



สปพส.
สำนักงานส่งเสริม
การค้าระหว่างประเทศ



Proceedings

The 5th National and International Conference on Sustainable Community Development

Khon Kaen University

**“The Future of
Development
Towards Stability,
Prosperity and
Sustainability in the
ASEAN Community”**

December 24-25, 2015

At Centara Hotel & Convention Centre, Khon Kaen

Preface

Research and Technology Transfer Affairs Division Khon Kaen University has assigned the Research and Development Institute as well as various departments of the University including the Faculty of Humanities and Social Sciences, College of Local Administration, ASEAN Studies Center, The Office of North Eastern Development Cooperation, Khon Kaen University Library, and Bureau of Academic Service to host the 5th National and International Conference on Sustainable Rural Development entitled “Future of Rural Development: Toward a Prosperous and Sustainable ASEAN Community”. In this, the University has received supports from outside agencies acting as co-hosts, namely, the Thai Research Fund, Social Development Health Affairs Division, Local Development Institute, and Kow Yoo Hah Company Limited. In this, the objective is to publish scholarly works on community development that consistent with development strategy and policy that aim to improve the quality of life of the citizens that fit with a prosperous and sustainable ASEAN community in the future. Moreover, the Conference allows researchers, academics and graduates both nationally and internationally to develop their own field of studies through presentations and discussions. Over three days, over 200 paper and poster presentations will be given in various fields of studies with world-renowned experts attending as keynote speakers. Further, numerous special lectures will also be given by experts with additional exhibitions shown during break-out sessions by related agencies and sponsors. And after the conference was finished, RDI had made the proceedings to disseminate the conference.

The Conference committee would like to thank departments, faculties, researchers, academics, students and graduates from various educational institutions and agencies in submitting their research for presentations and exhibitions. Great appreciations also go to officials, administrators, lecturers, staffs, students and other individuals from various institutions who has supported the committee as co-hosts. Finally, the committee would like to thank general public who has registered to attend the conference. All of the supports mentioned above make it possible for the conference to achieve its objectives and goals in all aspects.

Research and Technology Transfer Affairs Division Khon Kaen University

January 2016

The 5th National and International Conference on Sustainable Community Development

“The Future of Development towards Stability,

Prosperity and Sustainability in the ASEAN Community

December 24-25, 2015

At Centara Hotel & Convention Centre, Khon Kaen

1. Rationale

In 2015, Thailand will officially become a member of the ASEAN Community, which represents a regional attempt for countries to unite under one community of collective assistance and sharing. ASEAN represents one vision, one identity, and one community built on a concept of strengthening and improving the negotiating power of regional Asian nations. ASEAN harnesses the power and determination of more than 600 million people and was engineered to become a powerful competitor on the global economic stage. The effects of globalization have fueled intense international competition, especially with existing and emerging superpowers. In order to successfully compete in this increasingly competitive global marketplace, the ASEAN Community was designed around 3 fundamental pillars, those being:

1. ASEAN Security Community - ASC, which focuses on the peaceful coexistence of member countries in the region
2. ASEAN Economic Community - AEC, which is focuses on economic integration and facilitating trade among members
3. ASEAN Socio-Cultural Community- ASCC, which is intended to enable the populations and countries of ASEAN to live together under the concept of assistance with social welfare and human security

As a member of the ASEAN Community, Thailand will benefit through increased national security, political stability, exports and trade, service opportunities, and social security. In order to do its part in the ASEAN assimilation process, Thailand will have to make adjustments to accommodate changes in all affected environments under the national policy leading by Prime Minister Gen.Prayut Chan-ocha to prepare and get ready for joining ASEAN in 11 aspects. The Thai population, especially in rural areas, will have to be made aware of the coming changes and develop strategies to both meet and exceed the demands of change.

Khon Kaen University plays an important role in learning and development, problem solving, and community development, especially in the Northeast region of Thailand. The community has come to expect and rely upon Khon Kaen University for guidance and leadership through times of

change and development for the better. In keeping with this tradition of leadership, Khon Kaen University has organized the national and international conference on sustainable community development for the past 4 years with the main focus on the ASEAN Community with the aim to offer consistency in presentations of work and exchange of knowledge as well as brainstorming among national and international researchers, academics as well as network members and stakeholders. This is done to search for methods for sustainable development of communities and to disseminate knowledge into the community aiming for creating stability, prosperity and sustainability in accordance with national vision and policy. This is the future image of the community, society and nation and makes entry into the ASEAN community adhere to the vision, identity and aims of the ASEAN community.

2. Conference objectives

2.1 To publish academic works relating to rural development that relate to ASEAN community integration, as well as other essential work by researchers, both nationally and internationally

2.2 To support research work in rural development so it can be used to develop quality of life for domestic and international rural populations

2.3 To discuss ideas and methods that will help prepare local people and the greater community to successfully assimilate into the ASEAN community

3. Anticipated results

3.1. Research in the area of rural development to be published in academic circles and effectively transferred into the community for collective community benefit.

3.2. To acquire methods that will allow communities to effectively accommodate forthcoming changes relating to ASEAN 2015.

3.3. To have researchers in higher education, local organizations, local administrations, village communities, and other interested parties present their research, domestically and/or internationally.

4. The format of the meeting

- 4.1 The keynote address by national experts.
- 4.2 The roundtable discussion (Inter panel Discussion) platform developed ASEAN community by developers from Thailand. And neighboring countries in ASEAN community
- 4.3 Presentation article / contribution of invited experts in the Semi Panel Symposium.
- 4.4 Academic presentations both Oral Presentation and Poster Presentation.
- 4.5 Platform offers a vision of the future development of the city / community.
- 4.6 The exhibition presents the work involved in the Success Model, Success Case.

5. Themes and topics under the conference titles:

5.1 Local Community Economy

- 5.1.1 The development of community enterprises and SMEs
- 5.1.2 Development of community strength, Network for Local Development
- 5.1.3 Development to raise the quality of products and agricultural products.
- 5.1.4 Linking agricultural goods into agricultural processing industries
- 5.1.5 Transport and logistics
- 5.1.6 Products transfer, services, investment, and labor mobility
- 5.1.7 Linking tourism with the local culture.
- 5.1.8 Tourism development to blend in with the lifestyle and culture.
- 5.1.9 Skills development and quality of life of older workers.

