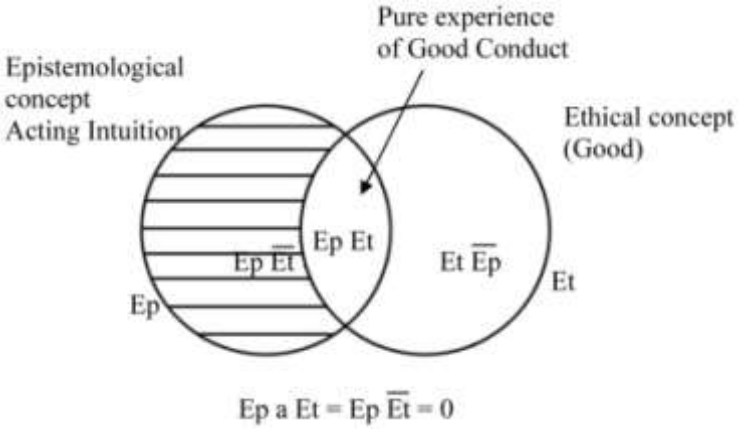
Nishida discussed the problem of ethics in connection with the problem of truth or reality. The good is not merely the way of human beings but it is also the way of reality. This means that the concept of good is understood on the basis of the concept of reality. For Nishida, the good has to fulfill one's deepest nature, to realize one's personality, so that, he bases his own ethics on his epistemology. According to Nishida, men reach the purest and most perfect form of good conduct only when subject and object merge, self and things forget each other, and all that exists is the activity of the sole reality of the universe.

Nishida considers applied philosophy what we ought to do, what the good is, and what the basis of human action ought to be. This cause appears in consciousness as a kind of impulsive feeling, which is called by Nishida the power of the will or motivation which is accompanied by an idea of a result. For Nishida, Will is the deepest unifying power of consciousness and also the most profound expression of the unifying power of reality. Then, an action is the expression of the will. Hence Nishida said that the only things men can freely manage are their own phenomena of consciousness that is the freedom of the will. Hence so far as one's knowledge advances, one becomes freer. This shows that knowledge leads to ethical behavior or epistemological concept leads to ethical concept.

For Nishida, the good must be the goal of one's will and it must be the standard to consciousness, the good must be articulated from pure consciousness. Hence for Nishida, the good is a coordinated harmony or mean between various activities. The good refers to determine the value of one's conduct.

To draw a logical diagram this paper can be summed up into a sentence. It can be coined as "to be is to have personality". For Nishida, the value judgments are found in one that which satisfies the internal demands of the self consciousness and the greatest demands of the self are the demands of personality. The demands of personality are the fundamental unifying power of consciousness and to satisfy these demands and to actualize personality is the absolute good. According to Nishida one reaches the pure experience of good conduct only when there is no distinction between things and the self or subject and object. For Nishida, the personality appears where the self has been forgotten that personality is the unifying power of consciousness in the sense of pure experience. This means that Nishida's view on epistemological concept leads to his ethical concept. This can be symbolized as "Universal Affirmative Proposition". "Ep" is for epistemological concept and "Et" for ethical concept. It can be symbolizes as Ep a Et. This can be stated by Venn's diagram as follows;

TO BE IS TO HAVE PERSONALITY



ACKNOWLEDGEMENTS

I would like to express my gratitude to Principal Dr Myint Swe,Taunggoke Degree College, for his advice and help, value knowledge, and idea to complete this study. I also want to thank Daw Hla Hla Maw, Lecturer, Head of the Department of Philosophy, Taunggoke Degree College for her suggestion and invaluable advice.

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An Analytical Study of Using on 5000-Religious Year-Concept in Myanmar

Arkar Moe Thu[45]

Abstract

Even today in Myanmar, most of the Buddhists believe that the Teachings would last for only 5000 years. This usage of the 5000-Religious Era- Concept is associated with Religious belief or is tradition, long held or followed by the common folk. As promoters of religion and upholder of tradition rulers in ancient times assiduously used it for political and social purpose as well as for their donations to be sustained in the next existences. At time passed 5000 Religious Era-Concept has been taken or new aspects in the context of current social and political needs are much in evidence on the ancient Myanmar stone inscriptions. The Myanmar has the concept of the 5000 Religious Era since Bagan Period. According to the Myanmar inscriptions from Bagan period up to later periods, the life span of the Buddha's Teaching for the 5000 years had been suggested to last long successively. It is based on commentaries but not on *Pāli*. The *Cūḷavagga* only mentioned the 500 years. This paper aims to solve the problem of the said 5000 years of the life span of the Teachings of the Buddha.

Introduction

Buddhism had been introduced to Pyu land of Myanmar in the 1st century AD. Since the Myanmar accepted the Teachings of the Buddha, they practised it with satisfaction and supported it from all aspects to be prosperous. And they wished it to last long for many years. In Pagan period, the Rājakumāra inscription took the life span of the Buddha's Teaching when the Buddha had gone on for 1628 years. Therefore their inscriptions used the life span of the Buddha's Teachings, King Badon from Kongbaung period mentioned the investigation of the 5000 years of the life span of the Buddha's Teachings in his bell inscription. In Many places there are scattered notes on the various eras which have been adopted at different times in Myanmar but a compendious list of the 5000-Religious Era which is found on old inscriptions have been never come across before.

The term *Sāsanā*

The term *Sāsanā* means the Teachings of the Buddha as well as instructions. The expression "to instruct" implies to admonish and to guide. One admonishes a person to keep away from doing what is not proper to do, as well as to arouse him to do what is beneficial to do. According to the pali canons, there are three *Sāsanā* in Buddhist community:

Pariyatti Sāsanā – The doctrinal teaching;

Paṭipatti Sāsanā – The practical teaching

Paṭiveda Sāsanā – penetrative teaching into the Four Noble Truths

They were *Purha*-the Lord, *Trya*, the law and Sangha, the Order and *Sāsanā* the Religious of the Lord, should last for 5000 years. But to a man like Lord *Cakukri*. Much advanced in thinking than common, the life span of the Religion would equal that of the earth itself Princess *Acawr Wan* also expected that it might stand for a period of One hundred *Asankheyya* (10,000,000 [20]). Even today in Myanmar, with the exception of a few, people believe that Myanmar people of the Religion world , just as his modern counterpart, blindly believe that the Religion would last for only 5000 years and that it was his duty to support it to the end. To fulfill these duties meant working for one's own salvation. The Religion taught him that nothing in this world is permanent

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and that even though one accumulates wealth in this lifetime. One cannot buy longevity and when he dies he leaves everything behind. Thus to give away one's own property in Charity in an unlimited and not to be quelled menace; if possible, was one of the means of acquiring merit contributing to the final attainment of Nirvana."

The ideas traditionally grasped in 5000- Religious-Era may be classified into three texts fundamentally.

The table of 5000 Religious Era-Concept

No	***Cūlavagga Bhikkhunikhandhaka Aṭṭhakathā***	**Pātheyya *Aṭṭhakathā Sagāthāvag gasaṁyutta Aṭṭhakathā***	***Anguttaraṭṭhakathā Samohavinodanī Aṭṭhakathā***
1	Epoch of *Patisaṁbhidāmagga-Arahat* 1000 years	Epoch of *Patisaṁbhidāmagga-*Arahat1000 years	Epoch of *Patisaṁbhidāmagga-*Arahat 1000 years
2	Epoch of *Sukkhavipassakara* 1000 years	Epoch of *Chaḷābhiññā-Arahat* 1000 years	Epoch of *Chaḷābhiññā Arahat* - 1000 years
3	Epoch of Non-returner (*Anāgāmi*)-1000 years	Epoch of *Tevijjaka* Arahat- 1000 years	Epoch of *Tevijjaka Arahat*- 1000 years
4	Epoch of Once-Returner (*Sakadāgāmi*)-1000 years	Epoch of *Sukkhavipassakara Arahat*- 1000 years	Epoch of *Sukkhavipassakara* 1000 years
5	Epoch of Stream-Winner (*Sotapanna*)- 1000 years	Epoch of *Pātimokkhasaṁvara Arahat*- 1000 years	Epoch of Non-returner, Once-Returner Sotapanna-1000years

The concept based upon sources such as stone inscriptions available in Five Volume of U Nyein Maung's Ancient Myanmar Inscriptions and on the Pāli canon related to Religious years.

According to U Nyein Maung's Ancient Myanmar Inscriptions there were demarcated with each of 50 years to do research the wave of 5000- Religious years- Concept.

The subject of my paper will be on the 5000- Religious years- Concept from 11th Century A.D to 19th Century A.D. During those years the role play by a number of kings involved in 5000- Religious years Concept.

This paper view encounters with 5000- Religious years-Concept and ancient Myanmar Kings during from 11th Century A.D to 19th Century A.D.

In my effort to find out 5000- Religious year- Concept of ancient Myanmar

However, the 5000- Religious Era- Concept presented here cannot be regarded as a full and complete picture and if anything is left behind it should be added by scholars.

Why ancient people handed down the usage of 5000 years religious years? This is a problem yet unsolved among learned circles. Based upon the primary sources of ancient stone inscriptions as some materials compiled by U Nyein Maung I wish to propose my personal view concerning this problem. In the U Nyein Maung's Ancient Myanmar Inscriptions 1 to 5 volumes, there is described the following syntax: ***Sāsanā* 5000 religious year** in the ancient Myanmar Inscription.

A comparatively important problem of 5000 years Religious Era, the problem of the belief, is involved in this ancient inscription records. Buddhism during the period of it initiation may be considered, in many respects, as a sort of resistance or revolution against Brahmanism, the principal religion that occupied the position of predomination at the time. It was but natural that it should have protected with determination of the belief of using 5000 years Religious Era from the other religious' dominants.

In spite of the fact that during the14th centuries AD., the development of the usage of 5000 years religious Era has teached its zenith, and if used, it would relived and halved from anxiety of Civil wars.

At the Journal of Royal Asiatic Society of Great Britain and Ireland is an interesting controversy on "The revised Buddhist era in Burma," carried on between Dr. Fleet and Mr. Blagden The thesis laid down by Dr. Fleet and questioned by Mr. Blagden is this: That the reckoning with the initial point in B.C 544 was devised in Ceylon, was put together in its complete form just after A.D. 1165, and was carried to Burma in the decade A.D. 1170-80. [46].

At the Indian Antiquary[47], Mr. Taw Sein Ko had discussed the Burmese eras and the mode of reckoning them. There are there eras, namely, the Religious Era (the Era of Religion), which began in 544 B.C; the Śaka Era which began in 638 A.D.: and the Chinese Era was established in its own second year, after wiping out 622 (544+78= do-do-rasa) years of the Religious Era; and the Chinese Era was established after wiping out 560 (Kha-cha-pañcha) years of the Śaka Era.

There appears to be strong evidence to show that the Religious Era or the Nibbāna Era, which began in 544 B.C., was known to the Myanmar people long before the 12th century A.D. When they adopted the *Śaka* as well as the Chinese Era, the year was reckoned in its equivalent of *Anno Buddhae*. Further, at the *Kalyanī* Inscriptions[48], precise dates are given of three principal events: *Anno Buddhae* 1601, *Sakkarāj* 419= *Anuruddha* or *Anawrahta* conquered Thaton. *Anno Buddhae* 1708, *Sakkarāj* 526= Siri-Sanghabodhi-Parakkamabāhu King of Ceylon, reformed Buddhism. *Anno Buddhae* 1714, *Sakkarāj* 532=*Maha-thera Uttarājīva* set out for Ceylon.

In order to convert a year of Anno *Buddhae* into a year of the Christian Era, we have to deduct 544 from the former; and in order to turn a year of *Sakkarāj* into a year of the Christian era, we have to add 638 to the former. It will thus be seen that, in Myanmar, it is customary, in all important documents, to record dates in Anno *Buddhae* as well as in *Sakkarāj*, the one acting as a salutary check on the other.

The *Rājakumāra* Inscription, which is referred to by the learned controversialists, is the first lithic record yet found in Myanmar, which is inscribed in the Myanmar Character. It has four faces, each of which is engraved in a different language, namely, Myanmar, Mon, Pāli, and *Pyu* language. Mr. Blagden notes that there are two copies of quadrilingual epigraph, and Dr. Fleet doubts it being a contemporary record because it states only the year of the accession of King *Kyanzittha*, namely 1628 *Anno Buddhae* (1084-A.D.), and omits the month and day of the erection of the Pagoda. As regards Mr. Blagden's query, the following account will show why unlike the majority of the other lithic records, two copies of the same inscription were made.

The *Rājakumāra* Inscriptions only gives the year of the Religious Era, because it records a past fact, namely, the year of accession of King *Kyanzittha*, and because the Era was common to the four communities, using the four scripts of the epigraph. It is not customary for the Myanamrs to incise on stones, which are not contemporary records, or to make forgeries of lithic records for the simple reason that the epigraphs declare the relinquishment of property and its dedication to a sacred purpose, and not its acquisition for a temporal or utilitarian purpose.

It now remains to consider the great historical value attached to *Rājakumāra* Inscription and how it may be utilized in Concept of 5000 Religious year expressed by a number of Stone inscriptions from 1067 A.D to 1567 A.D.

[46] The Journal of the Royal Asiatic Society of Great Britain and Ireland , the April number pp-474-481. The July number , pp-850-860.
[47] The Indian Antiquary, Volume- XXIII, 1894. Pp-256-257.
[48] The Kalyanī Inscriptions, (Rangoon edition) pp-49-50.

The List of 5000 Religious Era in Inscriptions

Volume-I list

1. The couple of Mahāsenāpati Anantasūriya inscription[49] (1223A.D)
2. Maṅkrī Asaṅkhayā inscription[50] ` (1232-A.D)
3. Jeyyasvat Pagoda Inscription[51] (1235-A.D)
4. Mahākassapa Kyaung Inscription[52] (1237-A.D)
5. Manūhā Inscription [53] (1067-A.D)
6. Toṅkhaṁ and jaysabaṅ Inscription[54] (1081-A.D)
7. Amat Samanbhatrā Inscription[55] (1082-A.D)
8. Matimāthera Inscription[56] (1105-A.D)
9. Cūḷāmaṇi pagoda Inscription[57] (1183-A.D)
10. Cākro Pagoda Inscription[58] (1192-A.D)
11. Maṅsattā Inscription[59] (1193-A.D)
12. Amatkrīḥ Supharit Inscription[60] (1194 A.D)
13. Cakrobhurāḥ lha Inscription[61] (1195 A.D)
14. Krvapulu and Kvayvkrīḥkhyattarā Inscription[62] (1200 A.D)
15. RhveTvaṅ oṅḥ Pagoda Inscription[63] (1200 A.D)
16. Mandalay palace No-(28) Inscription[64] (1256 A.D)

Volume-II list

1. Maṅmat Nagāpor miphāḥ Inscription[65] (1239 A.D)
2. ňňoṅ raṅ krī Inscription[66] (1242 A.D)
3. Samantakuṁthaṁ Inscription[67] (1242 AD)
4. Calin maṅAnantasū Inscription[68] (1243 A.D)

