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Architectures and Urban Planning

Commuting Behaviors in Vientiane Capital, Lao PDR

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Abstract

Lao PDR (Laos) is a least developed country (LDC) which is located surrounding with many Asian countries. The flow of development is highlighting the progress of policies based on the national development strategies. In many countries, capital city is facing both problems and challenges. In case of Laos, Vientiane is the capital of Laos with more than 700,000 inhabitants. From the 2015 national statistic, it is identified as the densest area among 18 administrative provinces of Laos. Regard to the condition of LDC, there are various problems including environment, health, economic, and transportation issues. The central government is also urging to tackle these problems.

According to the transportation system in the city center of Vientiane Capital, it should be solved and prior considered for long-term development. To solve this problem, the initiative step of urban and transportation planning should be taken in to account for the policy decisions. Urban and transportation planning approaches are the comprehensive direction to solve the poor environmental issues and reinforce the economic development. In this study, commuting behaviors are aimed to identify in terms of trip distribution. Commuting behavior is a significant indicator to explain the flows of transportation issues.

To clarify the commuting behaviors and solve the traffic congestion problem in the inner city of Vientiane Capital, commuting mode choices and traffic volume are considered crucially. Data and information are obtained both primary and secondary sources. The secondary data is simplify gathered from the previous study and reported policies. Primary data is processed on two directions: 1) vehicle volume recording; and 2) origin and destination data collection. Descriptive and regression model are employed to identify the behavior of commuters in the central area of Vientiane Capital. The primary results illustrated that the peak time and ordinary situations show only small gap in transportation flow.

Mode choices are identified outstanding on private automobile selection. The public transportation modes revealed insignificant statistically based on social interaction and commuting behavior. In addition, main destinations of commuters are defined in the central area within 10 km approximately. Therefore, land use and transportation planning should play an important role in traffic congestion problem in the capital city of Laos. In addition, public and green transportation modes should be considered long-term not only for reducing traffic congestion problems but also for long-life of health consideration in the sooner future.

Keywords: commuting behavior, vehicle volume, OD data, Vientiane Capital, Lao PDR

Study of Potential for Small Hydropower in Sangthong District, Vientiane Capital

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Abstract

This study investigates the potential of small hydropower schemes. Method for evaluating runoff are used: catchment area ratio considering the weight of the annual rainfall. Statistical runoff data from discharge gage station in Hinherb, and annual rainfall data from 11 stations surrounded, data period 2010-2014. A 1:100,000 scale topographic maps was used to locate the potential hydropower sites. Sites with the ratio of the length of the water segment to the water head of less than 20 considered. Evaluation of hydropower potential was conducted using maximum and minimum flow rates, 30% and 100% respectively, of time on the flow duration curve (FDC).

It was found that evaluation of the potential for hydropower sites in Santhong District, indicated 4 possible sites (3 sites on Sang river and 1 site on Ton river), all most sites of a dam scheme (no diversion). The total combined maximum power potential is 23,520 kilowatts; energy output per year is 142,303,594 kilowatt-hour. The 3th point on Sang river is most potential point, the power would be 7,467 kilowatts, producing 45,175,744 kilowatt-hour.

The study results can be used as preliminary data for investigations into the possibility dam site and development of a small hydropower in Sangthong district, However, this study emphasizes hydraulics engineering aspects therefore, further study on economic viability, flood volume, sediment volume, geology, which all affect hydropower potential, is necessary.

Keywords: Sangthong District, Vientiane Capital, Hydropower, Run off Estimation

Study on assessment of urban Center: Case study in Vientiane Capital

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Abstract

This study had the objectives to find out the urban center and evaluate sub urban centers using indicators and factors supporting urban sub-center developed in this study. The indicators and factors were developed from analyses of theory and standards of urban geography and urban planning disciplines and analysis of the urban planning guidelines both used in Laos and abroad. In this study provide the interview an evaluation of four Vientiane's sub-centers which JICA had determined such as: 1. Three village groups of Chanthabouly district, 2. Two village groups of Naxaithong district, 3. Thangone village group and 4. Khok Sivilay village groups of Xaythany district which were designated to be new sub-center to alleviate congestion in the core of Vientiane capital. In addition, the result of this research recommends guideline to further develop the designated sub-centers in order to achieve the goals of decentralization of Vientiane metropolitan.