5.2 community Self-Reliance and Self Management

- 5.2.1 Sufficiency economy and self-reliance of local communities
- 5.2.2 Self-management of the local community.
- 5.2.3 Family Development Network Community and civil society
- 5.2.4 Development of tourism merged with local ways of life and culture
- 5.2.5 Format and learning process with the local community.
- 5.2.6 Innovation and Technology at the local and community development.

5.3 Food and Agriculture

- 5.3.1 Food safety
- 5.3.2 Food from local wisdom and culture.
- 5.3.3 Food Safety and health food.
- 5.3.4 Sustainable Agriculture and Alternative Agriculture.
- 5.3.5 Development of crops and livestock that fit the local context.
- 5.3.6 Agricultural Development for the state of climate change.

5.4 Health Promotion among People in the Community

- 5.4.1 The prevention, treatment, surveillance and restore the health of people and communities.
- 5.4.2 Thailand medicine and alternative medicine community.
- 5.4.3 Self-reliant community health.
- 5.4.4 Physical activity and lifestyle.
- 5.4.5 Quality of life by age

5.5 Natural Resources and Environment

- 5.5.1 Security s resources of the local community.
- 5.5.2 Management of disputes over natural resources
- 5.5.3 Management and control of natural disasters
- 5.5.4 Management processes for the environment in the Agricultural sector and manufacturing
- 5.5.5 Management of air and water pollution and garbage in community
- 5.5.6 Technology and Energy Management
- 5.5.7 Changing climate conditions and the adjustment of the Community.

5.6 Society and Culture

- 5.6.1 Culture and Tradition
- 5.6.2 Religion and Development
- 5.6.3 Language and Literature
- 5.6.4 Art and Performance
- 5.6.5 Educational Development
- 5.6.6 Elderly people and Aging Society

6. Target consists of approximately 300 participants

- 6.1 Academic and Researchers for Rural Development in national level and international level.
- 6.2 Administrators from universities in Thailand and other countries.
- 6.3 Representatives from provincial government, local administration, community research network, NGOs, private sectors and scholars.
- 6.4 Students and general audiences

7. For more details, please visit website <http://cscd2015.kku.ac.th>

8. Date, and Venue

Date : December 24-25, 2015

Venue : Centara Hotel & Convention Centre, Khon Kaen

Tentative

The 5th National and International Conference on Sustainable Community Development

“The Future of Development towards Stability,
Prosperity and Sustainability in the ASEAN Community

December 24-25, 2015

At Centara Hotel & Convention Centre, Khon Kaen

Date	Time	Activities
24 December 2015	08.00- 10.00	Registration/ Exhibition of Community Development Projects
	10.00 - 10.30	Opening ceremony by Prof. Dr. Supachai Pathumnakul, KKU Vice president for Research and Technology Transfer
	10.30 - 11.45	Keynote Speech I : M.R. DisanuddaDiskul, President of Institute for Promotion and Development Foundation initiated by His Majesty King
	11.45 -12.00	Award ceremony
	12.00 - 13.00	Lunch
	13.00 - 14.00	Keynote Speech II : Prof. Dr. Kanok Wongtrangan, Consultant of the Office of Northeastern Development Cooperation
	14.00 – 15.00	Keynote Speech III : Dr. Pholdej Pinprateep, Director of Local Development Institute
	15.00 – 18.00	Oral presentation each theme (8 rooms)
	15.00 – 18.00	Poster presentation
	18.00 – 20.30	Dinner talk on Khon Kaen Community Development for the Next Decade
25 December 2015	8.00 - 9.00	Registration/ Exhibition of Community Development Projects
	9.00 – 10.30	Panel Session I : Community Development under the Sufficiency economic philosophy
	10.30 -12.00	Oral presentation (6 rooms)
	12.00 - 13.00	Lunch
	13.00 – 14.00	Keynote Speech IV : Prof. Dr. Suthipun Jitpimonmas, Director of The Thailand Research Fund (TRF)
	14.10 – 15.00	Award ceremony and Closing Speech

Editorial Committee

Theme : Local Community Economy

Assoc.Prof.Dr.Apirat Petchsiri

Theme : Community Self-Reliance and Self Management

Assit.Prof.Dr.Siwach Sripokangkul

Theme : Food and Agriculture

Assoc.Prof.Dr.Suchint Simaraks

Theme : Health Promotion among People in the Community

Assoc.Prof.Dr.Orawan Buranruk

Theme : Natural Resources and Environment

Dr.Harit Intakanok

Theme : Society and Culture

Assit.Prof.Dr.Rattana Jantoa

International Academic Committee

Khon Kaen University

1. Assoc.Prof.Dr.Apirat Petchsiri
2. Assoc.Prof.Dr.Bundit Tengjaroenkul
3. Assoc.Prof.Dr.Kongsak Thathong
4. Assoc.Prof.Dr.Bundit Tengjaroenkul
5. Assoc.Prof.Dr.Chainarong Navanukokg
6. Assoc.Prof.Dr.Suchint Simaraks
7. Assoc.Prof.Dr.Tawin Wongpalub
8. Assoc.Prof.Dr.Sompong klaynongsruang
9. Assoc.Prof.Dr.Orawan Buranruk
10. Assoc.Prof.Dr.Wichai Eungpinitchpong
11. Assoc.Prof.Dr.Thanomwan Prasertcha-roensuk
12. Assoc.Prof.Dr.Unchalee Sarnrattana
13. Assoc.Prof.Dr.Prayong Saenpuran
14. Assoc.Prof.Dr.Somsak Srisontisuk
15. Assit. Prof. Dr.Orasa Kongtaln
16. Assit. Prof. Pitcharut Sanchaisuriya
17. Dr.Harit Intakanok
18. Dr.Pongsatorn Tahtrabundit
19. Dr.Supachai Ritjareonwattu
20. Dr.Jaranya Wongprom
21. Mr.Poomipak Pitakkhuan-Khun