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[49] U Nyein Maung, Vol-I, p-154. Stanza-29. သာသနာအနှစ် ၅၀၀၀ မွေ့ာသြင်တည်ရစ်စိမ်အသော ငှာ အစီအရာင် များစွာ'။
[50] Ibid, p-229. Stanza 11-12. 'ဤသို့ ဘုရားသာ(သနာ) ၅၀၀၀ ပွယ်တည်အောင်လှူသော'။
[51] Ibid, p-268. Stanza 14. ဤငါလှူသောလဲကာ။ သာသနာ ၅၀၀၀ လျှင် တည်ရစ်စိယ်သတေ. . '။
[52] Ibid, p-309. Stanza-9. . . ဖွစိမ့်သောငှါ၊ သာသနာငါးထောင်တည်အောင်မပျက်ရေစက်ချ. . . '။
[53] Ibid, p-323. Stanza-11-14. သာသနာ ငါးခောင်မကုန်သရွေ၊ သဃီကဖြစ်စိမ့်သောင့်ါ'။
[54] Ibid, p-324. Stanza-1. ဗုဒ္ဓသာသနာ ၁၆၂၅ သကရစ် ၄၄၃ ခုပွသိုဝ်လဆန် ၁၅'။
[55] Ibid, p-325. Stanza-4. သတ္တာပေါက်၍ သာသနာငါထောင်ကုန်သြောင်. . . '။
Stanza-8. . . . သာသနာငါထောင်ကုန်သြောင်တာရှည်တည်စိုပ်သောင့်ါ. . . '.
Stanza-13-14. သာသနာငါထောင်တေည်စိုမ်သောင့်ါ. . . . . '။
[56] Ibid, p-327. Stanza-15. . . သင်ပုတ်ဝတ်ကိုဝ်၊ သာသနာ ငါထောင်တည်စိမ်သောင့်ါ. . . '။
[57] Ibid, p-347. Stanza-12 . . . ရေစင်တ်လွှသည်ကာ သာသနာ ၅၀၀၀ တေရစ်စိမ်သောင့်ါ'။.
[58] U Nyein Maung, **Myanmar Inscription**, Vol-I, Ibid, p-355. Stanza-23. . . . ကျိန်စာတိုက်စေ၏ သာသနာငါထောင်ကို(ဝ်)ငါရည်ရှယ်. . . '။
[59] Ibid, p-359. Stanza-18. မင်းမျာတိုဝ်ကာ၊ သာသနာ ၅ ထောင်တိုင် သြင်ခိပင်သမသ္မတ် တိုဝ်ကာ . . . '။
[60] Ibid, p-360. Stanza-6. . . . သာသ ၅၀၀၀ တည်စိမ်သောင့်ါ။ သင်ပု(တ်ဝတ်)။
[61] Ibid, p-363. Stanza-2. မွတ်မွန်ကိုဝ်၊ သာသနာ ငါထောင်ရည်ရှယ် ပြေည်ဝသင်နှင်'။
[62] Ibid, p-367. Stanza-7-8. ရှေမ္ဗိယ်သိခင်ဖွစ်ကျင်သောစည်သူမင်ကြီးကိုဝ်ပန်ရှယ် သာသနာ ၅ (၀၀၀) တည်စိမ့် သောင့်ါ-ပိတကတ်ကူကြွောင်
[63] Ibid, p-371. Stanza-4-5. 'ပရိနိဗ္ဗာန်လွန်ခဲ့ပြီးသော ဟိသ သာသနာတထောင်ငါရျာ ယှစ်ဆဲဖွစ်သော အခါနှိုက်။.
[64] Ibid, p-371. (ထိုကျောက်စာရှင်မှာ သီရိတိရိပဝရတိတ္လျာမဓမ္မရာဇာကို ညွှန်းထားသည့်အတွက် ထီးလိုင်သျှင် နန်းတက်သက္ကရာဇ်မှာ ၄၄၆-ခုနှစ်ဖြစ်၍ ဤကျောက်စာပါ သာသနာနှစ်အမည်မှာ စဉ်းစားဆင်ခြင်စရာ ဖြစ်ပါသည်။)
[65] U Nyein Maung, Myanmar Inscription Vol-II, p-3. Stanza-4- ကူပုရှာ ပွဲဇော်စိမ်သောငါ ရတနာ ၃ပါသောအာရည်ရှယ်လှူသောလဲ။.
[66] Ibid , p-35. Stanza-4- ကူပုရှာ ပွဲဇော်စိမ်သောငါရတနာ ၃ပါသောအာရည်ရှယ်လှူသောလဲ။
[67] Ibid , p-64. Stanza-7- ပုရှာတြျာသယ်ရတနာ ၃ပါသောကိုဝ် သာသနာ ၅၀၀၀အဆုံရောက်သြင် တည်စိမ်လျှင်ရကာ။
[68] Ibid , p-78. Stanza-7-8- သာသနာ ၅၀၀၀ မကုန်သရှယ်တည်ရစ်စိမ်၊ ဟု"

5.Kyasvā maṅkrī Inscription[69] (1244 A.D)
6. Khun thaṅ caso sūtui……. Inscription[70] (1249 A.D)
7. sakrvay ngavaṁ phlaethaṅ Inscription[71] (1249 A.D)
8. Phunsaňň ma caso…….. Inscription[72] (1251 A.D)

Vol- III list

1. Soeminkyarsavut Inscription[73] (1262 A.D)
2. Tarupprah maṅ Inscription[74] (1270-AD)
3. Thikhaṅ Rājasū and Phvāhco Inscription[75] (1291A.D)
4. Thikhaṅ Rājasū and Phvāhco Inscription[76] (1291A.D)
5. Thikhaṅ Rājasū and Phvāhco Inscription[77] (1291A.D)
6. Thikhaṅ Rājasū and Phvāhco Inscription[78] (1291A.D)
7. Amatgyi Indrapaccayah Inscription[79] (1293 A.D)
8. Indrapaccayah Pagoda Inscription[80] (1296 AD)
9. ngareksaṅlaṅmayah Inscription[81] (1296 AD)
10. cāsaṅgubhurāḥ anih rhi Inscription[82] (1299-AD)
11. mibhurāco Inscription[83] (1299- AD)
12. amatkrḥ sīrirājāsaṅkraṅ Inscription[84] (1299- AD)
13. asaṅkhayā kyoṅh Inscription[85] (1303- AD)
14. cattalaṅkāpate Inscription[86] (1304- AD)

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[69] U Nyein Maung, **Ancient Myanmar Inscription**, Vol-II. P-78, Stanza-4 .. တွင်မင်တောင်မှ သာသနာ ခိုလှုံစိမ်သောဌါကျောင်စရပ်ပျုချင်"

[70] Ibid, p-148, Stanza-2. ကဆုန်လသွေ့ သာသနာ ၅၀၀၀ တည်စိမ်ဟု။

[71] Ibid, p=157, Stanza-2. သာသနာ ၅၀၀၀ နှီက်တည်စိမ်သောဌာ သုကြွယ် ငဝံဖွည်သင်လျှသော

[72] Ibid, p-165, Stanza-16 သာသနာ ၅၀၀၀ နှီက်တည်စိမ်သောဌာ

[73] U Nyein Maung, **Ancient Myanmar Inscription**, Vol-III. p-9.

[74] Ibid, p-165, Stanza-5-6. . . . သာသနာ ၅၀၀၀ မျောက်သြောင်နောင်နှီက် အရှည်တည်စိမ့် သောဌါ . . . . . '။

[75] Ibid, p-147, Stanza-3. . . . သာသနာ ၅၀၀၀ လျှင်တည်စိယ်ချွင်ရုယ်လှျသောမျိယ်က'။
Ibid, p-148, Stanza-21 . . . ရတနာသုံးပါးကိုဝ်၊ သာသနာ ၅၀၀၀လျှင် အခါခပ်သိမ်းတည်ရစ်'။

[76] Ibid, p-151, Stanza-26-27, စာ-၁၅၁။ ကြောင်း ၂၆-၂၇/သာသနာ ၅၀၀၀ လျှင် တည်ရစ်စိမ်ဟု ဤငါလှျသောကောင်းမှုကို။

[77] Ibid, p-153, Stanza-3 'ရတနာ ၃ပါး သာသနာ ၅၀၀၀ လျှင် တည်စိမ်ချွင်ရုယ်။
Ibid, p-154, Stanza-19. စာ-၁၅၄။ ကြောင်း ၁၉/'. . . ရတနာ ၃ပါး သာသနာ ၅၀၀၀ အခါခပ်သိလျှင် တည်ရစ်စိယ်'။

[78] Ibid, p-156, Stanza-5. . . သာသနာ ၅၀၀၀ ရောက်သြောင် တည်စိမ်သဌါ}.

[79] Ibid, p-167, Stanza-11-12. သာသနာ ၅၀၀၀ ရောင်သြောင်တည်စိမ်သဌါ'။

[80] Ibid, p-175, Stanza-18. 'ဗုရ္ဓာသာသနာတည်သရှယ်သိခင်သင်ဃာပစ္စည်းလိယ်ပါ'။

[81] Ibid, p-184, Stanza-18. '. . . လေးသောင်စောင်သောနတ်၊ သာသနာငါထောင်စောင်သောနတ် ရစပါစေသော။

[82] Ibid, p-194, Stanza-5. . . အခါခပ်သိမ်းလျှင် သာသနာတည်တံသောကြောင့်'။

[83] Ibid, p-197, Stanza-1. 'ဗုရ္ဓာသိခင်သာသနာ ၁၈၄၃ ခုသောအခါ . . . . . '။
Ibid, p-198, Stanza-7.ကြောင်း ၇/'ဗုရ္ဓာသွိင်သာသနာအဆုံရောက်သြင်တည်စိမ်သောဌါ. . . '။

[84] Ibid, p-198, Stanza-1. ပုရ္ဓာသွိင်သာသနာ ၁၈၃၇ နှစ်သောအခါနှီက်. . . '။
Ibid,p-201,Stanza-41.အကြင်မျှလောက်ပုရ္ဓာသွိင်သာသနာတည်၏။ ထိုသာသနာတည်သရှယ်ကာ. '။

[85] Ibid,p-214,Stanza-2. . . . ဗုရ္ဓာသိခင်သာသနာကိုဝ်အခါခပ်သိမ်တေည်စိမ်သနှီက်'။
Ibid,p-215,Stanza-9. . . . . သာသနာ ၅၀၀၀ လျှင်တေည်စိမ်သောဌါလှျသော'။

[86] Ibid,p-218-9,Stanza-3-4. .မွတ်စွာသ ပုရ္ဓာသိခင်သာသနာနှီက် သတ္ထာကြည်ညိုဝ်စွာရုယ် သာသနာ ၅၀၀၀ တည်စိမ်သောဌာ'။

15. maṅhmatsupharac..caso suto Inscription[87] (1305- AD)
16. maṅsiṅkasū Inscription[88] (1308- AD)
17. cicsukrīhbhuraṅkapui Inscription[89] (1308 AD)
18. miphuraḥco Inscription[90] (1312 AD)
19. paṅḥyarhecaňňhkhuṁbhurah Inscription[91] (1312 AD)
20. maṅmatkrīh rācakakroṅ Inscription[92] (1315 AD)
21. mahākassapa kroṅ Inscription[93] (1315 AD)
22. rhaṅ mahākassapakyoṅ Inscription[94] (1315 AD)
23. Anantasūmoṅnhaṁkyoṅ Inscription[95] (1315 AD)
24. maṅasaṅkhayākyī Inscription[96] (1319 AD)
25. anantasubhurahkyoṅ Inscription[97] (1319 AD)
26. ratanācetī Inscription[98] (1320 AD)
27. amatkrīh arimat Inscription[99] (1324 AD)
28. ngajvanbhurāh Inscription[100] (1325 AD)
29. rhvekrak yak bhurāh Inscription[101] (1320 AD)
30. uccanāmaṅkrīh Inscription[102] (1330 AD)
31. Ratanāpuṁ amiphurāh Inscription[103] (1323 AD)
32. Uccanāmaṅkrīh Inscription[104] (1332 AD)
33. maṅhmat thaṅkapicaňhkyoṅh Inscription[105] (1332 AD)
34. maṅhmatkrīhsmankhyattarākroṅ Inscription[106] (1334 AD)
35. mathocetī Inscription[107] (1335 AD)
36. sariykūbhurāh Inscription[108] (1336 AD)

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[87] Ibid,p-225,Stanza-12, သည်ကာ သာသနာငါထောင်နှိုက်လျှင် တည်သည်ဖွစ်စေသတေ. . . ’။

[88] Ibid,p-240,Stanza-4. ‘. . . သော။ သာသနာ ၅၀၀၀။ တည်စီသော’။

[89] Ibid,p-243,Stanza-3. သာသနာငါထောင်တေည်စိမ်သောဌ်’။

[90] Ibid,p-247,Stanza-5. ယ်၊ နိယ်ရပန်လွန်သောအနှစ် ၁၈၅၄ နှစ်သောအခါနှိုက်။

[91] Ibid,p-254,Stanza-6.ကံရိုဆိုက် သာသနာ ၅၀၀၀ တည်စေသတေဟုရွှေကရာနှင်ရေစင်တော်
သွန်ရွှေယ်။

[92] Ibid,p-260,Stanza-8.]နှိုက် သာသနာ ၅၀၀၀ တည်ရစ်စိမ်ဟု. . . ’။

[93] . Ibid,p-262,Stanza-13. ‘. . . ဤသိုဝ်သာသနာငါထောင်. . . ’။

[94] U Nyein Maung, **Ancient Myanmar Inscription,** Vol-III. p-265. Stanza-10.
၁၀/. . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်။
Ibid, p-267. Stanza-38. ... ၃ ပါကိုဝ် သာသနာ ၅၀၀၀ တည်စိမ်သောဌာ။

[95] Ibid, p-276. Stanza-4-5.. . . . ကောင်းစွာအခါခပ်သိမ်လျှင်သာသနာတည်အံ့သောကြောင့်။
Ibid, p-277. Stanza-10. . . . အခါခပ်သိမ်းလျှင် သာသနာတည်လိုဝ်သောကြောင့်’။

[96] Ibid, p-282. Stanza-2. . . . ဇိနသယာပဥ္စဝဿဟဿနိသာပါလေတု။
Ibid, p-282. Stanza-17. ‘. . . အလျှကိုဝ်သာသနာ ၅၀၀၀ စိယ်ဩြင်လျှင် တည်စိမ်ဟု. . . ’။

[97] Ibid, p-290. Stanza-2 အနှစ် ၅၀၀၀ တည်စိမ်သောဌ် သေနာပတိအမတ်ကြီး၊ သာသဏာအနှစ် ၅၀၀၀ တည်စိမ် သောဌ်။.

[98] Ibid, p-294. Stanza-20-21. ငတောင်သာသနာ သုံးထောင်တရျာလိယ်ဆယ်လိယ်နှစ် (တွင်မင်နှစ်မ) အဖွစ်အပန် တလဲလဲ။

[99] Ibid, p-301. Stanza-3. ..ကြောင်တည်ရှယ်သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်။.

[100] Ibid, p-304. Stanza-20. ..(ပုရှာသွိင်) သာသနာ ၅၀၀၀ လျှင် တည်စိမ်ရွှင်ရှယ်။

[101] Ibid, p-309. Stanza-25. . . . . သာသနာမကုန်မချင်တည်စိယ်ရွှင်ရှယ်. . . ။

[102] Ibid, p-319. Stanza-2-3. စေတီအရွှင် ၇၀ ပွျလတ်ရှယ်သာသနာ ၅(၀၀၀)တည်စိမ်သောဌ်လှျသောမ္လိယ် အရပ် ကား။

[103] Ibid, p-327. Stanza-8. ‘. . . . . သာသနာ ၅၀၀၀လျှင် တည်စိမ်ဟူရှယ်. . . ’။

[104] Ibid, p-330. Stanza-2-3. စေတီအရွှင် ၆၁ တောင်ပွျရှယ်၊ သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်လှျပေသ်ိ မ္လိအရပ် ကား. . . ။

[105] Ibid, p-331. Stanza-10. . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်ကုလာကျွောင်။

[106] Ibid, p-347. Stanza-2-3. သာသနာငါထောင်တည်စိမ်သောဌသင်တေ. . . ။

[107] Ibid, p-352. Stanza-3. . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်လှျသောမ္လိယ်။

[108] Ibid, p-357. Stanza-2. မြင်ခုန်တိုင်အရပ်နှိုက် သရိယ်ကူပျက်ခသည်ကိုဝ်အရွှ(င် ၆၁)တာင်သော
စေတီပွျရှယ်

37. mahāvihārakroṅhto Inscription[109] (1337 AD)

Volume IV list

1. toṅlvàcharàňňvanso Inscription[110]	(1338 AD)
2. maṅhsatuihsīhasūra Inscription[111]	(1339 AD)
3. uccanāmaṅkrīh Inscription[112]	(1340 AD)
4. athinhsāhpaccapatiya Inscription[113]	(1340 AD)
5. sakrhaňňsaṅmaňňsosūtui Inscription[114]	(1341 AD)
6. sak rhaňňsaṅmaňňsosūtui Inscription[115]	(1341 AD)
7. abhayakrīhkroṅh Inscription[116]	(1342 AD)
8. satuihsaṅkasūkroṅ Inscription[117]	(1343- AD)
9. samantobhurāh Inscription[118]	(1343 AD)
10. Mandalay-nantvaṅruṁ Inscription[119]	(1334 AD)
11. ratanākuṁkà Inscription[120]	(1344 AD)
12. parimmasūkrīkoṅramsaṅmoṅnham Inscription[121]	(1344 AD)
13. mahāvihārakroṅto Inscription[122]	(1345 AD)
14. kunantaric Inscription[123]	(1345 AD)
15. cuihmaṅhkuiytokrī Inscription[124]	(1346 AD)

. Stanza-3. သာသနာ ၅၀၀၀ တည်စိမ်သောင့်ါလှျုသော့မွိယ်အရပ်ကာ. . . ။

[109] Ibid, p-364. Stanza-3. . . ဖုရှာသ္ခိင်သာသနာ ၅၀၀၀ ကိုဝ်တည်

Ibid, p-364. Stanza-4. သောင့်ါ။ ကောင်မှုတော်မူလိုဝ်ရကာ။ဝ။

Ibid, p-364. Stanza-11. ဖုရှာ့မွတ်စွာသာသ္ခင်နှင်သောသကြာပင်လျှင်။ ပျက်ခသြီသောဖုရှာသ္ခိင် သာသ္ခာကိုဝ်။

[110] U Nyein Maung, Ancient Myanmar Inscription, Vol-IV, p-6. ... ကွံ။ လက်ဘက်နှင့်အကွ လှျုပြန်၏ သာသနာငါထောင်စေသြင်အရှည်တည်စိမ်.