The hypothesis of this research is that completeness of urban sub-centers can be measured by a set of factors and a ratio of demand and supply (carrying capacity) of these factors. There are six factors to measure sub-center's status: Population, Jobs, Land use, Public utilities, Public services, and infrastructure and transportation system. This includes the consideration of factors. The consideration explicitly considered in the most objective and should be used for education as well as capacity in response to a center city themselves.

The sub-centers were selected based on their population size, ranked as small municipality or third-level city center in Laos's urban planning guideline. The current data on the six factors were collected based on secondary data sources and data from surveying by interview. They were analyzed for current demands and compared to the selected standard (recommended carrying capacity). The score of each factor indicates whether the sub-center has been developed to the required level. The total score summarizes the sub-center's level of completeness. The factor score show what area of service the sub-center needs improvement in order to meet the demand and to provide the service at a proper level of sub-center.

For this study can be concluded the sub-center in the Vientiane capital City that includes four groups can be used as a reference or improve legislation, infrastructure, standards of urban planning and the background urban center in Laos to the dissemination across the whole country (Lao PDR).

The appropriate sub-centers should comply with the social economic development, population growth, and reduce the crowded urban affluent especially to urban. From this problem, it is necessary to improve of land use, turning the land into capital, trade center service, public utilities, public services and infrastructure between the center and sub center peripheral to ensure of the social economic growth in the future.

Keywords: Urban centers, Major business centers, The majority of urban center, Sub urban, Urban center evaluation, Public utilities, Public services, Infrastructure and General planning, land use planning ,Vientiane Capital City, Lao P.D.R.

Economics and Business Management

Promoting Farmer Production Group and Written Contract Farming in Northern Laos

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Abstract

This paper provides an assessment of cross-border contract farming between Lao PDR and China using the case of pumpkins in Luang Namtha province. In recent years, Lao government policy on contract farming promotion has shifted from the simple attraction of investment and commercial-based farming scales to the development of green and smart policy.

From the key informant interviews, the paper found that some investors have a direct contract at the village level without formal approval from the local authorities, which often causes a number of problems. The focus group interviews and questionnaire survey revealed that it was difficult and took many years for farmers to shift from a verbal contract to a written one. The findings showed that there are significant improvements and more benefits to farmers when working to a written contract, such as prompt payment, clearer quality standards and better collection of harvested products, although there are still the disadvantages of low competition and price, poor domestic market and insufficient policy support.

There are many supportive policy options such as providing more information to relevant partners, better coordination among stakeholders, incentives to private sector actors and the creation of mechanisms for trust and long-run relationships between farmers and investors. The most preferred policy option is to establish farmer production groups as the key instrument to promote sustainable contract farming and rural development of Lao PDR.

Academic Governance and Leadership in Lao PRD: A Late Reforming Transition Economy at a Crossroad

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Abstract

Lao PDR has made considerable progress in lifting access to higher education in response to increasing social demand. However, the institutional governance structures of all five public universities in the Lao PDR remain weak and the degree of autonomy granted to each of higher education institutions (HEIs) is unclear and varied. This paper examines the current situation and future directions of governance and leadership of Lao higher education system and institutions.

HEIs in a country like the Lao PDR characterized as late reforming transition economy are at a crossroad. Quality improvements in higher education must be accelerated to pave the way towards narrowing development or human resource gaps between Lao PDR and other ASEAN countries. More autonomy should be given to public universities; however, the reality is that the level of autonomy should match up with capacity in governance and management leadership of university authorities.

Under these circumstances with so called policy dilemma, following measures can be considered at the country level and the subregional level as a matter of priorities. At the country level, the quality of HEIs, especially newly established public universities at the provincial level need to be greatly improved. As a matter of priority, faculty/staff development including university authorities need to receive due attention by external assistance agencies and foreign universities which would be able to offer scholarships for postgraduate degrees, and by the Government of Lao PDR which should establish student loan or scholarship schemes. At the subregional level, the capacity of the GMS-UC should be strengthened and consolidated by conducting governance and management, teaching and research capacity development activities, and by promoting harmonization among member universities of the GMS-UC in terms of QA and credit transfer systems, which complements networks of universities, most importantly, the AUN.