Contents

International Oral Presentation

Theme 1 Local Community Economy		Page
International Oral Presentation		
A01	Local Wisdom Knowledge Management, Smarter Technology and Reputation of the Community Silk Manufacturer Rapheephan Phong-inwong	3
A02	Economic Stages, Asset growth, and equity returns in the Stock Exchange of Thailand Thitima Chaiyakul	8
A03	Community Participation in Tourism Enhancement: A Case Study of Pong Krai Village, Mae Rim District, Chiang Mai Province Anavin Suwanna	14
A04	Factors Influencing Employee Recruitment, Selection, and Training: A Case of Thai Industrial Sector Satawat Thiansai	19
A05	Palmyra sugarcake from Palmyra Palm (<i>Borassus Flabellifer</i>) in Phetchaburi, Thailand: The Process of Changing Traditional Knowledge into Money Adhisiddhi Nujnetra	20
A06	Factors Affecting Thai Consumers' Purchase Intentions of Buying Textile-Apparel Products Thanatphong Mangdindam	21
Theme 2 Community Self-Reliance and Self Management		
International Oral Presentation		
B01	Sufficiency Economy Pattern of Buddhist Concepts for Local Strengthening Wasita Kerdphol Prasopsak	29
B02	Upgrading traditional handicraft for poverty reduction* (Sri Lanka) Pornnarong Charnnuwong	33
International Poster Presentation		
P014	Participatory Planning in the Inclusive City: Place-based Innovation: Case study Children in Khon Kaen Municipal Rawee Hanpachern	43

Theme 3 Food and Agriculture		Page
International Oral Presentation		
C01	The Acceptance on Halal food among Non-Muslim consumers: A case of Thai Consumers Preeyapond Laosakam	49
C02	Establishing a Model Commodity for Goat Milk Production by TACFS and Processing of Goat Milk Products according to GMP in Nakhon Si Thammarat Visaka Anantawat	54
C03	Utilization of cassava, broken rice or corn as the sole energy source and add DL-Methionine in weaned pig diets. Chusak Pulmar	64
C04	Study on efficacy of two Thai toxin binder to ameliorate the adverse effects of mycotoxins contaminated diet in Cherry Valley ducks Kantapat Rattanasinthuphong	70
C05	Effects of Dietary Acid and Different Environmental Temperature on the Growth Performance of Weaned Piglets Tanaphoom Boonmee	77
International Poster Presentation		
P030	Effect of Carbohydrate Sources and Fresh Mao Pomace on Carcass and Meat Quality of Weaning Kadon Pig Tanaphoom Boonmee Kraisit Vasupen	82
P031	Effect of aflatoxin and Hydrated Sodium Calcium Aluminosilicate supplementation in duck diets on hematology and serum biochemistry Thianchai Sroirax	86
P032	Efficacy of Mycotoxin Binders (Elitox [®]) to Ameliorate the Toxic Effects of Aflatoxin in Ducks diets on clinical sign and bone porosity Wannasukon Sainate	92
P033	Efficacy of Non-active Vegetal Charcoal (BlackBio) to Ameliorate the Toxic Effects of Aflatoxin in Ducks Sawitree Wongtangtintan	98
P034	Comparative Study of Aflatoxin B ₁ Adsorption by Thai Bentonite and Commercial Toxin Binders at Different Temperatures <i>In</i> Bundit Tengjaroenkul	104
P035	<i>In Vitro</i> Adsorption Study of Aflatoxin B ₁ between Natural and Synthetic Zeolites Peerapol Sukon	116
P036	Peroxide, Microbiological Quality and Antibacterial Activity of Phenol Equivalents in Thai Honey: a Comparison with Manuka Honey Chuleeporn Saksangawong	127

Theme 4 Health Promotion among People in the Community		Page
International Oral Presentation		
D01	Health Promotion Administrative System in Primary Schools of the Basic Education Commission Office in Tak Province Sasiratha Khangkhetkorn	138
D02	The Wisdom of Indigenous Healers in the Holistic Treatment of Fractures Siriratana Juntaramano	145
D03	The Appropriate Environment for the Elderly for Living in the Low-income Housing of the Network of Community Organizations Development Institute Ching Rai Sakditat Sermsri	157
International Poster Presentation		
P041	The health knowledge Promotion of the elderly in line with the lanna folk wisdom. Narate Bunloet	165
 Theme 5 Natural Resources and Environment		
International Oral Presentation		
E01	The Design for Minimize Energy Consumption in Medium-Rise Office Buildings, KhonKaen Province Choopong Thongkamsamut	176
E02	Reutilization of Effluent Wastewater in a Wet Scrubber to Absorb Volatile Fatty Acids from Standard Thai Rubber 20 Production Process Worapot Rattanapan	186
E03	Development of Cement Boards with Ground Coffee for Environment Conservation Pramot Weeranukul	192
E04	Applied Sustainability and Eco-city towards Sustainable Urban Development Seng Touch	199
E05	Urban Environmental Sustainability in Thailand as concrete policy action Khwanchanok Ampha	209
International Poster Presentation		
P050	Cluster analysis of the eco-city concept Detchat Niyomtrong	218

Theme 6 Society and Culture		Page
International Oral Presentation		
F01	The Curriculum Development for Developing the Thai Language Creativity of the 4 th -6 th Grade Students by Torrance's Future Problem Solving Model.	222
	Benjaporn Laowongsee	
International Poster Presentation		
P056	Developing strategies and metrics of measurement model developed in Chiang Rai.	228
	Phramaha Padoungsak Sanyottithat	
P061	Using DRTA Strategies To Enhance English Reading Comprehension For The Sixth Grade Students	235
	Sireewan Romyen Wolther	
P071	The Study of Emotional Quotient (EQ) and Adversity Quotient (AQ) of King Mongkut's University of Technology Thonburi (KMUTT) Students	245
	Jiraporn Wongkerd	
P073	THE CORRELATION WITH LEARNING ACHEIVEMENT AND LEADERSHIP COMPETENCY OF UNDERGRADUATE NONG KHAI CAMPUS KHON KAEN UNIVERSITY	252
	Chawengsak Prueksathewet	