Stanza-7. သောင့်ါ အာထုတ်ချင်အမြဲပြု၏။

[111] Ibid, p-9. Stanza-16. . . . အသက်ရှည်စွာ့ဖွစ်စေသတေ၊ ဘုရာသိခင်၏သာသနာနှိုက်အလှျု ပေရသိတ။

[112] Ibid, p-13. Stanza-2. သာသနာ ၅၀၀၀ တည်စိမ်သောင့်ါ အိမ်နိမ်ကျောင်ကိုဝ်လှျုတဝ်။

Ibid, p-13. Stanza-10. ထိ အချင်အတောင် ၃၀ တည်လစ်အ်၊ သာသနာ ၅၀၀၀ တည်စိမ်သောင့်ါ။

Ibid, p-14. Back. Stanza-2. ၁/'ဤသိုဝ်သာသနာ ငါထောင်တည်စိမ်သောင့်ါလှျုသောမြေကိုဝ်။

[113] Ibid, p-18. Stanza-5.ပ္လုရှယ်အစန်မပြတ် သာသနာနှိုက် တည်စိမ်ဟု။

[114] Ibid, p-32. Stanza-4. . . . . ကူကြိုလေအခင် ၂၀ပ္လုရှယ်သာသနာငါခေါင်စာ

Ibid, p-32. Stanza-5. ည်စိမ်သောင့်ါ၊ ကျွန်ဖင်အသည် ငြိုစ်သံ်ရောင်သော။

Ibid, p-32. Stanza-13. ဆန်ကြဲရေ၏၊ သာသနာငါခေါင်. . . . . ။

[115] Ibid, p-35. Stanza-26. . . . . . ။ဝ။ ဖုရာသာသနာ ၅၀၀၀ တည်စိမ်သောင့်ါ ငဲရှယ်လှျုသော'။

[116] Ibid, p-44-45. Stanza-4. ဓမ္မရာဇာက္လစွာမင်းကြီးသည် ရခယ်စွာသော သဗ္ဗညုဖုရာဆုကိုဝ် လို့ချင်သောကြောင် သာသနာ ၅၀၀၀ တည်စိမ်သောင့်ါ။

Ibid, p-44-45. Stanza-7. . . . . . သာသနာ ၅၀၀၀ တည်စေလိုဝ်သောင့်ါ လှျု၏. . . . . . . '။

Ibid, p-44-45. Stanza-19. /. . . . . ဤလူလက်ထက်ချေ်သာဟူသည် အတည်ဟိရှယ် သာသနာကိုဝ် ခီပင်ရသကိုဝ့်ဖွစ်စိ။

[117]. Ibid, p-49. Stanza-9. သာသနာ ၅၀၀၀ တည်စိမ်သောင့်ါ၊ စာသင်နှင်အကွသောထေရကာ ပစ္စည်း ၄ပါ ဖွစ်စိ။

[118] Ibid, p-50. Stanza-11. '. . . . . သာသနာငါထောင်ကုန်သြင်တည်စိမ်သောင့်ါမိ ၂ ဖုရှာနှိုက်။

[119] Ibid, p-54. Stanza-3. ရိုတ်တင်ကိုဝ် သာသနာ ၅၀၀၀ တေည်စိမ်သောင့်ါ. . . ။.

[120] Ibid, p-55. Stanza-2-3. . . . သာသနာ ၅၀၀၀ တွင် အသြယ်တည်စိမ်သောင့်ါ။

[121] Ibid, p-56-7. Stanza-3.ဟံသုဘံ၊ မုနိန္ဒဝရနမ္ဘောဇဂမ္ဘဇာတဏိ အစ္စယ ပဥ္စသသသဟဿာနိသာပါလေတု ခုဝံ'။

Ibid, p-55. Stanza-22. ....ဤသိုင်က္လရှယ်ဓမ္မလဒ္ဓရသ္လမွိယ်ကိုဝ် သာသနာ ၅၀၀၀ အရှည်တေည်စိမ်သောင့်ါ'

[122] Ibid, p-61.. Stanza-3. သာမောစွာသ ကြံတူအနိမ်မည်သပြည်နှိုက်။ ဖုရာသ္ခိင်သသ္ခာ ၅၀၀၀ ကိုဝ် တည်စိပ်သောင့်ါ။

Ibid, p-61.. Stanza-11. '. . . ဖုရှာ့မွတ်စွာ သာသ္ခာနှင်သောသကြာမင်လျှင်။ ပျက်ခပြီသော ဖုရှာသ္ခိင် သသ္ခာကိုဝ် မိ၂နှင့်ထပ်တူ ပ္လုစိယ် လိုရကာ. . . ။

[123] Ibid, p-62.. Stanza-3-4. ပုရှာသ္ခိင်သာသနာတွင် သာသနာ ၅၀၀၀ ကုန် သြာင်တည်စိမ်ဟူ၍ သူ့မွတ် တကာ ခီမ့်ရာ ဖွစ်သော့မွိယ်အရ။

16. sukrvaykrīh auimcoṅsaṅmoṅnham Inscription[125] (1345 AD)
17. bhurāhhnaṅkroṅh āh mre lhūso Inscription[126] (1346 AD)
18. rhaṅpaṅcvay Inscription[127] (1347 AD)
19. chutoṅprṅňňbhurāh Inscription[128] (1344 AD)
20. paṅhyarhecaňň khuṁbhurāh Inscription[129] (1350 AD)
21. cacsūkrīhlokanat Inscription[130] (1351 AD)
22. aṅhpàbhurāh nhaṅ nagāhruṁbhurāh Inscription[131] (1352 AD)
23. chaṅphrūsakhaṅmaṅh Inscription[132] (1353 AD)
24. ngaplāc lha Inscription[133] (1356 AD)
25. Mandalay mriu nan tvaṅh no-526 Inscription[134] (1356 AD)
26. maṅhmahā nhaṅ sīrimahā Inscription[135] (1356 AD)
27. aiun ṅṅuimi, aiun ṅṅupha Inscription[136] (1357 AD)
28. cattalaṅkāsū Inscription[137] (1359 AD)
29. paṅhya ummākroṅ Inscription[138] (1360 AD)
30. chaṅphrūsyhaṅ maṅ Inscription[139] (1363 AD)
31. saktorhaňň bhurāh Inscription[140] (1363 AD)
32. maṅhmahā sak thit moṅ nhaṁ Inscription[141] (1367 AD)
33. ciuh maṅhkuitokrīhkyoṅh Inscription[142] (1341-46 AD)
34. acokrīhmiphurāhkyoṅ Inscription[143] (1364 AD)
35. maṅhmahā sakthit moṅ nhaṁ Inscription[144] (1365 AD)
36. rājasaṅkraṁkyoṅh Inscription[145] (1365 AD)
37. thūpāruṁ phurāh Inscription (37/A)[146] (1375 AD)

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[124] Ibid, p-68.. Stanza-4. ..သာသနာ ၅၀၀၀ တည်စိပ်သောဌ် ဇေယျပူရ။
[125] Ibid, p-65.. Stanza-2. ရက်၅နိယ်သာသနာ ၅၀၀၀ သောတွင်တေည်စိပ်သော။
[126] Ibid, p-71.. Stanza-1-2. . . . . အက္ခရာ ကေရိတေမဟံ။ ပညွ်ဝဿသဟသာနိ၊ သာသနဿ ပတိဋ္ဌတု။
Ibid, p-71.. Stanza-13. '. . . . . မှန်သန် ၅ ပဲကိုဝ်၊ သာသနာ ၅၀၀၀တွင် တေည်စိသောဌ်။
Ibid, p-71.. Stanza-17. . . . . သာသနာ (၅၀၀၀ ကိုဝ်) စောင် (သည်နတ်ကိုဝ်အကွန်သက်တ)။
[127] Ibid, p-75.. Stanza-1. . . . . တမဖုရာသာသနာ ၅၀၀၀ (တည်ပါ)စိမ်သောဌ် ငါ (ပွ၏)ဤ
[128] Ibid, p-77.. Stanza-1. . . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်။
[129] Ibid, p-83.. Stanza-3. 'ဖွစ်ထသော အဖမင်ကြီအရိုက်တ်ကိုဝ် သာသနာ ၅၀၀၀ တည်စိမ်သောဌ် လျူတ်မူသော'။
[130] Ibid, p-86.. Stanza-2. '. . . ကောတမဖုရာသွိင်၏ သာသနာ ၅၀၀၀ မကုန်သရှယ်ရပွေ (တောင်ဦ)ဖုရာ။
[131] Ibid, p-94.. Stanza-23. . . . သာသနာငါထောင်မကုန်သရှယ်လျူကောင်ဖွယ်ရုယ်'။
[132] Ibid, p-97.. Stanza-21. သာသနာငါထောင်၊ တည်စိမ်သောဌ်. . . . '။
[133] Ibid, p-107.. Stanza-4. ၏ အလိုဝ်ဌ် သာသနာ ၅၀၀၀ တ ည်စေချင်ရုယ်'။
[134] Ibid, p-108.. Stanza-5. . /'ရှယ်သာသနာငါထောင်တေည်ရစ်. . . . . '။
[135] Ibid, p-109.. Stanza-2-3. 'ဘ. . . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ် မင်မဟာနှင်
သီရိမဟာက္ကိစ်စွာမင်ကြီက'။
[136] Ibid, p-111.. Stanza-2-3. . . . . ဘုရာ ကောတမသာသနာနှိုက် နိဗ္ဗာန်စေိစိပ် နတွေစေိစိမ် လူ၏စေိစိမ်။
[137] Ibid, p-117.. Stanza-11-12. . . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ် လျူသော မွေအရပ်ကာ မတောင်တ တောင်
အနောက်။
[138] Ibid, p-.119 Stanza-.15. . . . ဤဝတ္ထုကာ သာသနာအဆုပ်တိုင်ဩြင် ငါမိရင်၏ ကွောင်နှိုက် တည်စေသတေ။
Stanza- 18. 'သာသနာ ၅၀၀၀ . . . . '။
[139] Ibid, p-122.. Stanza-10. ... နိဗ္ဗာန်ဆုကိုဝ်လိုဝ်သောကြောင် သာသနာ ၅၀၀၀ တည်စိမ်သောဌ် မြင်ခုန်ဖြိုင်ခြိုန် တွင်။
[140] Ibid, p-135.. Stanza-20..' ငါထောင်. . . . . '။
[141] Ibid, p-139.. Stanza-5. သာသနာ ၅၀၀၀ (တည်စိ)မ်သောဌ်(ဟန်) ကွယ်မည်သော . . . . . နှိုက်'။
[142] Ibid, p-140.. Stanza-4. သာသနာ ၅၀၀၀ တည်စိမ်သောဌာ ဇေယျပူရမည်သော။
[143] Ibid, p-145.. Stanza-36. ဏာလေခသဒိသာ ထိရာဝါစာဇိနသဃံ ပညွ်ဝဿသဟဿာနိ သာပါ လေတုက္ကမံမဟီ။
[144] Ibid, p-149.. Stanza-5. 'သာသနာ၅၀၀၀တည်စိမ်သောဌ်ဟန်ကွယ်မည်သောမွေအရပ်နှိုက်. . . '။
[145] Ibid, p-151.. Stanza-5-6. . . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ် ကွောင်ပွ်ရှယ်လျူ
သလဲမွေအရပ်ကာ။

38. miphurāhkrīhconandā (face) Inscription[147] (1377 AD)
39. miphurāhkrīhconandā (back) Inscription[148] (1377 AD)
40. chutoṅpraňň phurāh Inscription[149] (1388 AD)
41. jaṁsīhbhurāh Inscription[150] (1389 AD)
42. maṅh ràkrīhkyoṅh Inscription[151] (1397 AD)
43. maṅhkrīhcvācokà Inscription[152] (1399 AD)
44. thvaṭṭaṅmār oṅ bhurāh Inscription[153] (1401 AD)
45. samantasūmoṅ nhaṁ Inscription[154] (1406 AD)
46. amatkrīhlakyāpharac Inscription[155] (1406 AD)
47. ratanācetī Inscription[156] (1423 AD)
48. muihnnhaṅh maṅhtarāh Inscription[157] (1423 AD)
49. amatkrīh mahā Inscription (Back)[158] (1432 AD)
50. paṅhtalà bhurāh Inscription[159] (1435 AD)

Volume V list[160]

1. kyoṅh āh mrelhūso Inscription[161] (1442AD)
2. chaṅkàcocaṁpakyoṅh Inscription[162] (1440 AD)
3. maṅhràkyocvā moṅ nhaṁ Inscription[163] (1441 AD)
4. taknvhà kyoṅh Inscription[164] (1442 AD)
5. mahāsīhasūra Inscription[165] (1446 AD)
6. paṅkrāhasaňň kyoṅh Inscription[166] (1446 AD)

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[146] Ibid, p-153.. Stanza-3-. . . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌ်။ မယ်တ်'။
Ibid, p-153.. Stanza-22. /'သာသနာ ၅၀၀၀ စောင်သောနတ် ဟိုဝ်သည်လေကောင်. . '။

[147] Ibid, p-168.. Stanza-1-2. ထီရာဝါစာ ဇိနိသယာ၊ ပညွဝဿသဟဿနိ၊ သာ ပါလေတု မဟီက္ကမံ. . . . . '။
Stanza- 22 . ကျောင်တ်ကိုဝ်သာသနာ ၅၀၀၀ တေစီသောဌ်. . . . . '။

[148] Ibid, p-170.. Stanza-15. သင်ပုဒ်ဝတ် သာသနာငါထောင် တိုင်အောင်လုပ်ကျွေစိမ် သောဌ်လျှတောဝ်မူ၏။ မရှက်ဇ။

[149] Ibid, p-186.. Stanza-21. ထိုဝ်ဧအ်မြိုဝ်လေ အကြင်မျလောက်ဖုရှာသွိင်သာသနာတည်၏။ ထိုသာသနာတည် ရှယ် ကာ. . . '။

[150] Ibid, p-191.. Stanza-19. '. . . . . အခါခပ်သွိမ်သသ္ဘာတည်သရုယ်'။

[151] Ibid, p-202.. Stanza-4-5. '. . . . . မင်ရယ်ကြီကျွောင်နှိုက် သာသနာ ငါထောင်တည်စိမ်သောဌ်။
ကုလာကျွေါင်ပျုရုယ် လျှသောမွေ့။

[152] Ibid, p-202.. Stanza-12. (မွ)နှ်လွန်ပြီသာသနာ ၅၀၀၀ တည်စိမ်ဖဌ်ရှေဘိုဝ်လောင်စဝ်တိုဝ သရိရဓတ်တ်အမျာ တိုဝ်'။

[153] Ibid, p-213.. Stanza-31. . . . . သာသနာ ၅၀၀၀ မကုန်မချင်အခါခပ်သိမ်တေည်စိမ်သောဌ် ငါဆိုဝ်၏ရှင်'။

[154] Ibid, p-218 .. Stanza-2-3. ....ည်ညိုဝ်စွာရုယ်သာသနာ ၅၀၀၀ တေည်စိမ်သောဌ် (အဝတ်လွဲ၏ရွှေကျောင်ပျ)၏. . '။

[155] Ibid, p-234.. Stanza-16-17. ' . . . . အကြင်မျလောက်ဖုရာသွိင်သာသနာတည်၏. . . . . '။

[156] Ibid, p-243.. Stanza-1-2.ကာလယုတ်ဟုသောအခါနှိုက်ပျက်ခယ်ပြီသော ဖုရာသိခင်သာသနာကိုဝ် တည်စိမ် သောဌ်. . . . . '။

[157] Ibid, p-256.. Stanza-22. . . . . သာသနာငါထောင်တည်စေလိုဝ်သောဌ် အဘယဒုတ္ထကာ မဏိမင်သည်၊ ရဟန်တာ
မျာနှင့်တကွ ခါမနာသော ရတ္တနာစာတီနှင်တူ. . . . . '။

[158] Ibid, p-264.. Stanza-9-10. သာသနာ၅၀၀၀ကုန်ဩာင်မကွာတည်(စိမ်ငေ)သဌ် ရေမွေ့ပသျင်. . . . . '။

[159] Ibid, p-265.. Stanza-2-3. ဖုရာမွတ်၏ သာသနာ. . . . . စိမ်သောဌ် သက္ကရစ် (၇၄၃)မြိက္ကသျိဝ်နှစ်. . . . . '။

[160] U Nyein Maung, Ancient Myanmar Inscription, Vol-V.
Ibid, p-265.. Stanza-9. ကိုဝ်သာသနာငါးထောင်. . . . ကျောက်ပတ်စွာကျင်သော။
Ibid, p-265.. Stanza-12. သာတိုဝ်ကိုဝ် . . . သာသနာငါးထောင်တည်သရွေ့ကိန်ထကျင်ဧ"။
Ibid, p-265.. Stanza-13. ငါလျှသောမွေ့အကျိုင်တိုဝ်ကာ သာသနာငါးထောင် တည်သရွေ့ သိခင်တိုဝ်အား"
Ibid, p-265.. Stanza-15. ဖုရားသာသနာ ငါးထောင်လွန်ရုယ် ငမွသည် တောခုန်ဖွစ်လေတုံမင်၏။

[161] Ibid, p-10.. Stanza-3. သောဆင်ကဲစဝ်စံပသည် သာသနာ ၅၀၀၀ တည်စိမ့်သောဌ်။

[162] Ibid, p-19.. Stanza-4. ငဩျာအခိုင်ရစေသတေ၊ သာသနာ ၅၀၀၀ တည်စိမ်သောဌ် ငါပျုသော"။

[163] Ibid, p-54.. Stanza-19. မွန်သောမြေအရပ်တွင် သာသနာငါးထောင်တည်အောင်မှတ်ရုယ်စတုတိ"

[164] Ibid, p-22 .. Stanza-19. . ကျွောင်ကိုဝ်ပျုတ်မူသည်ကာပြီ၏။ ဖုရာသျင်၏သာသနာ ၅၀၀၀၀၏ တည်သရွေ့။

[165] Ibid, p-50.. Stanza-4. . . သာသနာ ၅၀၀၀ တည်စိမ်သောဌာ ဘဝစည်နမ်မင်ကြီ"

7. sacchim kuiyto kyoṅh Inscription[167] (1454 AD)
8. aṅhvanarapatimaṅh nhaṅ miphurāh kyoṅ[168] (1437 AD)
9. uccanā maṅhkrīh Inscription[169] (1458 AD)
10. maṅhkrīhsimpatekroṅh Inscription[170] (1458 AD)
11. ruihcetībhurāh Inscription[171] (1468 AD)
12. ratanābimān kyoṅ Inscription[172] (1509 AD)
13. rannoṅkyaksareathimhmoṅnhaṁ Inscription[173] (1526 AD)
14. koṅhmūtobhurāh Inscription[174] (1536 AD)

Later discovering inscription list

1. sarabuilsūkyoṅh Inscription[175] (1173 AD)
2. chaṅphrūsikhaṅ Inscription[176] (1272 AD)
3. uccanāmaṅhkrīh Inscription[177] (1257 AD)
4. miphurāhsīrimahādhammadevī Inscription[178] (?)