Lao-Sino Railway Project Risk Management: Section 6 from Vientiane Province to Vientiane Capital

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Abstract

Lao-Sino Railway Project Risk Management section 6 from Vientiane Province to Vientiane Capital aims at assessing the socio-economic risks that the local community member perceived while developing railway and during the operation. The qualitative research approach was employed. The in-depth interviews were conducted with the Vientiane provincial project manager, director of Vientiane public works department, director of Vientiane provincial planning and investment department whereas the group discussions were made with the two communities alongside railway development plan. The context analysis was employed to interpret all the data transcribed from the interview and group discussion.

It was found that the risk was on the loss of agricultural land for crop production considered as the stable income generation including worry on land compensation for land development as well as intangible asset, buildings.

It was also found that the risk was also on the historical and cultural resources since during the development of railway there are immigrants with different socio-cultural background.

Economically, it was found that the risks were on the community natural economic resource, the non-timber forest products, specifically on the equal and fair accessibility to forest and aquatic resources.

It was also found that there would be the risk on local community members' income generation resource since the majority of the population was the traditional small-holder farmers, subsistent farmers with local traditional knowledge, which may not be adaptable to changing labour markets while the immigrants resettling may have new knowledge and technology adaptable to changing labour market. This competition may result in the loss of the common labour market for income generation due to the fact that the reliability on natural resource for income generation may not be possible.

Keyword: project socio-economic risk management

Export and Import Performance of Lao's Products

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Abstract

The objective of this paper is to identify key export products of Laos to the RCEP partners (ASEAN, China, Japan, Korea, Australia, New Zealand, and India) and to analyze import products which will affect domestic production. Export and import products of Laos were analyzed by using various trade indicators and trade data from International Trade Centre during the 2010-2014. In addition, trade performance of RCEP member countries were studied in order to compare with the trade performance of Laos. The Normalized Revealed Comparative Advantage (NRCA) was applied to analyze the export performance of Laos and to compare with RCEP members. The results of the study show that imports and exports were accounted for only 30% of the 6,558 products under HS code. Most of products having comparative advantage were natural resources. The product having the highest NRCA was product code 740311 (pure gold).

Keywords: Economic integration, Trade performance, NRCA

JEL Classification: F1, F15

Do Cash Transfers Help the Poor During Trade Liberalization? Evidence from Laos

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Abstract

Trade liberalization is prevalent in ASEAN. While trade liberalization promotes growth, it also creates winners and losers within a country. Therefore, governments need to create social protection programs to protect the poor from the negative impacts of trade liberalization. However, the research on trade liberalization has few studies that evaluate whether these programs are effective. Thus, our objective is to use the computable general equilibrium model and micro-simulation to assess the impact of these programs on poverty and income distribution. The results of this study indicate that cash transfers reduce poverty and narrow income inequality during trade liberalization.

Keywords: Social Protection Program; Trade liberalization; Poor; and Laos
JEL Classification: D33; E27; F13; I32; O15

Analysis of Financial Performance of Banking Industry in Lao PDR using CAMEL Approach

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Abstract

The banking industry in Lao PDR has been significantly developed in last decade. However, there were no previous studies to compare the performance among commercial banks in Lao PDR. The objectives of this research are to understand the financial situation and trend of banks operations in Lao PDR, to assess the efficiency of banking industry operations in Lao PDR and to compare the financial performances among 28 banks in Lao PDR and with Bank of Lao PDR standard and international standard. The CAMEL ratios of Bank of the Lao PDR (BOL) were applied where they were Capital Adequacy Ratios (C), Asset Qualification Ratios (A), Management Ratios (M), Earning Ratios (E) and Liquidity Ratios (L). The result shows that Public Bank Savannakhet Branch and Sikhai Branch were the best financial performance. It followed by Bank of Ayudhaya (Savannakhet Branch), Public Bank (Vientiane Branch), Booyong Bank and Krungthai Bank respectively. Finally, the last three of banks' performing were Banque Franco Lao, Lao Construction Bank and Phongsavanh Banks, respectively.