Oral Presentation Schedule

National and International Conference on Sustainable Community Development 5th

“The Future of Development towards Stability, Prosperity and Sustainability in the ASEAN Community”

December 24-25, 2015

At Centrara Hotel & Convention Centre Khon Kaen

December 24, 2015

Room : Ratchphruek 1

Theme : Local community economy

Presentation : International Oral Presentation

Chairman : Assoc.Prof.Dr.Apirat Petchsiri

Co-Chairman : Asst.Prof.Yaowarat Sriwaran

No.	Time	Article Title	Presenter
1.	16.30-16.45	Community Participation in Tourism Development: A Case Study of Pong Krai Village, Mae Rim District, Chiang Mai Province	Anavin Suwanna
2.	16.45-17.00	Factors Influencing Employee Recruitment, Selection, and Training: A Case of Thai Industrial Sector	Satawat Thiansai
3.	17.00-17.15	Palmyra sugarcake from Palmyra Palm (<i>Borassus Flabellifer</i>) in Phetchaburi, Thailand: The Process of Changing Traditional Knowledge into Money	Adhisiddhi Nujnetra
4.	17.15-17.30	Economic Stages, Asset growth, and equity returns in the Stock Exchange of Thailand	Thitima Chaiyakul
5.	17.30-17.45	Factors Affecting Thai Consumers' Purchase Intentions of Buying Textile-Apparel Products	Thanatphong Mangdindam
6.	17.45-18.00	Local Wisdom Knowledge Management, Smarter Technology and Reputation of the Community Silk Manufacturer	Rapheephan Phong-inwong

Oral Presentation Schedule

National and International Conference on Sustainable Community Development 5th

“The Future of Development towards Stability, Prosperity and Sustainability in the ASEAN Community”

December 24-25, 2015

At Centrara Hotel & Convention Centre Khon Kaen

December 25, 2015

Room : Ratchphruek 2

Theme : Community Self – Reliance and Self Management

Presentation : International Oral Presentation

Chairman : Assoc.Prof.Dr.Kongsak Thathong

No.	Time	Article Title	Presenter
1.	10.30-10.45	Sufficiency Economy Pattern of Buddhist Concepts for Local Strengthening	Wasita Kerdphol Prasopsak
2.	10.45-11.00	Upgrading traditional handicraft for poverty reduction* (Sri Lanka)	Pornnarong Charnnuwong

Oral Presentation Schedule

National and International Conference on Sustainable Community Development 5th

“The Future of Development towards Stability, Prosperity and Sustainability in the ASEAN Community”

December 24-25, 2015

At Centrara Hotel & Convention Centre Khon Kaen

December 24, 2015

Room : Ratchphruek 3

Theme : Food and Agriculture

Presentation : International Oral Presentation

Chairman : Assoc.Prof.Dr.Suchint Simaraks

No.	Time	Article Title	Presenter
1.	15.00-15.15	The Acceptance on Halal food among Non-Muslim consumers: A case of Thai Consumers	Preeyapond Laosakam
2.	15.15-15.30	Establiishing a Model Commodity for Goat Milk Production by TACFS and Processing of Goat Milk Productis according to GMP in Nakhon Si Thammarat	Visaka Anantawat
3.	15.30-15.45	Utilization of cassava, broken rice or corn as the sole energy source and add DL-Methionine in weaned pig diets.	Chusak Pulmar
4.	15.45-16.00	Study on efficacy of two Thai toxin binder to ameliorate the adverse effects of mycotoxins contaminated diet in Cherry Valley ducks	Kantapat Rattanasinthuphong
5.	16.00-16.15	Effects of Dietary Acid and Different Environmental Temperature on the Growth Performance of Weaned Piglets	Tanaphoom Boonmee

Oral Presentation Schedule

National and International Conference on Sustainable Community Development 5th

“The Future of Development towards Stability, Prosperity and Sustainability in the ASEAN Community”

December 24-25, 2015

At Centrara Hotel & Convention Centre Khon Kaen

December 25, 2015

Room : Ratchphruek 4

Theme : Health Promotion among people in the Community

Presentation : International Oral Presentation

Chairman : Assit.Prof.Dr.Orasa Kongtaln

Co-Chairman : Assoc.Prof.Dr.Orawan Buranruk

No.	Time	Article Title	Presenter
3.	11.00-11.12	Health Promotion Administrative System in Primary Schools of the Basic Education Commission Office in Tak Province	Sasiratha Khangkhetkorn
4.	11.12-11.24	The Wisdom of Indigenous Healers in the Holistic Treatment of Fractures	Siratana Juntaramano
5.	11.24-11.48	The Appropriate Environment for the Elderly for Living in the Low-income Housing of the Network of Community Organizations Development Institute Ching Rai	Sakditat Semsri

Oral Presentation Schedule

National and International Conference on Sustainable Community Development 5th

“The Future of Development towards Stability, Prosperity and Sustainability in the ASEAN Community”

December 24-25, 2015

At Centrara Hotel & Convention Centre Khon Kaen

December 24, 2015

Room : Convention 1-2

Theme : Natural Resources and Environment

Presentation : International Oral Presentation

Chirman : Dr.Supachai Ritjareonwattu

ลำดับ	เวลา	บทความ	นักวิจัย
1.	15.00-15.15	The Design for Minimize Energy Consumption in Medium-Rise Office Buildings, KhonKaen Province	Choopong Thongkamsamut
2.	15.15-15.30	Reutilization of Effluent Wastewater in a Wet Scrubber to Absorb Volatile Fatty Acids from Standard Thai Rubber 20 Production Process	Worapot Rattanapan
3.	15.30-15.45	Development of Cement Boards with Ground Coffee for Environment Conservation	Pramot Weeranukul
4.	16.00-16.15	Applied Sustainability and Eco-city towards Sustainable Urban Development	Seng Touch
5.	16.15-16.30	Urban Environmental Sustainability in Thailand as concrete policy action	Khwanchanok Ampha