A study of religious year inscription from1067 AD to 1567 AD

It can be studied from 1067 AD to 1567 AD as each of 50 years.

Between 1067 AD and 1117 AD	4 plates
Between 1117-AD and 1167 AD	no
Between 1167-AD and 1217 AD	7 plates
Between 1217-AD and 1267 AD	15 plates
Between 1267-AD and 1317 AD	23 plates
Between 1317-AD and 1367 AD	46 plates
Between 1367-AD and 1417 AD	14plates
Between 1417-AD and 1467 AD	14plates
Between 1467-AD and 1517 AD	2 plates
Between 1517-AD and 1567 AD	2 plates

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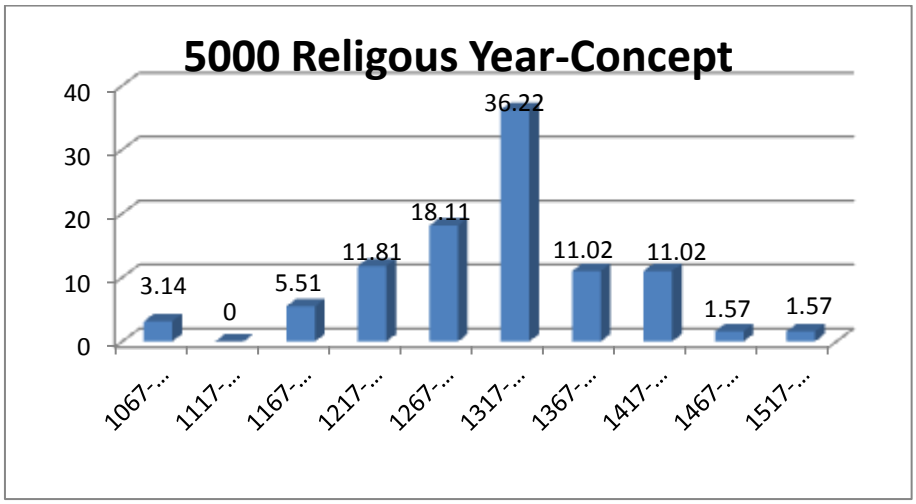
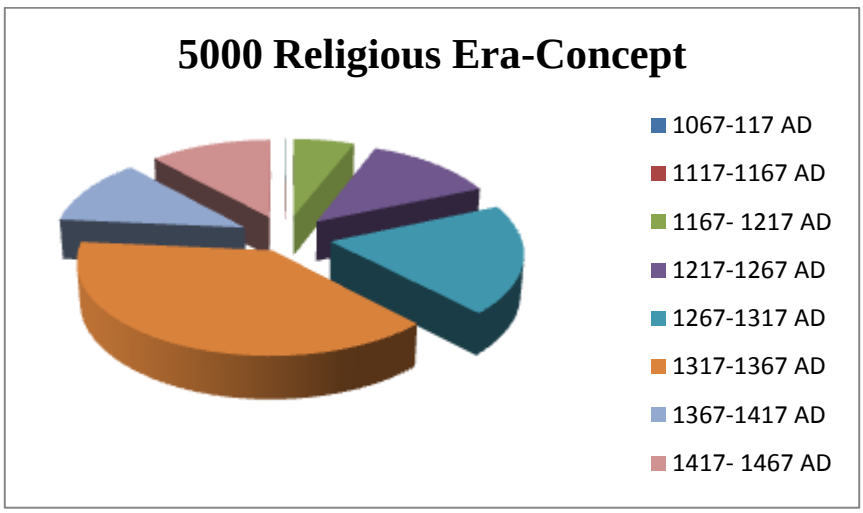
[166] Ibid, p-54.. Stanza-16. ရွှေကြောင်ချယ်သိပ္ပါရုယ်ဖုရာသာသနာငါးထောင်တည်စေလိုဝ်. . . ရုယ်။
[167] Ibid, p-58.. Stanza-1. ပဥ္စာသေသဟသာနိ သီမံဝတွာ စနိသုတံ
[168] Ibid, p-61.. Stanza-2. သာသနာ ၅၀၀၀ တည်စိမ်သောဒ့ါ လျှသောမ္လိယ်အရပ်ကား
Ibid, p-61.. Stanza-12. သယ် အပေါင်နှစ်၊ သာသနာ ငါးထောင်တည်စိမ်သောဒ့ါ။
[169] Ibid, p-63.. Stanza-5. သာသနာငါးထောင်တည်စိမ်သောဒ့ါစ်တိုက်ရာတွင်ပါသည်။
[170] Ibid, p-65.. Stanza-4. ဝ်၊ သာသနာ ၅၀၀၀ တည်စိမ်သောဒ့ါ၊ ပြောရွာသူကြီးကျောင်း။
[171] Ibid, p-91.. Stanza-12. ဆာင်ရုယ် ငါးထောင်မ္ဘလောက် နောက်ခါရောက်လည်း (နောင်တင်နှာ် လိုက်လတ်ပါဟု သာသနာန္ဒိုက်)။
Ibid, p- 91.. Stanza-49. သာသနာတ်ကုန်ဩြင်နောက်နောင်အရှည် ဤကျောက်စာကို တည်စိမ်သောဒ့ါ။
Ibid, p- 91.. Stanza-53 နောက်နောင် သာသနာစေခါတိုင်မြင်ဝရ်စ္ဆိမ်ထောင်သကျောက်ဆောင်လက် သံပိုင်စာကို
မဟာသီလဝံသ်တေည်ဘုံမ်။
[172] Ibid, p-125. Stanza-22. (တိုဝ်လင်နှင်မျာကြံရုယ်ပ္လသော ကောင်းမှုကား သာသနာ ၅၀၀၀ မကုန်မချင်း တည်စေ)။
[173] Ibid, p-143.. Stanza-31. (း ထောင် သာသနာတည်စိမ်အဒ့ါလျှင် ဌာပနာတိုက်ရာ။
Ibid, p-145.. Stanza-42. ရာဇမဏိစသဋ္ဌာအန်တ်ဟိသဝ်ဤစေတီတ်ကိုဖ ငးထောင်သာသနာ ခိုင်ခံအမြဲမြံစွာ။
Ibid, p-158.. Stanza-53. မြတ်စေတီ ငးထောင်သာသနာတည်စိမ်အသောအဒ့ါ။
Ibid, p-162.. Stanza-58. ငးထောင်သာသနာတည်စိမ်ဒ့ါလျှင် များစွာခြံရုံဝတ္ထုတံတိုဝ်။
[174] Ibid, p-162.. Stanza-58. ငးထောင်သာသနာတည်စိမ်ဒ့ါလျှင် များစွာခြံရုံဝတ္ထုတံတိုဝ်။
[175] Latest Inscription, p-77.. Stanza-4. နှောင်းတွေ့ကျောက်စာ။ စာ-'. . . . . ကြောင်ပ္လုရုယ်သာသနာအဆုံတိုင်
ဩက်ပစ္ဆည်. . . . . '။
[176] Ibid, p-64. Stanza-9. ပုရိုင်အာဩြာပြုတော်မူ၍ ကျောင်တော်ကိုသာသနာ၅၀၀၀တည်စိမ်သောဒ့ါရွှေကရာ။
[177] Ibid, p-86. . . . . သာသနာ ၅၀၀၀ တည်စိမ်သောဒ့ါလျှသော ပ္လိယ်အရပ်ကာ'။
[178] Ibid, p-116. . . . ငါခေါင်သာသနာပုံမ်မွေကျော်အရိုက်တော်ကိုဝ်တမူလေ'။

In 127 inscriptions are there the use of 5000 religious years and Anno Buddhae can be found. They are evenly divided into each 50-year. It can be seen that there are no plates about 5000 Religious years between 1117 AD and 1167 AD. In the 50 years between 1317 AD and 1367, there are the most useful of the religious years in the ancient Myanmar inscriptions. The usage of 5000 religious years gradually decrease after 1367 AD. This is because the people have released from civil war and carried out their livelihood.

The Table of Inscriptions-List within each of 50 years

No	Within the 50-year inscriptions	items	Percent	Remark
1	1067-117 AD	4	3.14%	
2	1117-1167 AD	-	-	The lowest
3	1167- 1217 AD	7	5.51 %	
4	1217-1267 AD	15	11.81%	
5	1267-1317 AD	23	18.11%	
6	1317-1367 AD	46	36.22%	The highest
7	1367-1417 AD	14	11.02%	
8	1417- 1467 AD	14	11.02%	
9	1467-1517 AD	2	1.57%	
10	1517-1576 AD	2	1.57%	





Conclusion

The concepts of 500 years in Pāli and 5000 years in commentaries had been taken and used by the Myanmar kings in their inscriptions. Buddhism educates the people how to lead to their livelihood in the art of living. Human life is full of vicissitudes. If they pursue the teachings of the Buddha, they could have relief in the very life and liberation alias emancipation may be expected. So the Buddhists wish to have the long life span of the Buddha's Teachings not only for 500 or 5000 years but also for eternal years for peace. In the context of the duration dispensation, the said 5000-religious concepts are mentioned only in the commentaries but not in the Pāli. However the belief has been introduced since the Bagan period in the inscriptions. This belief to last long 5000 years may be the Buddhists devotees' motivation as the teachings of the Buddha is to enlighten the people who wish to free from the cycle of rebirths. In the *Cūlasīhanāda sutta*, the Buddha proclaimed that (in the Buddha's Teaching,) there were the first *sāmaṇa*, the second *sāmaṇa*, the third *sāmaṇa* and the fourth *sāmaṇa*. Other systems of Teaching were devoid of *sāmaṇa* which is known as the Four Noble Truths. This was rightly and boldly proclaimed. This proclaimation refers to the four types of *samaṇas*: (1) the stream enterer (*sotapanna*), the once returner (*sakadagāmi*), the non-returner (*anāgāmi*) and the *arhat* (*arhanta*). There cannot be forced in others of teaching. For the reason, as long as Buddhism lasts long, so long as it will be beneficial for the people. Seeing this, the well-wishes hope the teaching of the Buddha to last long not only for 5000 years but also for infinite years. Therefore it is to conclude that it depends on the support of devoted practitioners, monks, lay devotees and the governors.

Acknowledgements

We are deeply grateful to Dr. Myint Swe, Taunggup Degree College for his permission to do this research. Special thanks are also to U Aye Min, Professor(Rtd.) of Dagon University, who encouraged us to develop our research further. Also, we wish to express special thanks to our Lecturer, Head of the Department of Oriental Studies in Tauggup Degree College for her suggestion in conducting this research paper. May I express my profound thanks to my supervisor, Daw Ohn Myint, Rtd Professor of the Department of Oriental Studies, University of Distance Education, for her close supervision, valuable suggestions and advice throughout my research. Finally, we all also give heartily thanks to U Aye Min, Professor of the Department of Oriental Studies, Dagon University, for his valuable data suggestion to this research paper.

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မြန်မာကျမ်းများ

မန်လည် ဆရာတော်။ မဟာသုတကာရီ မဃဒေဝလင်္ကာသစ်၊ ရန်ကုန်၊ ကောင်းကင်ပြာပုံနှိပ်တိုက်၊ (၄) ကြိမ်၊ ၁၉၉၅။

r[mA'aCmo? t&i /0y&yPmo|uxm ? &eue? A'omoemtz?1970/

r[mA'aCmo? t&i /c'uyX|uxm? &eue? A'omoemtz?1958/

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ဇာတကဋ္ဌကထာ (ပထမေဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၉။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ဇာတကဋ္ဌကထာ (ဒုတိယောဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၉။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ဇာတကဋ္ဌကထာ (တတိယောဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၉။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ထေရဂါထာ ဋ္ဌကထာ (ဒုတိယောဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၉။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ဓမ္မပဒ ဋ္ဌကထာ (ပထမောဘာဂေါ) ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၈။

ဓမ္မပါလ၊ အရှင် ။ပဋိသမ္ဘိဒါမဂ္ဂဋ္ဌကထာ (ဒုတိယောဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၈။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ပါစိတျာဒိဋ္ဌကထာ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၅။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ပါထိကဝဂ္ဂ ဋ္ဌကထာ ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၈။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။ပါရာဇိကကဏ္ဍဋ္ဌကထာ(ပထမောဘာဂေါ)၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၇။

ဗုဒ္ဓဒတ္တ၊ အရှင်။ဗုဒ္ဓဝံသဋ္ဌကထာ ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၉။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။မဟာဝဂ္ဂဋ္ဌကထာ(သုတ္တ) ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၈။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။မူလပဏ္ဏာသဋ္ဌကထာ (ပထမောဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၇။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။မူလပဏ္ဏာသဋ္ဌကထာ (ဒုတိယောဘာဂေါ)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၇။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။မဇ္ဈိမပဏ္ဏာသဋ္ဌကထာ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၇၁။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။သဂါထာဝဂ္ဂ သံယုတဋ္ဌကထာ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၇။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။နိဒါနဝဂ္ဂခန္ဓဋ္ဌကထာ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၇။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။သဋ္ဌာယတနမဟာဝဂ္ဂဋ္ဌကထာ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၇။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။သီလခန္ဓာဝဂ္ဂဋ္ဌကထာ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၆၈။

မဟာဗုဒ္ဓယောသ၊ အရှင် ။သုတ္တနိပါတဋ္ဌကထာ (ဒုတိယောဘာဂေါ)၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့၊၁၉၅၈။

ဂန္ထဝင်ကျမ်းများ

အနုရုဒ္ဓါ၊ အရှင်။ ဋီကာကျော်ပါဠ် ၊ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့ပုံနှိပ်တိုက်၊ ၁၉၇၁။

အုန်းညို၊ ရှင်၊ ။ ဂါထာခြောက်ဆယ်ပျို့။ ရန်ကုန်၊ ဟံသာဝတီပုံနှိပ်တိုက်၊၁၉၆၅ ။

ကျီးသဲလေးထပ်ဆရာတော်။ ဇိနတ္ထပကာသနီ၊ ရန်ကုန်၊ ဟံသာဝတီပုံနှိပ်တိုက်၊၁၉၄၃ ။

ကျီးသဲလေးထပ်ဆရာတော် ။ ဇိနတ္ထပကာသနီ၊ ရန်ကုန်၊ သာသနာရေးဦးစီးဌာန၊၁၉၉၂ ။

ဂုဏာရံသာလင်္ကာရအရှင် ။အစိန္တေယျဝတ္ထု ၊ ရန်ကုန်၊မြန်မာနိုင်ငံသုတေသနအသင်း၊သုတေသန စာစဉ်အသစ် (၁၅)၊ ၁၉၈၀။

တေဇောသာရ၊ အရှင် ။ ပြာဋိဟာခန်းပျို့၊ ရန်ကုန်၊ ဟံသာဝတီပုံနှိပ်တိုက်၊၁၉၂၉။

သီလဝံသ၊အရှင်။ ရာဇဝင်ကျော် ၊ ရန်ကုန်၊ စိတ်ကူးချို့ချို့ပုံနှိပ်တိုက် ၊ ၂၀၀၈။

ဟုတ်စိန်ဦး။ ပါဠို-မြန်မာ အဘိဓါန်။ ရန်ကုန်၊ပြည်ထောင်စုမြန်မာနိုင်ငံတော်အစိုးရစာပုံနှိပ်ရေးနှင့် စာရေးကိရိယာဌာန၊ ၁၉၅၄။

--------- ။ တိပိဋကပါဠို-မြန်မာအဘိဓါန်။ (အတွဲ-၃) ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့ပုံနှိပ်တိုက်၊ ၁၉၇၁။

----------။တိပိဋကပါဠို-မြန်မာအဘိဓါန်။ (အတွဲ-၆)ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့ပုံနှိပ်တိုက်၊ ၁၉၇၁။

----------။ မူလပဏ္ဏာသပါဠိမြန်မာပြန်။ ရန်ကုန်၊ ဗုဒ္ဓသာသနာအဖွဲ့ပုံနှိပ်တိုက်၊ ၁၉၆၀။

Preliminary Phytochemical Examination and some Analysis of Soybean Seeds Powder

Maung Maung Khin[179], Win Naing[2], Saw Hla Myint[3]

Abstract

It is concerned with preliminary phytochemical chemical examination and some analysis of soybean seeds powder. In the preliminary phytochemical tests, there was eleven chemical tests which carried out to investigate phytochemicals in soybean. Among them, nine phytochemicals such as glycosides, steroids, -amino acids, flavonoids, tannins, carbohydrates, alkaloids, saponins, and reducing sugar were presented. And, starch and terpenoids were not present or absent. In chemical analysis of soybean powder, it was found that moisture content (9.3 %), fat content (15.5 %), total ash content (4.36 %), acid insoluble ash content (0.46 %), water soluble ash content (2.92 %) and soluble matter contents in different solvents (ethanol, methanol, ethyl acetate, dichloroethane and pet-ether) were 12.67 %, 5.83 %, 15.22 %, 12.97 % and 11.8 % respectively.