The Impact of Household Characteristics and Government Provision on Early Childhood Development in Laos

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Abstract

Early childhood development (ECD) such as pre-education is a key determinant for future success of children. Number of studies suggest a significance of early education, or pre-primary level, on the long life earning, health status, criminal behavior, etc. Although ECD is very important, many children do not receive a proper ECD program. In Laos, many children in pre-primary education age could not access to the ECD program. Therefore, this study aims to investigate the factors that determine the likelihood to access ECD program of children in Laos. The interested factors are household factors and the provision of the government on ECD. This study applies an econometric equation with household data named 5th Lao Expenditure and Consumption Survey. The result from this study confirms the existing literatures as well as fill in a missing gap on ECD study in Lao context.

The Motivation Factors to Become Entrepreneurs, the Case of BBA Students, Faculty of Economics and Business and Management, National University of Laos

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Abstract

The study is aimed to identify motivation factors to become entrepreneurs on the case of BBA students at Business Management Department, Faculty of Economics and Business Management, National University of Laos. The methodology of this study was formed in quantitative research. The study has been conducted by collecting information and data from 190 questionnaire respondents of 3rd and 4th year students of Business Management, Department of Business Management, Faculty of Economics and Business Management. The information was analyzed and interpreted by SPSS for Windows, Version 21.0. The total respondents of this study are 190 people, the majority is female (56.84%), age between 20-21 years old, which represents 43.68% of the samples, 98.42% are single, senior student is 54.21%, the average CGPA of the majority samples is 2.50 – 2.99 which is 43.68%, the majority of the samples are from other provinces remained 56.32%, most of the respondents' fathers work for the government (37.37%) and most of the respondents' mothers are farmer (33.16%), government officer is chosen as the first career after the graduation of the sample remained 40.53%, all of the samples (100%) desire to establish a business in a lifetime, the average to start up a business within 1-3 years after the graduate school is 44.74%. The result of the study reveals that the main motivation factors to become entrepreneurs are the intrinsic motivation with the mean of 4.24; subsequently is the extrinsic motivation which is remarkable with 3.62.

Land Concession for Rubber Tree Plantation in Bolikhamxay Province

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Abstract

The land concession for rubber tree plantation in Bolikhamxay Province aimed at firstly examining the impacts on socio-economy and environment; secondly investigating the practice of land concession by looking at the procedures, the implementation itself and the monitoring and evaluation of the project; and finally identifying the gap between the guiding rules, regulation and the laws related to the concession and the practice. Both qualitative and quantitative research methods were employed. The in-depth interviews were conducted among the directors of the provincial departments of planning and investment, agriculture and forestry and natural resource and environment. Apart from that the heads of district offices of planning and investment, agriculture and forestry and natural resource and environment were also interviewed while the group discussions were made with chief of villages and the village committee members. For quantitative data collection the open-ended questions were used with total of 100 forms in Ban Phoxay, Pakkading District, Vietnamese Rubber Company and 100 forms in Nakhapha Thaphabath District. The content analysis was employed for qualitative data while the software of Social Package for Social Science 19 was used for frequency and percentage.

It was found that the land concession in Bolikhamxay commenced in the provincial department of planning and investment who has officially in hand to accept the land concession with their consultation system to the provincial department of agriculture and forestry and the provincial department of natural resource and environment. There was direction system from the provincial responsible bodies to district level and to the community.

It was found that the socio-economic impacts of the community people nearby the project was the accessibility of non-timber forest products, which were considered as the community basic household income as it was found that the use of chemicals had major impacts on environment, specifically aquatic lives and wild lives.

It was thirdly found that the permission was not well performed in accordance with regulations of the land concession since the environmental and social impact assessment was later performed when the project has already operated for five years. The monitoring and evaluation of the project was not known in practice by the community people or event district responsible authorities.

It was finally found that, according to the in-depth interviews and the group discussion among the chiefs of the village and village committee, the participations of the communities in decision-making, project design and mitigation were not at all consulted so that the practice of the land concession, specifically the communication were not well-interlinked as top-down and bottom-up approach.