ประเด็น : ทรัพยากรธรรมชาติและสิ่งแวดล้อม

ประเภทการนำเสนอ : บรรยายระดับชาติ

ประธานห้อง : ดร.ศุภชัย ฤทธิเจริญวิัตถุ

ลำดับ	เวลา	บทความ	นักวิจัย
1.	16.30-16.45	การถ่ายทอดเทคโนโลยีแอลอีดีเพื่อสังคมคาร์บอนต่ำ (การออกแบบ)	นายคิตชาย อุณหศิริกุล
2.	16.45-17.00	การศึกษาเชิงทดลองของพฤติกรรมการเผาไหม้ของแก๊สในเตาเผาฟลูอิดไดซ์เบดที่มีครีบริบรูตัววี	นายภาณุวัฒน์ หุ่นพงษ์
3.	17.00-17.15	การใช้เศษหินพิมพ์สำหรับพัฒนาเป็นผลิตภัณฑ์คอนกรีตบล็อกน้ำหนักเบาเพื่อชุมชน	นางสาวนิรมล ปั่นลาย
4.	17.15-17.30	การจัดการทรัพยากรประมงโดยชุมชน : กรณีศึกษาชุมชนประมงพื้นบ้านแหลมมะขาม ตำบลเขาไม้แก้ว อำเภอสีเกา จังหวัดตรัง	กัญญารัตน์ ตลิ่งผล

Oral Presentation Schedule

National and International Conference on Sustainable Community Development 5th
“The Future of Development towards Stability, Prosperity and Sustainability in the ASEAN Community”

December 24-25, 2015

At Centrara Hotel & Convention Centre Khon Kaen

December 24, 2015

Room : Ratchphruek 6

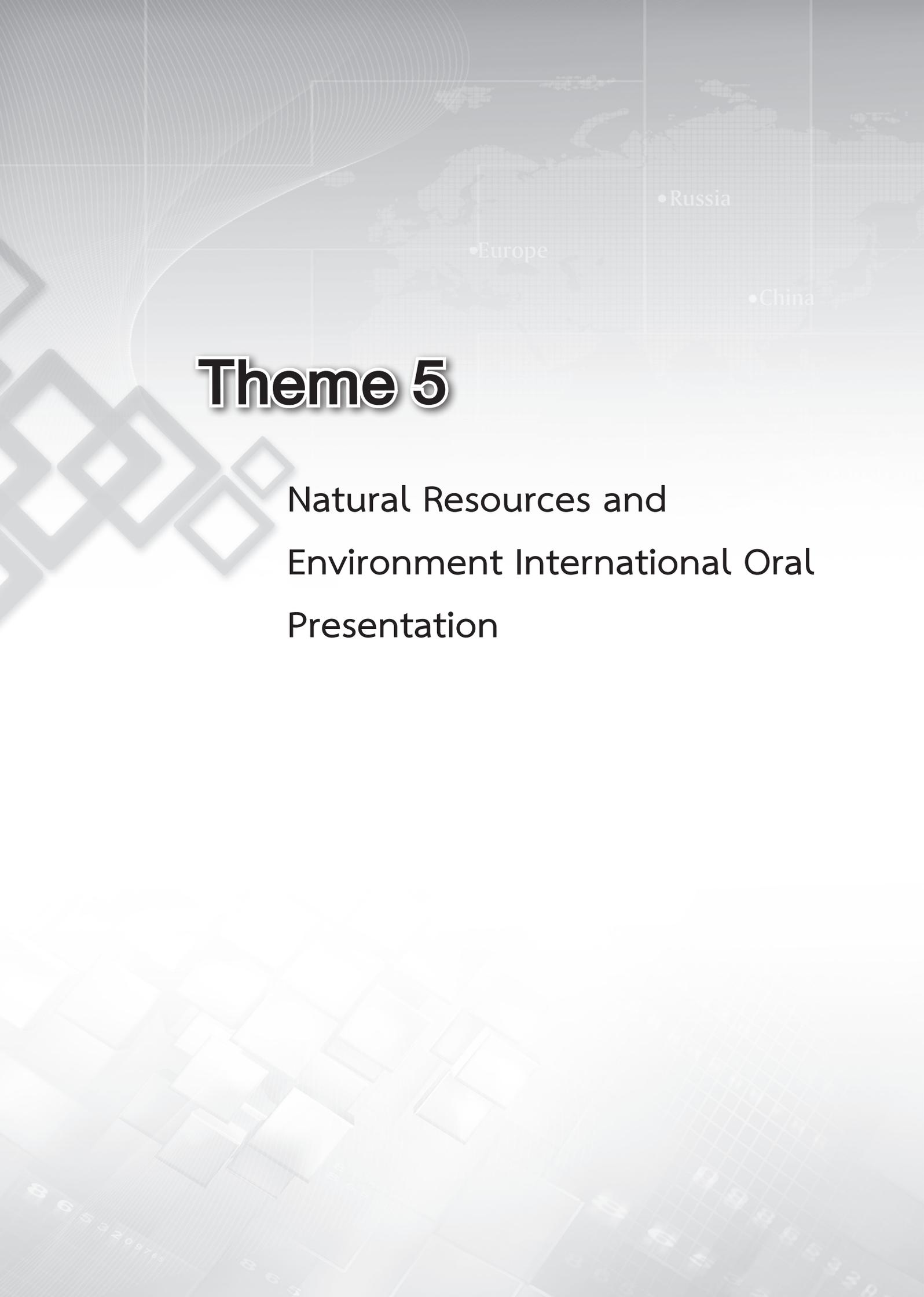
Theme : Society and Culture

Presentation : International Oral Presentation

Chairman : Assoc.Prof.Dr.Pennee Narot

Co-Chairman : Assoc.Prof.Dr.Kongsak Thathong

No.	Time	Article Title	Presenter
2.	15.15-15.30	The Curriculum Development for Developing the Thai Language Creativity of the 4 th -6 th Grade Students by Torrance’s Future Problem Solving Model.	Benjaporn Laowongsee