Keywords: Soybean, Phytochemical, Chemical tests, Analysis, Solvents

INTRODUCTION

The soybean (*Glycine max*) is grown as a commercial crop in over 35 countries as the major oilseed (Smith & Huyser, 1987). The fruit of soybean is simple or in the shape of rescent pod. Its length is about 3-7cm, including 1 or 2seeds. The mass of 1000 seeds can be taken out 115-280g. On the fodder designed the seeds in mass about 180-200g.Unripen seeds are green , and mature have from light-yellow by green to brown colour. In practice are used seeds of different cultivars, what influence on colour and form of seeds. The soybean seeds of modern cultivars have spherical shape, and the yellow and green colour is the most desirable (Sikorski, 2007).The soybean products are used in food industry in the world. The soybean seeds contain high quantity of protein and its amino acid composition is approximate to the composition of animal proteins. Therefore, it is often used as replacement component of meat protein. Soybean seeds are used in oil industry. About 90% of soybean seeds make up cotyledons and 8% there are hulls. In the cotyledons are accumulated proteins and fats , the main components of seeds. In the cotyledons also are accumulated carbohydrates and anti-nutritional factors. As a result, the separation of this components or their extraction got different soybean products used in human and animals feeding.

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Materials and Methods

Collection and Preparation of Sample

The soybean seeds were collected from Nyaung Pin Lay Plaza, Yangon, Myanmar, in bulk in order to prevent the variation of the composition of the materials present in the raw materials. The seeds were kept air dry for one week. Dried seeds were ground to powder by using a grinding mill. The dried powder was stored in air-tight glass bottles.

Preliminary Phytochemical Examination of the Soybean Seeds

Test for Glycosides

Dried powdered seeds (ca. 1 g) was boiled with the distilled water for about 10 minutes, allowed to cool and filtered. The filtrate was treated with 10 % lead acetate solution. Observation was made to see if precipitation took place on addition of the reagent. (Steech, 1949)

Test for Steriods

Dried powdered seeds (ca. 5 g) was refluxed with benzene and the solvent was removed by distillation under reduced pressure. Acetic anhydride (3 drops) was added to the residue and the mixture was shaken. Then a few drops of concentrated sulphuric acid was carefully added and shaken. Observation was made to see if the solution turned to green colour. (Trease & Evans, 1954) ; (Charkravartic, 1982) ; (Rangaswami & Rav, 1955)

Test fo acid Amino Acid

Dried powdered seeds (ca. 5 g) was boiled with water for about 10 minutes and then filtered. An aliquot portion of the filtrate was transferred to a filter paper with the help of the micro pipette and allowed to dry. Then the filter paper was sprayed with ninhydrin reagent and allowed to dry at 110 ºC in an oven. Observation was made to see if a violet coloured spot appeared on the filter paper. (Linsted, 1955)

Test for Flavonoid

Dried powdered seeds (ca. 5 g) was refluxed with methanol (25 cm^3) and filtered. Alcoholic hydrochloric acid (95 % EtOH 1 vol + H_2O 1 vol + concentrated HCl 1 vol) (2 cm^3) was added to above filtrate (2 cm^3). A few pieces of Mg turning were added to the mixture. Observation was made to see if pink colour appeared within three minutes. (Harbone, 1984)

Test for Tannins

Dried powdered seeds (ca. 2 g) was refluxed with distilled water (10 cm^3) on water-bath for thirty minutes and filtered by using cotton wool. The filtrate was added 2 % sodium chloride solution (5 cm^3) and filtered through filter paper. The obtained clear solution was added 1 % gelatin solution (5 cm^3). Observation was made to see if white precipitate came down in the solution. (Marini Bettolo, et al., 1981)

Test for Carbohydrates

Dried poiwdered seeds (ca. 3 g) was boiled with water (10 cm^3) for about 20 minutes and filtered. The filtrate was placed into a test tube and a few drops of 10 % -naphthol in ethanol was added and shaken. This test tube was inclined at an angle of 45 ºC and concentrated sulphuric acid (ca. 1 cm^3) was slowly introduced along the side of the test tube. Observation was made to see if a red ring formed between two layers. (Vogel, 1966; Priestman & Edwards, 1993)

Test for Alkaloids

The dried soybean powder (ca. 2 g) was added 1 % hydrochloric acid (10 cm^3) and heated on water-bath for thirty minutes. The filtrate was added modified Dragendoff solution (5 drops). Observation was made to see if the reddish orange precipitate was observed in the solution. (Genus, 1978)

Test for Starch

Dried powdered seeds (ca. 1 g) was boiled with purified water (10 cm^3) for 30 minutes. It was then filtered and iodine solution (2 drops) were added to the filtrate. Observation was made to see if bluish-black precipitate were formed. (Harbone, 1984)

Test for Saponins

Dried powdered seeds (a little) were introduced into a test tube followed by the addition of distilled water and the mixture was vigorously shaken for a few minutes. Observation was made to see if frothing took place. (Trease & Evans, 1961)

Test for Terpenoids

Dried powdered seeds (ca. 1 g) were extracted with hot chloroform (20 cm^3) for 30 minutes and filtered. The filtrate was evaporated to dryness in vaccuo and the residue was dissolved in ethanol (2 cm^3). The solution was divided into two portions. One portion was transferred to watch-glass and the solvent was evaporated to dryness on a water-batch. The residue was dissolved in acetic anhydride, using a glass-rod. The solution was treated with a drop of concentrated sulphuric acid and observation was made to see if greenish blue colour occurred. (cited in M T Y, 1993)

The second portion was transferred to a filter paper using a micro pipette and allowed to dry. The paper was then exposed to iodine vapour to see if a reddish-brown spot appeared.

Test for Reducing Sugar

The soybean powder (0.5 g) were boiled with dilute sulphuric acid (5 cm^3) for about 10 minutes and filtered. The filtrate was then neutralized with dilute sodium hydroxide solution. The resulting solution was mixed with 2 drops of Benefits solution and boiled for about 2 minutes. Then, the solution was allowed to cool. (Harbone, 1984)

Some Analysis of Soybean Seeds

Determination of Moisture Content

Toluene (150 cm^3) and water (1 cm^3) were placed in a dried round-bottomed flask (250 cm^3), some boiling chips were added and the apparatus was assembled. The mixture was then refluxed at 80 ºC for two hours. Both water and toluene were evaporated, condensed in the condenser and collected in the graduated side arm of Dean and Stark's apparatus. The condensed toluene which formed the upper layer, overflowed continuously back into the distillation flask, while the heavier condensed water remained at the bottom of the tube.

After all the added water (approximately 1 cm^3) collected at the bottom of the graduated side arm, the heating was stopped, allowed to cool for 30 minutes and the volume of water was read. Then, the dried powder of soybean seeds (ca. 10 g) was introduced into the distillation flask and some pieces of boiling chips were again added to the flask. The distillation was continued for about 5 hours until all the moisture was removed from the sample and the volume of water was read.

Determination of Ash Content

The ash content, the acid insoluble ash content and the water soluble ash content were determined by using the method described in "The Chemical Analysis of Foods".

Determination of Total Ash Content

Dried powder of soybean seeds sample (ca. 1 g) was accurately weighed and placed in a preheated, cooled and weighed porcelain crucible. The crucible was heated carefully on a hot plate until the organic matter dried and burned off without flaming. The partially decomposed sample was then incinerated in a Muffle furnace at 823 K for 6 hours until the resultant ash was uniformed in colour (i.e., white or gray). The crucible containing the ash was then cooled to room temperature in a desiccators and weighed. Heating, cooling and weighing were repeated until a

constant weight was obtained. (Pearson, 1970); (Joslyn, 1970); (William, 1984). The ash content of soybean seeds powder was shown in Table (2).

Determination of Acid Insoluble Ash Content

The accurately weighed ash obtained from the determination of ash was put into a beaker and boiled with 25 cm^3 of dilute hydrochloric acid for about 5 minutes and then filtered, using an ashless filter paper. The residues was subsequently washed with hot water transferred to the Muffle furnace and heated at 823 K.

The crucible containing the insoluble ash was then cooled to room temperaturein a desiccators and weighed. Heating, cooling and weighing were repeated until the constant weight was obtained which correspond to the acid-insoluble matter in ash.

The acid-insoluble ash content of soybean seeds powder was shown in Table (2).

Determination of Water Soluble Ash Content

The accurately weighed ash obtained from the determination of ash was boiled with distilled water (25 cm^3) for about 5 minutes and then filtered, using an ashless filter paper. The residues was washed with hot water and kept in an oven for about 10 minutes.

It was subsequently transferred to the Muffle furnace and heated at 823 K for 5 hours. The crucible containing the water insoluble ash was then cooled to room temperature in a desiccators and weighed. Heating, cooling and weighing were repeated until the constant weight was obtained. When the weight of the insoluble matter was substracted from the weight of the ash,the difference in weight represented water soluble ash. The results were shown in Table (2).

Determination of Fat Content

Soybean seeds powder (ca. 50 g) was placed in a cloth bag and the bag was then placed in a Soxhlet extractor. Petroleum ether was poured into the extractor until some of it over flowed into the flask. The petroleum ether was heated by means of a water bath.

The extraction was assumed to be completed when a small amount of extract placed on a water bath did not leave any residue on evaporation of solvent. A duration of about 24 hours was required for the complete extraction during which the petroleum ether was recycled for about 480 times. The petroleum ether was removed by simple distillation until the volume of petroleum ether solution was transferred quantitatively into a tarred 50 cm^3 round-bottomed flask and the residual petroleum ether by vaccum distillation at 333.2 K until frothing totally ceased. The outside of the flask was rubbed with a clean wetted with methylated spirit and then weighed. The difference in weight of the round bottom flask before and after the distillation gave the weight of fat content in the sample of soybean seeds powder. (Joslyn, 1970)

The fat content of soybean seeds powder was shown in Table (2).

Determination of Soluble Matters in Different Solvents

Alcohol Soluble Matter Content

Dried powdered soybean seeds sample (ca. 3 g) was placed in a conical flask. 95 % ethanol (100 cm^3) was added and the flask was stoppered with a cork. The sample was allowed to macerate for 24 hours. The flask was then placed on a shaker. It was continuously shaken for 6 hours and the suspension was allowed to stand for 18 hours. The contents were rapidly filtered through a filter paper and wash with small portions of alcohol to ensure complete removal of alcohol soluble matter. The filtrate and wash liquors were combined and the volume made up to 100 cm^3. A portion of the filtrate (25 cm^3) was taken in a tared round-bottomed flask and evaporated to dryness on a water bath. It was dried at 378 K to constant weight. The difference in

the weight of the round-bottomed flask before and after the experiment was taken as the alcohol soluble matter.

The alcohol soluble matter content of soybean seeds sample was shown in Table (3).

Ethyl Acetate Soluble Matter Content

Ethyl acetate soluble matter content of soybean seeds sample was determined by the method given in "The British Pharmacopoeia" as described in procedure of alcohol soluble matter content, by using ethyl acetate instead of alcohol. The ethyl acetate soluble matter content of soybean seeds sample was shown in Table (3). (Steyermark, 1961); (Nadkec, 1954)

Methanol Soluble Matter Content

Methanol soluble matter content of soybean seeds sample was determined by the method given in "The British Pharmacopoeia" as described in procedure of alcohol soluble matter content, by using methanol (100 cm^3) instead of alcohol. The methanol soluble matter content of soybean seeds sample was shown in Table (3). (Steyermark, 1961); (Nadkec, 1954)

Dichloroethane Soluble Matter Content

Dichloroethane soluble matter content of soybean seeds sample was determined by the method given in "The British Pharmacopoeia" as described in procedure of alcohol soluble matter content, by using dichloroethane (100 cm^3) instead of alcohol. The dichloroethane soluble matter content of soybean seeds sample was shown in Table (3). (Steyermark, 1961); (Nadkec, 1954)

Petroleum Ether Soluble Matter Content

Petroleum ether soluble matter content of soybean seeds sample was determined by the method given in "The British Pharmacopoeia" as described in procedure of alcohol soluble matter content, by using petroleum ether instead of alcohol. The petroleum ether soluble matter content of soybean seeds sample was shown in Table (3). (Steyermark, 1961); (Nadkec, 1954)

RESULTS AND DISCUSSION

Collection and Preparation of Sample

Soybean seeds were collected from Nyaung Pin Lay Plaza in Yangon. The seed were dried in air for one week. This drying reduced the moisture content to 10 % or less, the condition necessary to prevent growth of mould during the storage of the sample. The dried seeda were powdered in a grinding machine. The powdered sample was then stored in an air-tight container.

Preliminary Phytochemical Tests of the Soybean Powder

No.	Tests	Extract	Test reagent	Observation	Result
1.	Glycosides	H_2O extract	10 % lead acetate	White ppt.	+
2.	Steroids	Benzene extract	acetic anhydride and H_2SO_4	Green	+
3.	α-Amino cids	H_2O extract	ninhydrin reagent	Violet spot	+
4.	Flavonoids	MeOH extract	alcoholic HCland Mg turning	Pink solution	+
5.	Tannins	H_2O extract	2 % NaCl solution, 1 % gelatin solution	White ppt.	+
6.	Carbohydrates	H_2O extract	10 % α-naphthol Dragendoff's reagent	Red ring	+
7.	Alkaloids	1 % HCl extract	Iodine solution	Orange-red ppt.	+
8.	Starch	H_2O extract	Distilled water	No bluish-black ppt.	-
9.	Saponins	H_2O extract	Acetic anhydride and conc.	Frothing	+
10.	Terpenoids	$CHCl_3$ extract	H_2SO_4, iodine vapour	No greenish blue colour, no reddish brown spot	-
	Reducing sugar	H_2SO_4 extract			
11.			NaOH solution and Benedict's solution	Brick-red ppt.	+

A literature survey showed that a very little work has been carried out on the chemical studies of locally soybean seeds. Therefore, the following preliminary phytochemical investigation carried out on the seeds powder with a view to determine the presence or absence of glycoside, steroids, -amino acids, flavonoids, tannins, carbohydrates, alkaloid, starch, saponins, terpenoids and reducing sugars in Table (1).

Table 1. Results of Preliminary Phytochemical Tests of Soybean Seed Powder

(+) = Present, (-) = Absent

Some Analysis of Soybean Powder

Dried powdered sample was submitted to analysis for the determination of moisture content, fat content, ash content, acid insoluble ash content, water soluble ash content and soluble matter contents in different solvents (ethanol, methanol, ethyl acetate, dichloroethane and pet-ether).

Determination of Moisture Content

Moisture content was determined by the Dean and Stark method and oven drying method.

Dean and Stark distillation method involves the reflux distillation of the sample with an immiscible solvent having a higher boiling point and lower specific gravity than water, e.g., toluene, heptanes, xylene. This method has the advantages that (a) it needs little attention once the apparatus has been set up and (b) any volatile oils which distilled over mixed with the solvent are not measured.

Dean and Stark distillation method directly measures the water content. The moisture content of the sample was determined to be 9.3 % as shown in Table (2).

Determination of Fat Content

Fat was determined by Soxhlet Extraction Method.

Fat was extracted with petroleum ether by heating on water bath using Soxhlet Extractor. And then petroleum ether was removed by vaccum distillation method. The difference of round-bottomed flask before and after the distillation gave the weight of fat content in the sample of soybean powder.