Education

The Development of Mathematics Learning Management Strategy by Integrating Metacognition Theory and Opened Approach to Enhance Mathematical Outcomes of Bachelor Students of the National University of Laos

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Abstract

The purposes of this research were: 1) The mathematics learning strategies management develops by integrating metacognition theory and opened approach 2) To study the results of using the strategy of designing learning through integrating metacognition theory and opened approach. This research is carried out in three phases as follows: **Phase 1** Study the situation and problems of designing the mathematical learning of the bachelor degree student from theoretical trends and literature related to mathematics achievement and creativity. Interview key experts on math education and math teachers. **Phase 2** Based on integrating the data from phase I, develop strategies for designing learning. Have experts critique the strategies developed during phase II. **Phase 3** Research the results of actually using an integrated theory of metacognition and opened approach by experimentally testing the strategy. The group for this year 1 bachelor degree student in the national university of Laos second term fernery academic year 2015. This is one class rooms with a total of 29 students. This represents a cluster sample. Students were randomly assigned to an experimental. The period of the experiment was for eight weeks, with four hours of instruction each week. There were four instruments used in the study, namely: 1) The lesson plans for instruction 2) Mathematics achievement test. 3) The kills process of problem solving mathematics 4) An instrument to measure attitudes toward the subject of mathematics. The basic research design for the study was a classic pre-post control group design.

Summary of Findings

1. The strategy A major result of this research is the development of a strategy of designing learning through integrating metacognition theory and opened approach paradigm with the following five key elements: 1) The goals of the strategy 2) Basic theoretical foundations 3) Basic principles of the strategy 4) Factors and process of the learning strategy beginning with four levels of learning, namely: Thinking urged. Check for new content. Solve. Summary knowledge by reference and evaluation 5) Evaluating the strategy

2. Results In assessing the results of using the strategy there were four major findings: 1) Achievement scores are average After learning was higher than before learning. 2) Scores problem solving skills learning are average After learning was higher than before learning. 3) Attitude Score are average after learning higher than before learning.

The Development a Causal Model of Influencing Mathematics Achievement of Mathayomsomboon Sueksa 7 Students at Saithany the Vientiane Capital of Lao People's Democratic Republic: Multiple Group Analysis

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LOEI RAJABHAT UNIVERSITY

Abstract

Student's mathematic achievement tells how successful mathematic study is. If an activity planning is appropriate and useful, it will result in good achievement. The research was aimed at: 1) developing and validating the factor model influencing mathematics achievement of Matthayomsomboon sukka 7 student at Saithany the Vientiane Capital of Lao People's democratic republic; and 2) testing the invariance of the form and parameter factor model influencing mathematics achievement of Matthayomsomboon sukka 7 male and female students at Saithany the Vientiane Capital of Lao People's democratic republic. The sample consisted of 1,024 students in the second semester of the academic year 2015 at Saithany selected through two-stage sampling. The research instruments included a 50 –item-mathematic achievement test, 20–item-math aptitude test and the item difficulties ranging from .029 to .080, item discrimination powers ranging from .020 to .80 and the overall reliability of 0.85, and 50 –item questionnaire for students with the overall reliability of 0.90, model validation, and multiple group analysis were used to analyze data. The results of the study were as follows:

1. Regarding developing and validating the factor model which had influence on mathematic achievement of Matthayomsomboon sukka 7 student at Saithany the Vientiane Capital , it was found that the model was consistent with the empirical data, generating the consistent indices such as $\chi^2 = 351.78$ $df = 350$, $p = 0.484$, $RMSEA = 0.001$, $GFI = 0.981$, and $AGFI = 0.972$. From an overall model, the observed variable of achievement variables for mathematics study with the most load-bearing structure was attitudes towards mathematics (ATT) and the variables directly and indirectly influencing mathematics achievement included math teacher's quality of teaching which gave the value of the indirect effect through achievement motivation (AM) and entry knowledge (EK) having direct and indirect and giving the value of the indirect influence through self-confidence and attitudes towards mathematic. The variables which had only indirect influence on mathematics achievement were peer relationships (PER) and achievement motivation (MOT) which gave the value of the indirect influence through attitudes towards mathematics (ATT). As a whole, mathematics achievement (MAC) had predictive coefficient (R^2) of 0.51, and it was the internal-inherited-variable which could explain about 51

per of the variance o mathematics achievement of Matthayomsomboon suksa 7 students at Saithany the Vientiane Capital.