Theme 5

Natural Resources and
Environment International Oral
Presentation

Development of Cement Boards with Ground Coffee for Environment Conservation

Pramot Weeranukul* and Kittipong Suweero**

* Assistant Professor, Department of Industrial Engineering, Faculty of Industrial Education,
Rajamangala University of Technology Phra Nakhon

** Professional Counsellor, Technology Licensing Office of Rajamangala University of Technology

Abstract

The using of ground coffee wastes from industries to develop the cement board is an objective of this research that can solve the air pollution problems from smell and spreading of ground coffee wastes. The ratio of Portland cement type1: fine sand: tap water is equal to 1: 0.5: 0.416 by weight and the ratios of Portland cement type1: ground coffee wastes include 1: 0.05, 1: 0.06, 1: 0.07, 1: 0.08, 1:0.09 and 1: 0.10 by weight (6 ratios). The production of cement board uses the pressure casting in temperature 30 – 35 degree of Celsius and controls 0.75 g/cm^3 of density. The testing of cement-bonded fiberboard properties follow the TIS 878-2537 standard (cement bonded particle board: high density). From the results, 1: 0.05 is the most suitable quantity of cement: ground coffee wastes which mixed in cement board. This cement boards can reduce the ground coffee wastes by using as aggregate to produce the construction materials.

Key Words : Cement board, Ground coffee waste, Environment

Introduction

Coffee is main beverage of Thailand with annual income around 2,500 million baht per year. In 2008, the area of coffee planting was 388,662 Rais and had 50,442 plants. The most of breed was Robusta as 95%. Main source of planting is in Southern such as Choomporn, Surat Thani, Krabi, PhangNga, Nakornsri Thammarat and Prachuab Kirikhan, ect. For breed of Arabica was only 5% main source at Northern such as Chiang Mai, Chiang Rai, Mae Hong Sorn and Tak (Ong-art, 2008). Cement Board or Wood Board is product for construction instant house and used as component of housing, reduce cost of construction, due to favor to use as wall rather than mason (Department of Industrial Promotion, 1996). Cement board divided into 3 types; first type called in forest circle as wood-wood board or wood-wood cement slabs (W.W.S.) has standard

of TIS. 442-2525 about wood-wood board for general work (TIS., 2525), second type is cement-bonded particle-boards, wood chip are raw material has maximum density $1,250 \text{ kg./m}^2$ has standard of TIS. 878-2537, about cement-bonded particle-boards, high density (TIS, 2537) and third type is cement-bonded fiber board has same procedure as cement-bonded particle-boards but use fiber from wood rather than wood piece. Currently, this industry not produced as product and also no supervise standard. In the future fiber from Eucalyptus Camaldulensis and agriculture plant, such as palm oil may be used this plywood replaced fiber from Asbestos caused of pollution to environment.

The development is taking waste of instant coffee processing or coffee canned from industry factory as alternative material of cement board for both of internal and external. There is

properties of insulator, saving energy and reduce structure size of building which added value of ground coffee, as well as environment preservation.

Objectives of the study

This research has objective to development cement board from ground coffee.

Methodology

1. Material and tools

The mixtures of cement board with ground coffee were Portland cement type 1, ground coffee from industrial plants of Pathum Thani Province (Figure 1), fine sand and tap water. And the instruments included vibratcement board compressor, cement board formwork size 30x30x1.5 cm, flip-cement boardplatform, plastic supporter, and lubricant. The properties tests of this cement board were tested as TIS. 878-2537 (cement-bonded particle-boards with high density which the device such asmicrometer, scales and metal tape, etc., thermal conductivity tested machine, and universal testing machine (UTM).



Figure 1 Ground Coffee from Industrial factory in zone of Pathum Thani Province.

2. Research sequences

The development of cement board from ground coffee has method consist of

2.1 Design mixture of cement board from ground coffee for 6 ratios as table 1.

Table 1 Mixture by weight of cement board from ground coffee.

Ratios	cement	Fine sand	Ground coffee	Tap water
1:0.05	1	0.5	0.05	0.416
1:0.06	1	0.5	0.06	0.416
1:0.07	1	0.5	0.07	0.416
1:0.08	1	0.5	0.08	0.416
1:0.09	1	0.5	0.09	0.416
1:0.10	1	0.5	0.10	0.416

2.2 Measure the mixtures by weight and mix all mixtures by concrete mixer.

2.3 Form the mixturesto cement board by vibrate cement board compressor (figure 2) at normal temperature (30 – 35°C), minimize control density at 0.75 g/cm³ (Pablo, 1989) as size of 30x30x1.5 cm. Mold has plastic support and lubricant and cement board flipper, and then taking cement board to cure in the air at any period is 7 days, 14 days, 21 days and 28 days in order to further test.



Figure 2 The vibratcement board compressorfor molding the cement board.

2.4 Testing properties of cement board from ground coffee were tested as standard of TIS 878-2537 (TSI, 2537) and ASTM C177 (ASTM, 2010), such as general characteristics, density, moisture, thermal conductivity or thermal conductivity coefficient, swell, bending strength, elastic modulus and tensile strength perpendicular with surface by using 5 samples per ratio in every testing (Figure 3 to 5).



Figure 3 Soaked cement boards from ground coffee for swell test.



Figure 4 Testing bending strength and modulus of elasticity of cement board from ground coffee.



Figure 5 Damage of test tensile strength at surface of cement board from ground coffee.

2.5 Analysis and conclusion research is further commerce implementation.

Results and Discussion

From consideration and testing the properties of cement board from ground coffee both of mechanical physical and conductivity are summarized in each test as follows.

1. General characteristics, density, moisture and swell

The results of the inspection on general characteristics of cement board from 6 ratios of ground coffee that look perfect; that is, cement board has thickness, firmness and smooth consistency throughout the plate. As well as margin is set at right angles to the surface plane as standard of TIS 878-2537, about cement-bonded particle-boards, high density (TSI, 2537). Because there was mixed and molded sheet samples with preliminary design ratio. By mixing ground coffee into cement board is fail to mix cement per ground coffee is over than 1: 0.10 (a ratio of 1: 0.10). Because it will not freeze cement board and space is incoherent when exposed to fracture easily, as shown in Figure 6.