The average fat content of the sample was found to be 15.5 % as shown in Table (2).

Determination of Total Ash Content

Ash is inorganic residue remained after the organic matter has been burnt away. Ash was determined according to Jacobs. The sample was incinerated in a porcelain crucibile until all the carbonaceous material had been removed. Burning of the dried powdered sample was avoided by beginning the combustion at a low temperature. The combustion was completed at a temperature of approximately 550 ºC. the period of ashing is usually not specified, the ashing being continued until a uniformly light gray or white ash of constant weight is obtained. (Jacobs, 1958)

The average ash content of dried powder of soybean was 4.36 % as shown in Table (2).

Determination of Acid Insoluble Ash Content

The total ash is the residue remaining after incinerations. The determination of acid insoluble ash consists of boiling the total ash with dilute hydrochloric acid, filtering, igniting and weighing the acid insoluble ash. The result was shown in Table (2) and the average acid insoluble was calculated to be 0.46 %.

Determination of Water Soluble Ash Content

The determination of water soluble ash consists of boiling the total ash with distilled water, filtering, igniting and weighing. When the weight of the insoluble matter was substracted from the weight of the ash, the difference in weight represented the water soluble ash. The result was shown in Table (2) and the average ash content was found to be 2.92 %.

Table (2) Results of some Analysis of Soybean Seeds Powder

No.	Experiments	Results (%)
1.	Determination of moisture content	9.3
2.	Determination of fat content	15.5
3.	Determination of total ash content	4.36
4.	Determination of acid insoluble ash content	0.46
5.	Determination of water soluble ash content	2.92

Determination of Soluble Matters in Different Solvents

Ethanol, methanol, petroleum ether, dichloroethane, ethyl acetate soluble matter contents in dried powdered sample was determined by the method given in "The British Pharmacopoeia".

Ethanol, methanol, PE, dichloroethane, ethyl acetate soluble matter contents of the sample were listed in Table (3).

Table (3) Results of Determination of Soluble Matter Contents of Soybean

Sr. no.	Solvent	Soluble Matter content (%)
1	Ethanol	12.67
2	Methanol	5.83
3	Prtroleum ether	15.22
4	Dichloroethane	12.97
5	Ethyl acetate	11.8

CONCLUSION

In the preliminary phytochemical examination of soybean, it can be concluded as follows. There were eleven chemical tests carried out to investigate phytochemicals in soybean. Among them, nine phytochemicals such as glycosides, steroids, -amino acids, flavonoids, tannins, carbohydrates, alkaloids, saponins, and reducing sugar were presented. And, starch and terpenoids were not present or absent. In chemical analysis of soybean powder, it was found that moisture content (9.3 %), fat content (15.5 %), total ash content (4.36 %), acid insoluble ash content (0.46 %), water soluble ash content (2.92 %) and soluble matter contents in different solvents (ethanol, methanol, ethyl acetate, dichloroethane and pet-ether) were 12.67 %, 5.83 %, 15.22 %, 12.97 % and 11.8 % respectively.

ACKNOWLEDGEMENT

We would like to express our profound gratitude to the Principal, Dr Myint Swe, Taunggoke Degree College, Rakhine State, Myanmar. We also give gratitude to our Professor, Dr Win Naing, Head, Department of Chemistry, Taunggoke Degree College, for provision an opportunity to do this research and for giving permission to do this paper.

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Vibrational Characteristic of Nickel Cobalt Ferrite

Khin Hnin Yu

ABSTRUCT

Nickel-Cobalt (abbreviated as Ni-Co) ferrites with the general formula $Ni_xCo_{1-x}Fe_2O_4$(where x = 0, 0.5, 1) were prepared by usual solid-state reaction method. The precursor uses wereAnalar (AR) grade Nickel Oxide (NiO), Cobalt Oxide (CoO)and Iron Oxide (Fe_2O_3). These materials were weighed with stoichiometric compositionand then the precursors were annealed at 1100°C for 4 h in vacuum chamber (160 mmHg).Vibrational characteristic of the sample was analyzed by Fourier Transform Infrared (FTIR) spectroscopy to confirm the phase formation of the sample.

Keywords: $Ni_xCo_{1-x}Fe_2O_4$,solid-state reaction method, FTIR

INTRODUCTION

Ferrites are chemical compounds consisting of ceramic materials with iron(III) oxide (Fe_2O_3) as their principal component. Many of them are magnetic materials and they are used to make permanent magnets, ferrite cores for transformers, and in various other applications. Many ferrites are spinels with the formula AB_2O_4, where A and B represent various metal cations, usually including iron Fe. The magnetic material known as "NiFe" has the formula $NiFe_2O_4$, with Fe^{3+} occupying the octahedral sites and Ni^{2+} occupy the tetrahedral sites, it's an example of a spinel ferrite. Spinel ferrites usually adopt a crystal motif consisting of cubic close-packed (fcc) oxides (O^{2-}) with A cations occupying one eighth of the tetrahedral holes and B cations occupying half of the octahedral holes. If one eight of the tetrahedral holes are occupied by B cation, then one fourth of the octahedral sites are occupied by A cation and the other one fourth by B cation and it's called the inverse spinel structure. The aim of this work is report and discuss the results of vibrational characteristic of $Ni_xCo_{1-x}Fe_2O_4$ (Where x = 0, 0.5, 1).

EXPERIMENTAL DETAILS

Preparation of Nickel-Cobalt Ferrite, $Ni_xCo_{1-x}Fe_2O_4$

Experimental procedures for the preparation of Nickel-Cobalt ferrite, $Ni_xCo_{1-x}Fe_2O_4$ (where x = 0, 0.5, 1) were as follows: First, the starting materials of Analar (AR) grade Nickel Oxide (NiO), Cobalt Oxide (CoO) and Iron Oxide (Fe_2O_3) were weighed with stoichiometric composition. These samples were mixed and grounded by an agate mortar for 3 h to be homogeneous and fine powders. The powders were annealed at 1100°C for 4 h in the vacuum chamber by using thermal resistive heating coil that controlled DELTA A Series Temperature Controller DTA4896 and the K-type thermocouple were used as the temperature sensor for the sample preparation.Finally, the material of Nickel-Cobalt ferrite, $Ni_xCo_{1-x}Fe_2O_4$ was obtained. Photographs of the weighed starting materials, mixed starting materials and sample preparation system are shown in Figure 1(a-b) respectively. Experimental set-up of sample preparation system is shown in Figure 2.

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Figure 1. (a) Photograph of the weighed starting materials of NiO, CoO and Fe_2O_3 for x = 0, 0.5,1 of $Ni_xCo_{1-x}Fe_2O_4$

Figure 1. (b) Photograph of the side view of mixed starting materials of NiO, CoO and Fe_2O_3 (Left to right, x = 0, 0.5, 1 of $Ni_xCo_{1-x}Fe_2O_4$)

Figure 2 Photograph of the experimental setup of sample preparation system

FTIR SPECTROSCOPIC MEASUREMENT

FTIR transmission spectra of the samples with Potassium Bromide, KBr pellet methodare observed by PC-controlled (SHIMADZU) FTIR-8400 Spectrophotometer at room temperature.Photograph of the SHIMADZU FTIR-8400 spectrophotometer is shown in Fig 3.

Figure 3 Photograph of the SHIMADZU FTIR-8400 Spectrophotometer

RESULTS AND DISCUSSION

FTIR Spectroscopic Analysis

It is generally known that the spinel ferrites exhibit four IR active bands, designated as ν_1, ν_2, $\nu_3$and ν_4. The occurrence of these four bands has been rationalized on the basis of group theoretical calculations employing space group and point symmetries, both in normal and inverse spinels. The first three IR bands are due to tetrahedral and octahedral complexes while the fourth one is due to some type of lattice vibrations. However, the ν_3-mode and ν_4-mode are normally appeared in the wavenumber range of 300 cm^{-1} – 400 cm^{-1} region. In this work, the observed wavenumbers are in the range of 4000 cm^{-1} – 400 cm^{-1} (mid-IR region). Thus, the ν_3-mode and ν_4-mode are out of range of the mid-IR region of 4000 cm^{-1} – 400 cm^{-1}. The vibrational frequencies (wavenumbers) of pure Nickel Ferrite, $NiFe_2O_4$, are mainly appeared in FTIR spectrum at 486 cm^{-1}, 587 cm^{-1} and 602 cm^{-1} for B atoms on octahedral sites (assigned as ν_2-mode) and 413 cm^{-1} for A atoms on tetrahedral sites (assigned as ν_1-mode). Also, the lines at 540 cm^{-1}, 555 cm^{-1} and 575 cm^{-1} for B atoms on tetrahedral sites of pure $CoFe_2O_4$. The vibrational frequencies of a molecule may be changed due to the crystalline environments.Each of the FTIR transmission spectrum of Nickel-Cobalt ferrites, $Ni_xCo_{1-x}Fe_2O_4$ (where x = 0, 0.5, 1) with KBr pellet method in the wavenumber range of 400 cm^{-1} – 4000 cm^{-1} region are shown in Figure 4(a – c). The collected wavenumbers and corresponding vibrational modes of constituent molecules are listed in Table 1. FTIR transmission spectra of $Ni_xCo_{1-x}Fe_2O_4$ (where

x = 0, 0.5, 1) samples are shown in Figure 4(d). Two absorption bands below 1000 cm^{-1} is a common feature of all the ferrites. The bands arise from the lattice vibrations of the oxide ions against the cations. Generally, the bands in the 300 – 700 cm^{-1} region are assigned to the fundamental vibrations of the crystal lattice. The band around 600 cm^{-1} is attributed to stretching assigned to a vibration of the coordinated group(s) containing the highest valencycation and it is assigned as ν_1-mode. Variations of ν_1-mode and ν_2-mode with the contents x of Ni of the samples are shown in Figure 5. As shown in figures, the observed wavenumbers are increased (shifted) due to the lattice substitution of different ionic radii of Co^{2+} and Ni^{2+}.

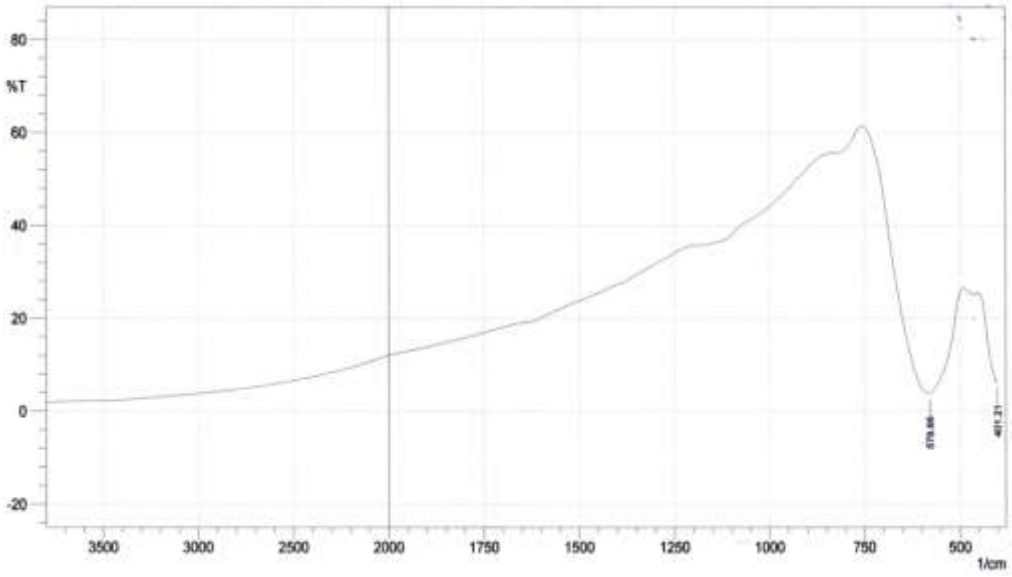

Figure 4. (a) FTIR transmission spectrum of $Ni_xCo_{1-x}Fe_2O_4$ (where x = 0)

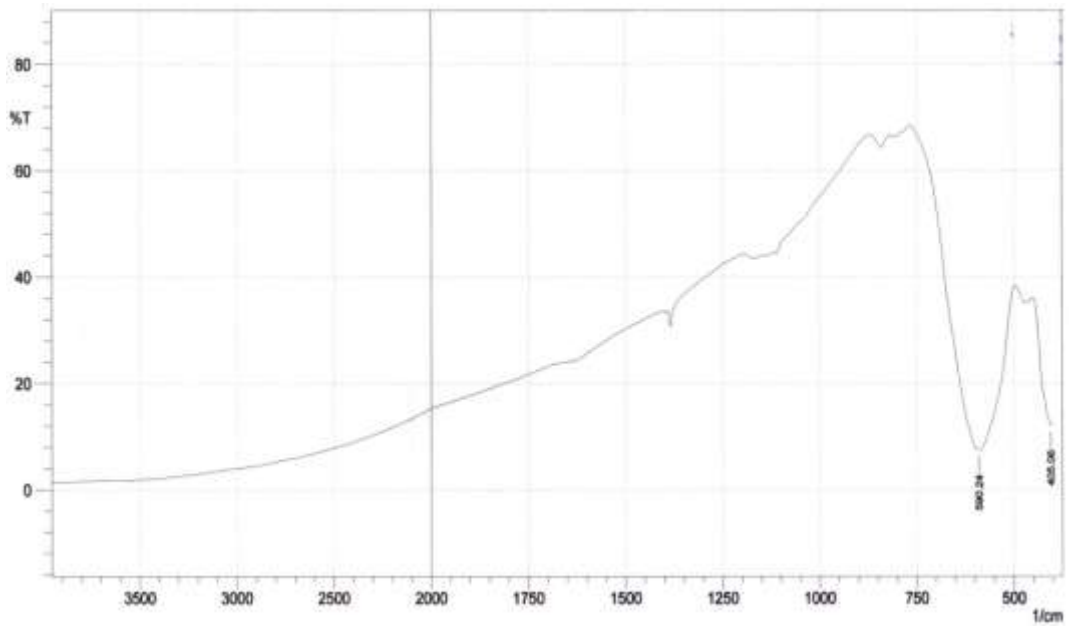

Figure 4. (b) FTIR transmission spectrum of $Ni_xCo_{1-x}Fe_2O_4$ (where x = 0.5)

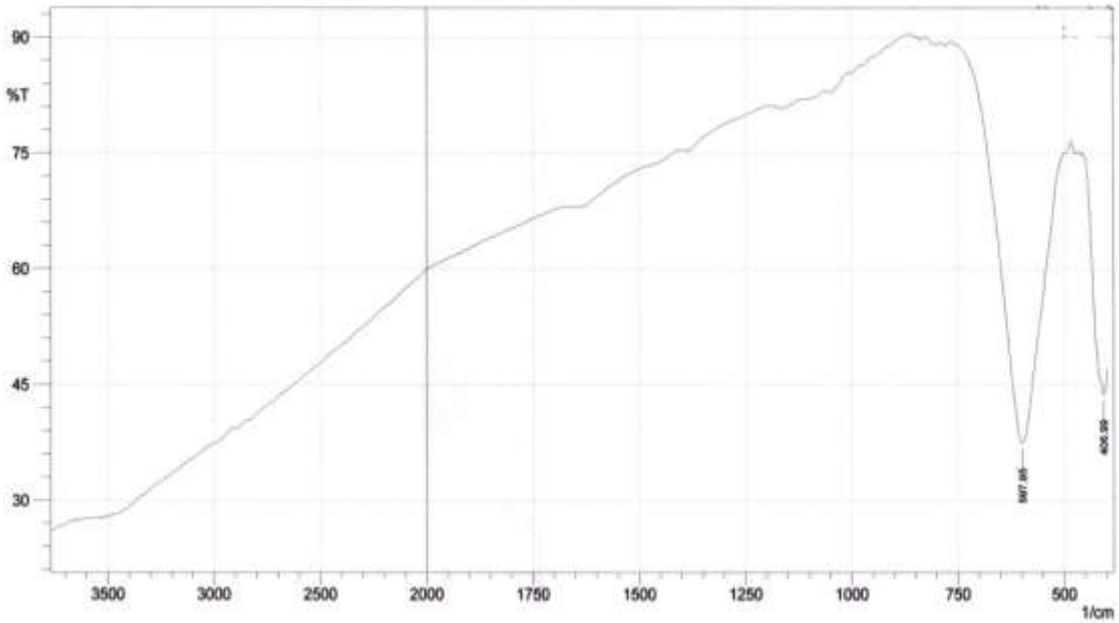

Figure 4. (c) FTIR transmission spectrum of $Ni_xCo_{1-x}Fe_2O_4$ (where x = 1)