2. with reference to testing the invariance of the form and parameter factor model influencing mathematic achievement of Matthayomsomboon suksa 7 students at Saithany the Viettiane Capital, it was found that the model did not have the invariance of the form according to the testing results including $\chi^2 = 847.53$ $df = 672$, $p = 0.000$, $CFI = .99$, $RMSEA = 0.021$, the analysis model explaining about the invariance of estimating parameter values by using multiple group analysis was Assumption Model 4 which set up the condition of the invariance of parameters for 4 matrixes including 1) structure loading matrix of external-observed variables (Ax), 2) structure loading matrix of internal-observed variable (Ay3) 3) matrix for effect of internal-inherited-variable and internal-inherited-variable (β), 4) matrix for effect of internal-inherited-variable and external-inherited –variable (Γ). Matrix which had the least difference of parameters between groups was Matrix BE (β), followed by Matrix GA (Γ) and this showed that matrix of parameter did not vary among groups.

In conclusion, there were many factors influencing mathematics achievement of Matthayomsomboon suksa 7 students at Saithany the Vientiane Capital. Based on the multiple group analysis, it was found that the model which did not vary among group was sex. It did not influence or obstruct the activities planning for developing student's skill to gain characteristics according to the variables at the outset. Both male and female students had achievement in studying together. Therefore, entry knowledge, math teacher's quality of teaching, parents and student should facilitate, support and develop such factors in order that students are able to develop mathematics achievement and further reach the goal and standard of national education.

Faculty Attitudes towards Research at National University of Laos

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Abstract

In higher education, positive attitudes by faculty have been a focus of development in order for enhanced faculty scholarly productivity. In Laos, faculty research productivity has been lagged behind, majority of Lao faculty members teach rather do research. This paper, therefore, studies attitudes towards research of Lao faculty members working at the National University of Laos (NUOL). The objectives were to (1) examine and describe faculty attitudes perceived or exhibited towards research; and (2) compare faculty attitudes among faculty groups categorized by demographic differences. A mixed-method approach was employed for this study. 200 faculty participants completed a self-administered questionnaire survey, 30 of which were purposively selected for a follow-up interview. The study focuses on six dimensions in attitudes towards research: personal interest in research, the perceived usefulness of research, self-efficacy for research, the perceived value of professional training on research, commitment to research, and perceived institutional support for research. Participants were asked to rate their agreement levels on a four-point Likert-type scale. This study also compares faculty attitudes according to different attributes of gender, age, educational level, rank, and discipline with analyses of an independent t-test and one-way ANOVA.

The results indicate that faculty participants were likely to express more positive attitudes towards research with respect to three dimensions compared to the other three, the perceived usefulness of research, personal interest, and the perceived value of professional training ($M= 3.24$, $M= 3.19$, and $M= 2.86$, respectively). Faculty participants perceived importance of research as it improved their teaching effectiveness. It also helped them get promoted and tenured. However, faculty participants were likely to exhibit low self-efficacy and commitment to conducting research due to perceived obstacles, for example, limited English language proficiency, the low bandwidth of Internet connections, lacking opportunities of exposure to research activities, and etc. Even more, they were likely not to be satisfied with the departmental and institutional support and management such as facilities, work appointment, fund and funding skills. Interview data detailed more that departmental support for faculty members in research activities was not really high. Comparative analyses indicate that faculty members at a professorial rank, holding a PhD degree, male, and/or of an older age tended to perceive research more positively than others. In order to improve Lao faculty members to be more productive in doing research, it is recommended for the institution and related departments to give more regular support, not only fund and facilities, but also providing them opportunities of further education abroad.