Figure 6 Non-rigid of cement board mixed with Ground coffee as ratio 1:0.15 was cured 7 days.

For result of test density, moisture and swell of cement board from ground coffee can be summarized in the Figure 7 through 9.

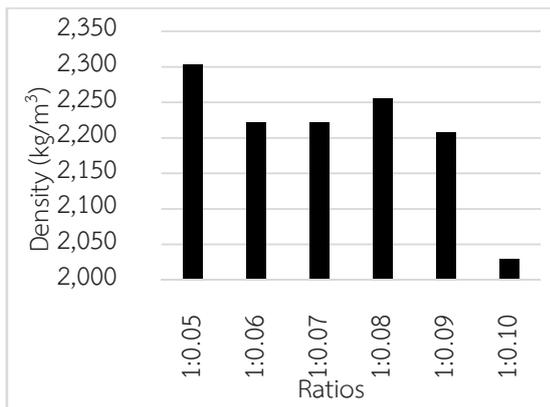


Figure 7 Density of cement board from ground coffee were cured 28 days.

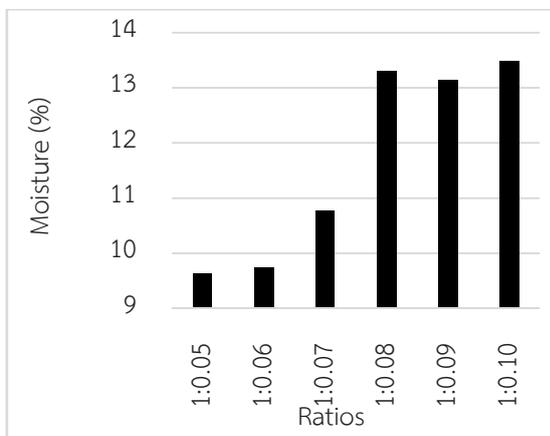


Figure 8 Moisture of cement board from ground coffee were cured 28 days.

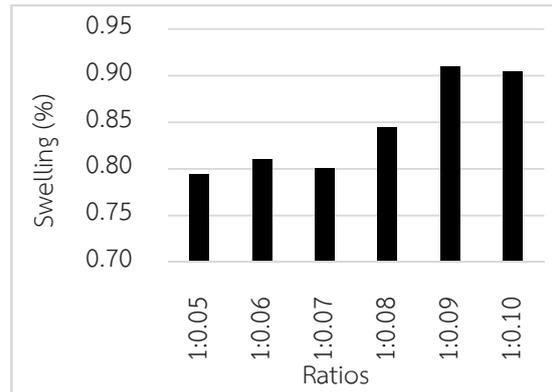


Figure 9 Swelling of cement board from ground coffee were cured 28 days.

Quantity of ground coffee has affect to physical properties of cement board in figure 7 through 9. This is to show that most of ground coffee is affect to light weight of cement board as ratio 1:0.10 is lightest weight of cement board and ratio of cement board 1:0.05 is most weight. Ground coffee has specific gravity only 0.80 which has gross mass of light weight (Parinya and Chai, 2008). In addition, ground coffee has affect to moisture and swell when soaked due to ground coffee is better absorb moisture, better moisture in cement board but not over than standard of TIS.878-2537. Specify is between 9-15% (TSI, 2537). In term of swell when soaked even if ground coffee will be easy swell when contact water, but cement is stick cement board swell is still in standard of TIS.878-2537 is not over 2% (TSI, 2537)

2. Thermal conductivity

The insulation is the important properties of cement board due to affects the energy savings in buildings. The cement board with better insulation has lower thermal conductivity. The result study on thermal conductivity of cement board from ground coffee is summarized in Figure 10.

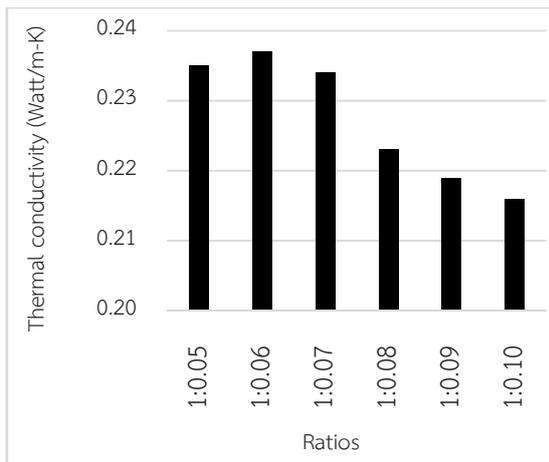


Figure 10 Thermal conductivity of cement board from ground coffee were cured 28 days.

From figure 10 found that mixed ground coffee has thermal conductivity or thermal conductivity coefficient of cement board is reduced or as better insulator (Thanunchai, et al., 2006). There are most of ground coffee of cement board is 1:0.10 is lowest ratio of thermal conductivity as 0.216 Watts per meter Kelvin, ratio of 1:0.05 is ratio of maximum thermal conductivity as 0.235 Watts per meter Kelvin. All of these are heating conduction accordance with standard of TIS.878-2537 has specified not exceeding 0.25 Watts per meter Kelvin (TSI, 2537).

3. Bending strength and modulus of elasticity

Properties of mechanical of cement board from ground coffee on bending strength and modulus of elasticity is summary as Figure 11 and 12.

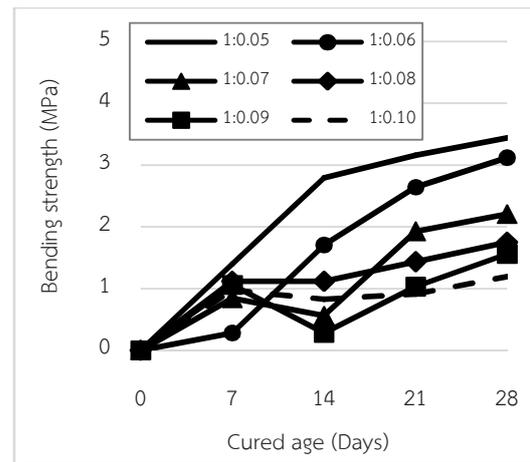


Figure 11 Bending strength of cement board from ground coffee were cured 28 days.