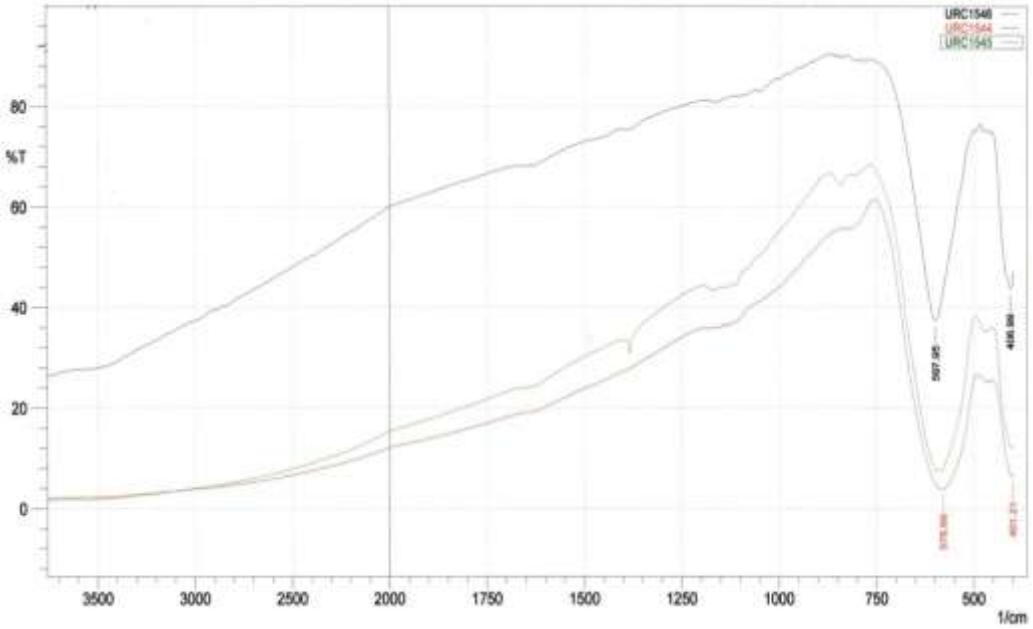

Figure 4. (d) FTIR transmission spectra of $Ni_xCo_{1-x}Fe_2O_4$ (where x = 0, 0.5, 1)

Table 1The collected wavenumbers and corresponding vibrational characteristics of $Ni_xCo_{1-x}Fe_2O_4$(where x = 0, 0.5, 1)

Contents x of Ni	$\bar{\nu}$ (cm)	Mode
0	401	ν_2-mode
	579	ν_1-mode
0.5	405	ν_2-mode
	590	ν_1-mode
1	407	ν_2-mode
	598	ν_1-mode

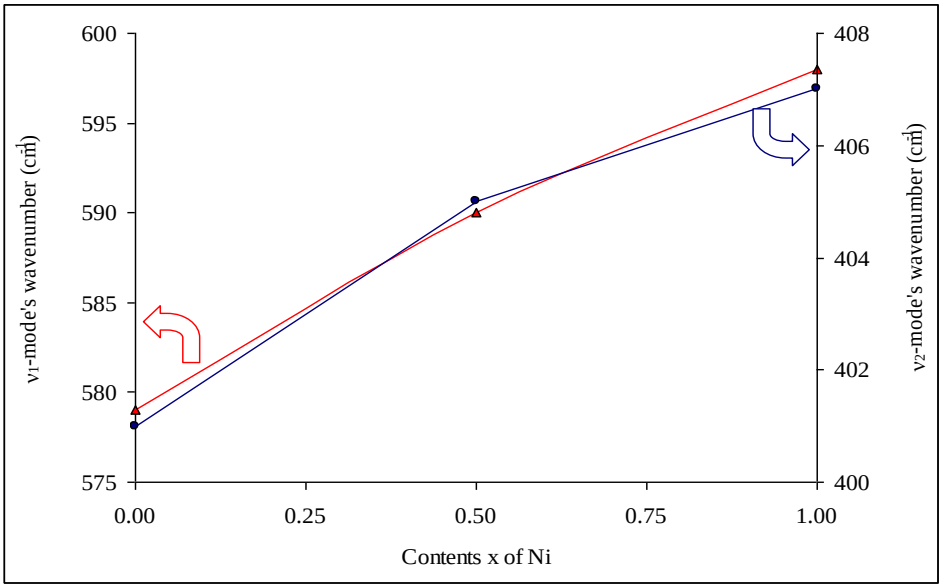

Figure 5 Variations of ν_1-mode and ν_2-mode with the contents x of Ni of the $Ni_xCo_{1-x}Fe_2O_4$ (Where x = 0, 0.5, 1)

CONCLUSION

Nickel-Cobalt ferrites, $Ni_xCo_{1-x}Fe_2O_4$ (where x = 0, 0.5, 1), were successfully prepared by usual solid-state reactionmethod. Vibrational of the sample was reported by means of FTIR measurements. Phase confirmation of the sample was performed by FTIR spectrum in which only two normal modes of ν_1- and ν_2-modes were found and these are vibrational characteristic of the samples. The activation energies of the samples are increased with increase in Ni concentration. This samples can be used as the solid electrolyte materials.

ACKNOWLEDGEMENT

The authors would like to thank DrMyintSwe, Principal, Taunggoke Degree College, for his kind permission to carry out this research work.We are also thankful to Dr Tin Tin Yi, Professor and Head of Department of Physics,Taunggoke Degree College, for her suggestions and encouragement in carrying out this work.

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THE PERFORMANCE OF RADIOTRACER

Yin Thuzar Thein

Abstract

The measurement of flow and residence time distribution has been measured with the Tracer – Rig by the radiotracer technique using Tc – 99m. Mean Residence Time (MRT) has been newly prepared from the program JINRTD and is applied to the tracer test in Tracer – Rig. The experimental results by the new residence time distribution are compared with the Residence Time Distribution Analysis Program to simulate the data obtained by using radio tracer techniques.

Keywords: water flow rate, radiotracer, gamma ray source, variation of count rate

Introduction

The water flow rate can be measured from the Mean Residence Time Distribution. Tc – 99 is used as gamma ray source, the variation of count rate and distribution injected into the unknown water flow rate are also presented. Radiotracer is injected at a constant, measurment in the stream to be measured. The source is taken from a point sufficiently distant downstream to ensure complete mixing of racer with the stream. In experimental set up, the approach to the complete mixing is assisted by using the longest length of pipe, so that dispersion of the tracer is minimized by the flow region.

The program JINRTD is used for data analysis to calculate Mean Residence Time and to determine mixing characteristics. The experimental results by the new RTD are compared with JINRTD to simulate the data obtained.

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Experimental Method

Properties of Gamma – rays

Different kinds of radiation have particular properties and interact with matter in different ways. Gamma – rays interact with matter. There are three main processes by which energetic photons interact with matter: photoelectric effect, compton scattering and pair production.

For a narrow beam of monoenergetic gamma – rays of intensity I_o travelling through a medium of density ρ, the residual intensity after travelling a distance x is given by $I = I_0 \exp(-\mu\rho x)$, where μ is a constant, called the mass absorption coefficient, for the particular energy of the beam.

Tracer source

The tracer is a substance intentionally added to a system to study its dynamic behavior. The tracer should behave more or less similar to the bulk material in the system, but should be distinguishable for detection. The tracer quantity should be so small that its addition should not cause any disturbance to the system. Radioisotope based tracers alone can satisfy all the conditions of a good tracer.

The method is applicable to test the measured dilution of the tracer radioisotope as Tc – 99m injected. The Tc – 99 source has an activity of 1.1 mCi and volume 3 mL and its half – life is 360 min. Source is kept approximately at the center of the hole of lead container.

Experimental Procedure

The general arrangement of equipment is shown in Figure 2. A radiotracer Tc - 99m is injected over a short period of time so that a pulse of radioactivity moves with the stream to be measured. The passage of the pulse is timed between two detectors, positioned at a known distance (d) apart. The linear velocity of the stream is converted to a volume rate of flow, as the diameter of the line carrying the stream is known.

Figure 3 shows electronics block diagram for a detection system using a scintillator Tallium – activated sodium iodide scintillation detector is used with detector probe which is available with the built – in preamplifier. The detector output pulse is positive and the working voltage is 1000 V dc in this research work.

A multichannel analyzer provides an output whenever a pulse enters which meets the upper and lower energy criteria of the analyzer. If the multichannel analyzer window is made very narrow and counts are accumulated for equal times as the windows is placed at successively high or low energy levels, a histogram of relative intensity versus energy can be constructed, that is, a pulse height spectrum is obtained.

For input and output position we get the characteristic curve on MCA. By using these curves, traces from which the transit time is derived. Evidently it is desirable that the traces

should be as sharply defined as possible for minimize uncertainty in the determination of the time interval. The Residence Time Distribution must then be adjusted to take account of the transit time of the tracer in the lines if this significant.

In pulse velocity method, the volume flow rate calculated in the following formula

$$U = \frac{d}{t} \times \pi r^2$$

Where U = volume flow rate

d = detectors separation length

t = transit time

r = radius of the parallel pipe

Protection

In the laboratory, disposable rubber gloves should be sufficient to afford protection, so Tc – 99, is injected over a short period of time.

Then, the chemical form is chosen so that the tracer remains in solution in the stream to be measured and the radiation sufficiently penetrating to be detected with detectors situated outside the containment of the stream, a factor which simplifies experimental procedure considerably.

Results and Discussion

The experimental data, obtained input and output position on MCA, can be entered from the keyboard and stored in files named EX4 which can then be read by the program.

The program JINRTD can be used for data analysis to calculate Mean Residence Time and to determine mixing characteristics. The program fits experimental tracer data with two basic flow models; water model and radioisotope Tc – 99m model.

It is an interactive program which allows the user to try different values of parameters to obtain a good fit. So, in this work, the main characteristic of input/ output position on MCA are considered, count vs time curve and count vs channel number. The results of the measurement are shown in Table 1 and Table 2 for Tc – 99m input position and output position. The spectra of these obtained data are shown in Figure 4, 5 , 6 and 7 respectively. For this measurement Series 30 and Series 40 MCA are done by establishing a direct relationship between count and channel numbers.

Radioactive materials are particularly effective as tracers in the investigation process of vessel systems because of the wide variety of isotopes available, chemical and fluid compatibility. In this process, the low concentration is required, and the ease with which

sharp pulses of tracer may be injected into most systems. The ability to choose the external detection of trace (or) sampling and to determine tracer concentration is an additional advantage.

For liquid flow, error in the distance between measurement points and that in the determination of transit time can both be made a little; often in industrial pipelines, a larger source of error is associated with internal diameter of the pipeline where only nominal bores are known. Frequently, this is the dominant source of error in the calculation of volume rates of the flow in the pulse velocity method.

Source Calibration

Source = Tc – 99m

Activity = 1.1 mCi

Total Volume = 0.3 mL

Half – life = 6.02 hr

$\Delta E = \pm 0.008$

Energy = 140 keV

From flow meter,

Volume flow rate = 1.0 GPM

d = 10.67 m , r = 1.5 x 10^{-2} m

10^3 lit = 1 m^3 , 1 G = 3.785 lit

Time travel = 2 min

$$U = \frac{d}{t} \times \pi r^2$$

$$= \frac{10.67x3.142x\left(1.5x10^{-2}\right)^2}{2} \ m^3 \ min^{-1}$$

$$= \frac{10.67x3.142x\left(1.5x10^{-2}\right)^2 x10^3}{2x3.785} GPM$$

$$= 0.9964 \ GPM$$

Measuring System for Input Position

MCA Series 30 (Model 3100, Sr No 378105)

HVPS = 1230 V (power supply bin)

Detector – Scintillation = NaI (Tl) (Model 802 – 5)

Measuring System for Output Position

MCA Series 40 (Model 4202, Sr No 7820)

HVPS = 1000 V (Model LV 236, Sr 17254)

Detector - Scintiallation = HAR SHAW NaI (Tl) Type – 12A12

Figure 1 Tracer Rig arrangement

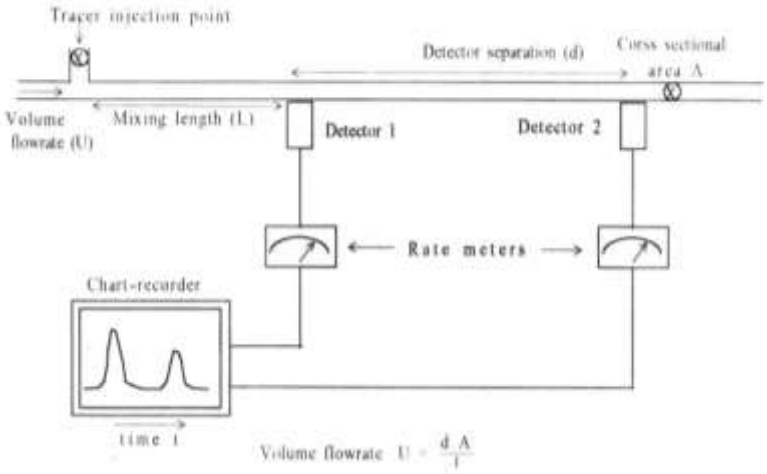

Figure 2 General arrangement for pulse – velocity measurement of flow

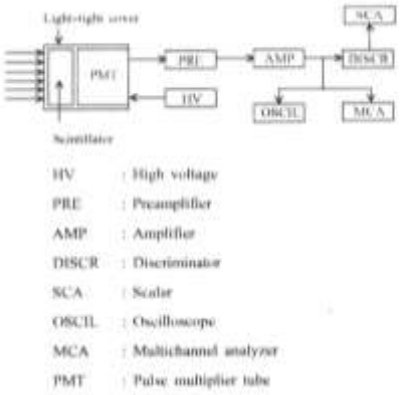

Figure 3 Electronics block diagram for a detection system using a scintillator

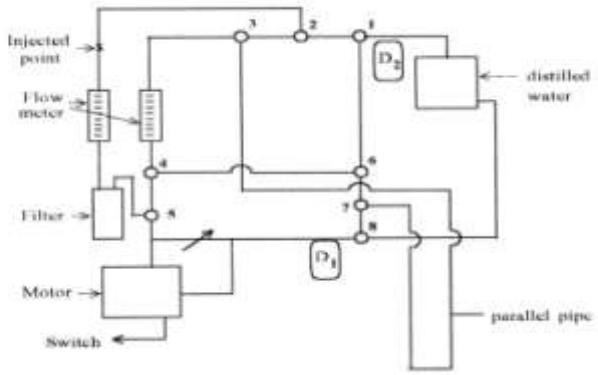

Figure 4 Experimental arrangement for measurement of flow using radioactive tracer

Table 1 For Tc-99m Input position

Sr No.	Time (min)	Count
1	0	30
2	1	185
3	2	243
4	3	322
5	4	384
6	5	449
7	6	509
8	7	570
9	8	630
10	9	690
11	10	750
12	11	814
13	12	888
14	13	950
15	14	1015
16	15	1076
17	16	1137
18	17	E

Table 2 For Tc-99m Output position

Sr No.	Time (min)	Count
1	0	0
2	1	4
3	2	10
4	3	17
5	4	21
6	5	34
7	6	40
8	7	44
9	8	55
10	9	62
11	10	69
12	11	73
13	12	80
14	13	87
15	14	93
16	15	96
17	16	101
18	17	E

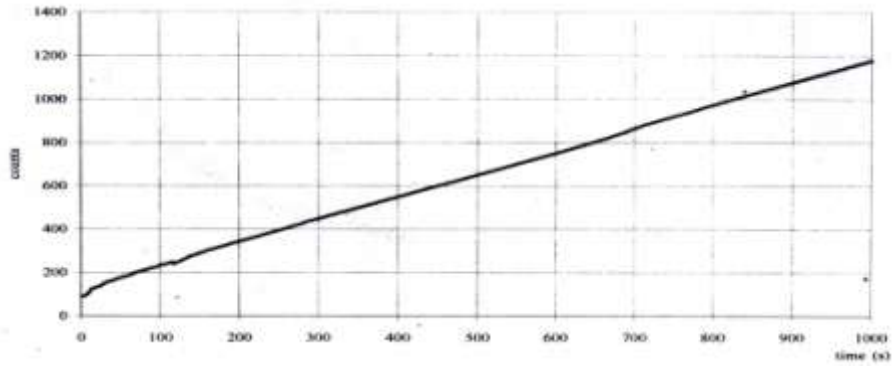

Figure 5 Count vs time curve for input position

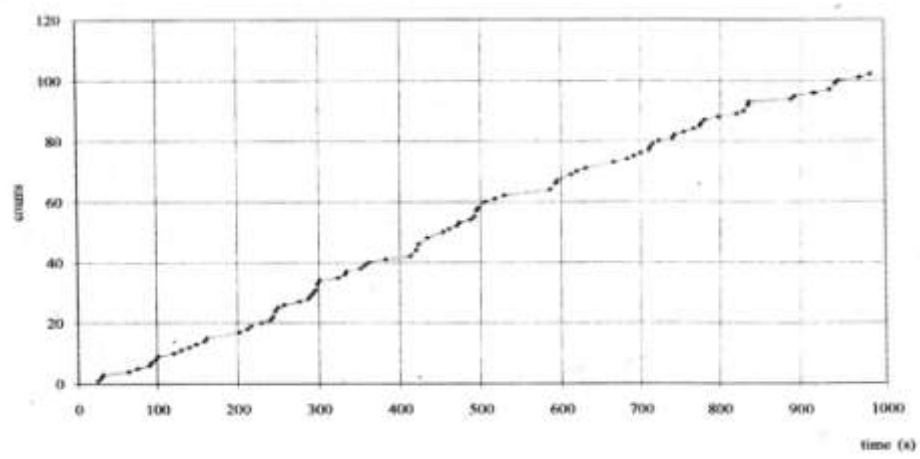

Figure 6 Count vs time curve for output position

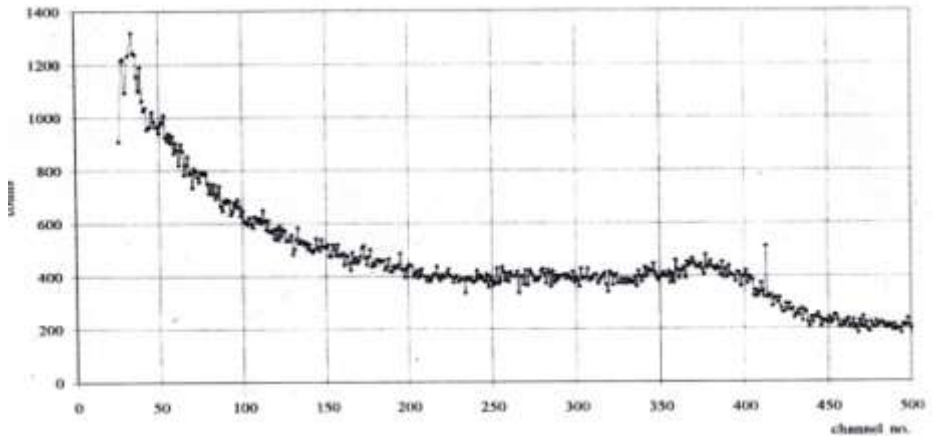

Figure 7 Gamma ray pulse height spectrum traced at input position on MCA

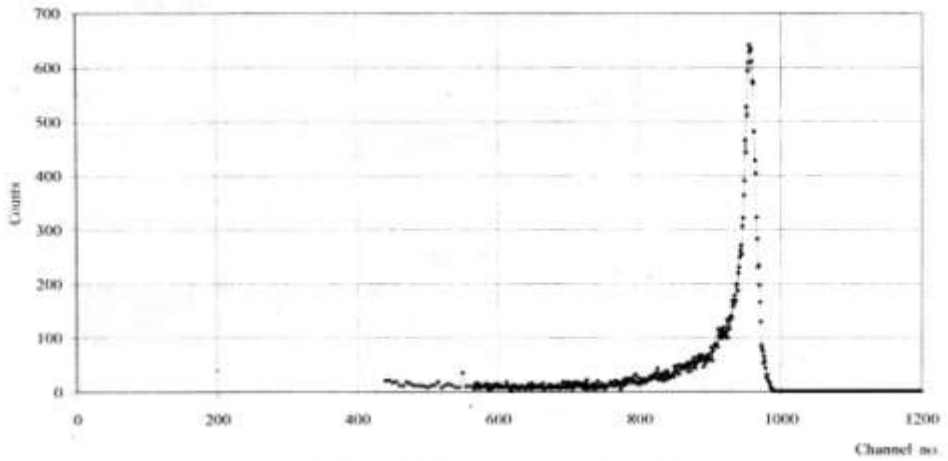

Figure 8 Gamma ray pulse height spectrum traced at output position on MCA

Acknowledgements

I would like to express my gratitude to Dr Myint Swe, the Principal, Taunggoke Degree College and Dr Tin Tin Yi, Head of the Department of Physics, Taunggoke Degree College for their permission and encouragement to do this research.

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The Application of Network Flow

Khin Khin Chaw[1], Ni Ni Mar[2]

Abstract

In this paper, some basic definitions and the network models of the given problems are firstly introduced. Then the relation between the maximum flow, the size of the maximum matching and the maximum number of edge-disjoint paths in the given network are presented. Finally, the problem of air scheduling is solved by using the maximum flow.

Keywords network models, maximum flow, matching, edge-disjoint path

Introduction

The problem of finding the maximum flow capacity of networks has many applications in Modern Logistics management. Computer programs that can solve maximum flow programs are used by all automatic systems to calculate how shipments are transported by shipping companies (they may use planes, ships, trains, etc.). Another common use of maximum flow problem is in the optimization of design. This includes the design of piping systems for chemical and food-processing plants, water supply of a city, sewage system, etc. In this paper, the maximum flow in networks and its application has been studied. In section 1, some basic definitions and notations followed by [1] and [2] have been described. In section 2, the definitions of matching, maximum flow and edge-disjoint paths based on [1] have been introduced. Then, the theorems which deal with the relation between the maximum flow, the size of maximum matching and the number of edge disjoint paths have been presented. In section 3, we solve the airline scheduling in Rakhine State has been solved by using the edge-disjoint paths based on [3].

1. Basic Definitions and Notations

An **undirected graph** G consists of a set V of **vertices** and a set E of **edges** such that each edge $e \in E$ is associated with an unordered pair of vertices. A **directed graph** (or **digraph**) G consists of a set V of vertices and a set E of edges such that each edge $e \in E$ is associated with an ordered pair of vertices. In a directed graph, the directed edges are indicated by arrows. A graph with numbers on the edges is called a **weighted graph**. If the edge e is labeled k, the weight of the edge e is k.

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The two edges both associated with the same pair of vertices are **parallel edges**. An edge incident on a single vertex is called a **loop**. A graph with neither loops nor parallel edges is a **simple graph**. A graph in which the vertices can be partitioned into disjoint sets V_1 and V_2 with every edge incident on one vertex in V_1 and one vertex in V_2 is called a **bipartite graph**. A **path** in a graph is a finite or infinite sequence of edges which connects a sequence of vertices which are all distinct from one another. A **simple path** is a path with no repeated vertices. A graph G is said to be **connected** if for any two vertices u and v of G, there is a path in G.

A **transport network** is a simple, weighted, directed graph G satisfying:

(a) There is exactly one vertex in G, called the **source**, having no incoming edges.

(b) There is exactly one vertex in G, called the **sink**, having no outgoing edges.

(c) The weight C_{ij} of the directed edge (i, j), called the **capacity** of (i, j), is a nonnegative number.

(d) The undirected graph obtained from G by ignoring the directions of the edges is connected.

The graph of Fig.1 is a transport network. The source is vertex "a" and the sink is vertex "z". The capacity of edge (a, b), C_{ab} is 3 and the capacity of edge (b, c), C_{bc}, is 2.

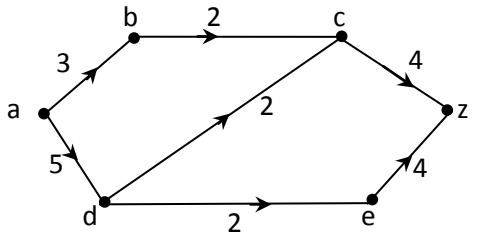

Fig. 1

Let G be a transport network. Let C_{ij} denote the capacity of the directed edge (i, j), a nonnegative number F_{ij} such that $F_{ij} \le C_{ij}$, and for each vertex j, which is neither the source nor the sink, $\sum_i F_{ij} = \sum_i F_{ji}$. We call F_{ij} the flow in edge (i, j). For any vertex j, we call $\sum_i F_{ij}$ the flow into j and $\sum_i F_{ji}$ the flow out of "j". In Fig. 2, we redraw the network of Fig. 1 to show the flow. The flow into vertex "d", $F_{ad} = 3$, and the flow out of vertex "d", $F_{dc} + F_{de} = 1 + 2 = 3$. So it can be seen that the flow in of a vertex equals the flow out of it.

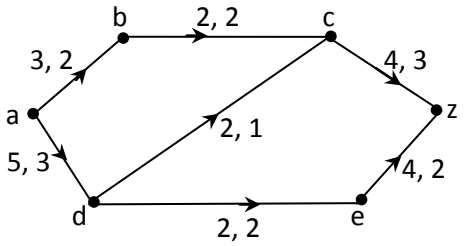

Fig. 2

Now we construct a network model of the airlines for four towns in Rakhine State. We consider the following flights. The edges represent the flights and u_i is the origin and v_i is the destination of the flight "i ", respectively.

u_1: Thandwe (depart 7:45 A.M.) – v_1: Ann (arrive 8:15 A.M.)
u_2: Thandwe (depart 9 A.M.) – v_2: Munaung (arrive 9:45 A.M.)
u_3: Ann (depart 8:30 A.M.) – v_3: Kyuakphyu (arrive 8:45 A.M.)
u_4: Munaung (depart 10:00A.M.) – v_4: Kyuakphyu (arrive 10:15 A.M.)

The graph of the given flights is represented as

G

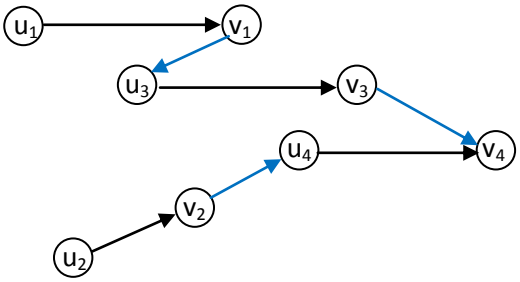

Fig. 3

In Fig. 3, the graph G is not a transport network since there are multiple sources u_i and multiple sinks v_i for i = 1,2,3,4. Therefore we produce an equivalent transport network H by tying the sources into a supersource "s" and tying together the sinks into a supersink "t".

H

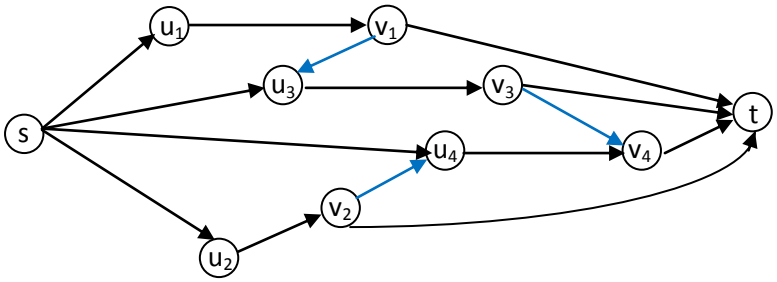

Fig. 4

2. Maximum Flow and Edge-Disjoint Paths

2.1 Definition. Let G be a directed bipartite graph with disjoint vertex sets V and W in which the edges are directed from vertices in V to vertices in W. A **bipartite matching** (simply **matching**) for G is the set of edges E with no vertices in common. **The size of a matching** for G is the maximum number of edges in E containing in that matching.

2.2 Definition. Let F be a flow in a transport network H. Then a **maximal flow** in H is a flow with a maximum value.

In general, there will be several flows having the same maximum value. We can find the maximum flow by using the algorithms (such as Ford-Fulkerson algorithm, Edmonds-Karp algorithm, Dinic's algorithm etc.). The following theorem is the relation between the maximum flow and matching.

2.3 Theorem. [1] Let G be a directed bipartite graph with disjoint vertex sets V and W in which the edges are directed from vertices in V to vertices in W. A flow in the matching network gives a matching in G. Then the vertex $v \in V$ is matched with the vertex $w \in W$ if and only if the flow in edge (v, w) is 1 and the maximum flow equals to the size of the maximum matching.

Proof. Let a(z) represent the source (sink) in the matching network and suppose that a flow is given.

Suppose that the edge $(v, w), v \in V$, $w \in W$, has flow 1. The only edge into the vertex v is (a, v). This edge must have flow 1, thus the flow into the vertex v is 1. Since the flow out of v is also 1, the only edge of the form (v, x) having flow 1 is (v, w). Similarly, the only edge of the form (x, w) having flow 1 is (v, w). Therefore, if E is the set of edges of the form (v, w) having flow 1, the members of E have no vertices in common, thus E is a matching for G. So that the number of vertices in V matched is equal to the value of the corresponding flow.

2.4 Definition. Let H be a transport network. Two paths are said to be **edge-disjoint** in H if they have no edge in common.

2.5 Definition. A flow F in a transport network H is called **0/1-flow** if every edge has either no flow on it, or one unit of flow.

2.6 Lemma.[3] Let F be a 0/1-flow in a transport network H with flow value k. Then there are k edge-disjoint paths between "s" and "t" in H.

Proof. By induction on the number of edged in H that has one unit of flow assigned to them by F. If k = 0 then there is nothing to prove.

Otherwise, start traversing the graph H from "s" travelling only along edges with flow 1 assigned to them by F. We mark such an edge as used, and do not allow one to travel on such an edge again. There are two possibilities:

(i) We reached the target vertex "t". In this case, we take this path, add it to the set of output paths, and reduce the flow along the edge of the generated path π to 0. Let H′ be the resulting flow

network and F' be the resulting flow. We have $|F'| = k-1$, H′ has less edges, and by induction, it has $k-1$ edge-disjoint paths in H′ between "s" and "t". Together with π this forms k such paths.

(ii) We visit a vertex v for the second time. In this case, our traversal contains a cycle C, of edges in H that have the flow 1 on them. We set the flow along the edges of C to 0 and use induction on the remaining graph (since it has less edge with flow 1 on them). The value of the flow F did not change by removing C, and as such it follows by induction that there are k edge-disjoint paths between "s" and "t" in H.

2.7 Theorem.[3] Let G be a directed, bipartite graph with each edge has a capacity 1. Then the maximum number of edge-disjoint paths is equal to the maximum flow in G.

Proof. Suppose there are k edge-disjoint paths P_1, P_2, …, P_k. Set $F_e = 1$ if e participates in some path P_i; otherwise, set $F_e = 0$. Since paths are edge-disjoint, F is a flow of value k. Conversely, suppose that the maximum flow value is k. By integrality theorem, there exists $\{0,1\}$ flow F of value k. Consider the edge (s, v) with $F_{sv} = 1$. By conservation, there exists an edge (v, w) with $F_{vw} = 1$. We continue until reach t, always choosing a new edge. Then we produce k edge-disjoint paths.

The above theorem shows the relation between the maximum flow and edge-disjoint paths.

3. Application of Maximum Flow

Now we solve the problem of airline scheduling if we are given the flights that the airline needs to serve. We can find the minimum number of airplanes needed to carry out this schedule. For example, see Fig. 3. We can use the same airplane for two segments "i" and "j "if the destination of "i "is the origin of the segment "j" and there is enough time in between the two flights for the required maintenance. The edge- disjoint paths of the network H in Fig. 4 can be seen as below.

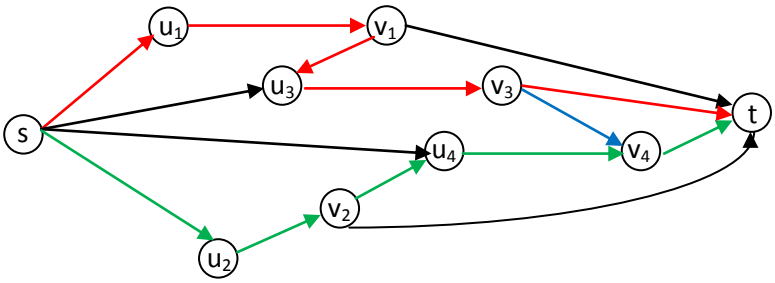

Fig. 5

If we denote the supersource "s" as Yangon and the supersink "t" as Sittwe, then the new schedule can be extended as follow:

1. Yangon (depart 7:00 A.M.) - Thandwe (arrive 7:30 A.M.)
2. Thandwe (depart 7:45 A.M.) - Ann (arrive 8:15 A.M.)
3. Ann (depart 8:30 A.M.) – Kyuakphyu (arrive 8:45 A.M.)
4. Kyuakphyu (depart 9:00 A.M.) - Sittwe (arrive 9:15 A.M.)
5. Yangon (depart 9:00 A.M.) - Thandwe (arrive 9:30 A.M.)
6. Thandwe(depart 9:45 A.M.) - Munaung (arrive 10:15 A.M.)
7. Munaung (depart 10:30A.M.) - Kyuakphyu (arrive 10:45 A.M.)
8. Kyuakphyu (depart 11:0 0A.M.) - Sittwe (arrive 11:15 A.M.)

Now Fig. 5 represents the transport network of the new schedule. Since we have two edge-disjoint paths from "s" to "t", the number of airplanes needed to serve for the new schedule is 2. So we use only two airplanes for the flights from Yangon airport to the airports in Rakhine State. In the following map, the flights of the required schedules can be seen.

Fig. 6

Conclusion

In this research paper, the problem can be solved if certain information about flights are given. It is sure that an airline needs to provide and generate a profitable schedule.

Acknowledgement

We would like to express our sincere thanks to Dr. Myint Swe, Principal of Taunggoke Degree College for his permission to write this research paper. We also wish to record our deep gratitude to Dr. Khin Sandar Win, Professor and Head of Department of Mathematics, Taunggoke Degree College for her encouragement and invaluable suggestions.

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