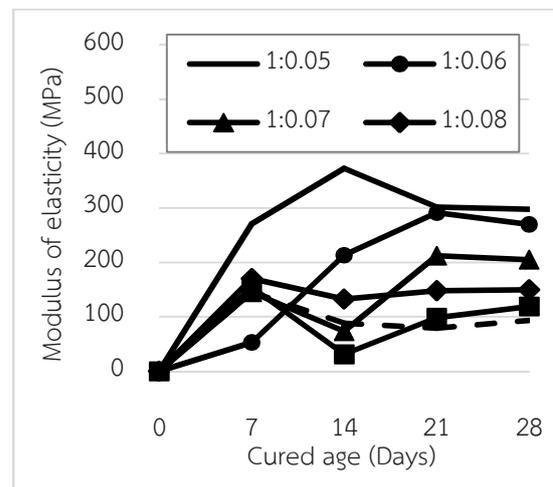


Figure 12 Modulus of elasticity of cement board from ground coffee were cured 28 days.

Figure 11 show that cement board from ground coffee has ratio 1:0.05, has maximum bending strength and next is ratio 1:0.06, 1:0.07, 1:0.08, 1:0.09 and 1:0.10 has minimize bending strength, respectively. It is result from mixed ground coffee is rather soft powder only mass in cement board without support (Parinya and Chai, 2008). To adding ground coffee is reduced strength when compared with standard of TIS.878-2537 (TSI, 2537) has specified bending strength not less than 9 Mega Pascal. Found that cement board from all of ground coffee has

lower standard. For result of testing modulus of elasticity (figure 12) found that cement board from ground coffee has higher standard of bend TIS 878-2537, see from modulus of elasticity of cement board from all ratio of ground coffee has lower than 3,000 Mega Pascal (TSI, 2537)

4. Tensile strength perpendicular with surface

For tensile strength perpendicular with surface of cement board from ground coffee in figure 13 found that, many ground coffee has affect to increase tensile strength perpendicular with surface. It is result from quality of ground coffee on extend texture of cement board has better support tensile (Bledzki and Gassan,1999) see from figure 14.

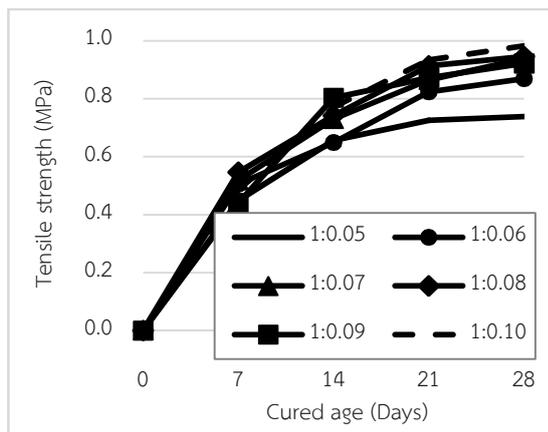


Figure 13 tensile strength perpendicular with surface of cement board from ground coffee were cured to 28 days.



Figure14 surface of cement board from ground coffee was damaged from tensile strength perpendicular with surface.

Conclusions

Cement board from ground coffee was developed to reduce quantity of waste ground coffee and preservation environment. Found that ground coffee is mixture with cement, sand and water and molded is better cement board by vibrate compressor, but cement board has some properties non-standard of TIS 878-2537, about cement-bonded particle-Boards with high density has only general properties, moisture, swell when soak and heat conduction has standard. In addition, cement board has much of ground coffee and light weight is better to tensile and is insulator. For less ground coffee of cement board will be more weight, better tensile strength and swell when soak. In term of further development cement board from ground coffee shall be add wood piece into mixture, in order to reduce density and more tensile strength of cement board. As well as method of molded by holding weight rather than vibrate, its possibility to development cement board from ground coffee has light weight and standard strength.

Acknowledgements

This research has support budget, Rajamangala University of Technology Phra Nakhon of 2015, the researcher would like to thank you at this occasion.

References

- Department of Industrial Promotion. 1996. Cement Board. Bangkok: Department of Industrial Promotion. Ministry of Industry, Industry Magazine. October - November 1996. (in Thai).
- Thananchai Pakhunworrakit, Phunda Putpaired, Worathum Ounjittichai, and Phanjira

- Thisawiphat. 2006. Effective heat protection of building insulation from agricultural waste. *Journal of Architectural/Planning Research and Studies*.3 (4): 115-122. (in Thai).
- Parinya Jindaprasert, and Chai Jaturapitakkul.2008. Pozzolan Cement and Concrete.5th Edition. Bangkok: Thai Concrete Association. (in Thai).
- Thai Industrial Standards Institute (TISI). 1982. Thai Industrial Standard in the shredded sheets of plywood with cement: general type (TIS. 442-1982). Bangkok: Thai Industrial Standards Institute, Ministry of Industry. (in Thai).
- Thai Industrial Standards Institute (TISI). 1994. Thai Industrial Standard in the high density cement particle boards (TIS. 878-1994). Bangkok: Thai Industrial Standards Institute, Ministry of Industry. (in Thai).
- Ong-art Chungthada. 2008. Coffee.Chumphon Horticultural Research Center, Bureau of Agricultural Research and Development Region 7, Department of Agriculture, Ministry of Agriculture and Cooperatives. (in Thai).
- American Society for Testing and Materials (ASTM).2010, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means the Guarded-Hot-Plate Apparatus ASTM C 177.Philadelphia: Annual Book of ASTM Standards.
- Bledzki, A.K. and Gassan, J..1999. Composites Reinforced with Cellulose based Fibers. *Progress in Polymer Science*.24: 221-274.
- Pablo, A.A. 1989. Wood cement boards from wood wastes and fast-growing plantation species for lowcost housing. *The Philippine Lumberman*. 35: 8–53.