Enhancing Competency Based Teacher By (CO)² Action Plan for Innovative Classroom Learning Management

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Abstract

The purposes of this research were: 1) to develop the course of enhancing competency based teacher by (CO)² action plan 2) to testing the effectiveness the course of enhancing competency based teacher by (CO)² action plan for innovative classroom learning management. Step methodology of research and divided into 4 phases; 1) Development; 2) Testing; 3) Implementing; 4) Evaluation. The course developed by using data of context concept framework, and guideline for data based instruction was collected by doing in-depth interview with 8 stakeholders. The focus group session with 5 experts was used for considering competency indicators and 5 experts monitored the congruency the course, tried out with 23 non-subjected teachers. The research was conducted with 25 civics teachers who were qualified by Ministry of Education and Sports. The teachers were undergraduate students of Faculty of Education, National University of Laos and in second semester of the academic year 2015-2016. The first result for development of the course were consisted competency-based teachers 5C, 8F and 39 indicators, 5 components 7 activities, 16 training hours for theory and practice. Methodology of training to use classic competency based teacher by action research in class room (PAOR) + C.

The second result for testing the effectiveness of the course test part theory score in terms of knowledge, skills, attributes civics teacher 25 persons over the set criteria 70 percentages up, and also the 21 civics teachers who passed the effective part performance rate more than 84 percentages and 19 civics teachers passed contesting expert performance classic competency based by (CO)² action plan more than 76 percentages. But who did not passed the effective rate of less than 70 percentages were 6 civics teachers 28 percentages.

The course was found that the all of civics teacher to develop 25 innovative classroom learning management and the effectiveness of the course test part theory and performance the course over set criteria 70/70.

Keyword: Competency Based Teacher; (CO)² Action Plan; Innovative learning.

Application of Information Technology to Initiate Interactive Self-Learning in Chemistry Project

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Abstract

Lack of instructional media aids for chemistry studies is a serious obstacle for students to reinforce their knowledge to achieve their teacher pre-service qualification. In order to remediate this situation, our project based on creation of lesson summary and proposed quiz exercises, using JQuiz as software support for interactive self-learning is a way to overcome this obstacle.

The purposes of this project are: (1) provide an instructional media aid containing a summary of lesson content with series of proposed quiz exercises in General Chemistry and (2) evaluate the students' self-learning process with its impact on their results.

The methodology consists to compare the student's performance between two lots: the reference group with 24 students and the experimental group with 20 students. The research instruments used are: (1) the subject final score marks for all the students in both two groups (lots); (2) the subject paper test covered all whole content in both two group; (3) the questionnaire about student's involvement in subject study and student's representation about this "Interactive Self-Learning in Chemistry"; (4) Student's behavior observation in computer room while self-learning sessions.

Principal results are:

- (1) The subject final score mark (average, maximum and minimum) is a bit higher in reference group than in the experimental group.
- (2) The subject achievement evaluated by the subject paper test (average, maximum and minimum) is significantly higher in the experimental group than the reference group.
- (3) The questionnaire informs that the experimental group practices self-learning more than the reference group.
- (4) The student's behaviors observation informs about most student's priority while doing activities in the computer room.

The conclusion for this study is that this project completely fits to student's needs in providing interactive instructional media. This research recommends extending this kind of project for others subjects.

**An Investigation of EFL Learners Using the ICT: The Case of Laos
Undergraduate Students at the National University of Laos**

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Abstract

This study has a main purpose to investigate the current status of using of Information and Communication Technology (ICT) among the learners of English as Foreign Language (EFL) in the National University of Laos (NUOL). A quantitative research method is employed to examine the demographic characteristics of participants, computer and internet access available, efficiency of internet access and its facilities in the university, and students' computer and internet skill levels. Research sample was stratified randomly selected from a total of 415 students who have studied in various departments of the university. These findings of the research have shown that the use of ICT among the students was relatively low. The level of computer and internet skills among these students were also at worrying figures with only a small percentage of them has the required skill to engage in ICT based tasks. The analyses also confirmed notable concern over the use of ICT in the learning of English as Foreign Language. Results revealed that most of the students did not have the facilities and the skill to utilize the ICT despite knowing that the internet has an abundance of resources for English language learning. The evidence from the research suggest that it is very importance of increasing availability and accessibility of ICT and internet as these would enable students to enrich and equip themselves with the relevant ICT and internet skills. A number of practical recommendations were outlined in order to make these students to familiar themselves with ICT as well as to be the true 'citizens' of the Digital World.

Key word: Investigation, EFL Learner, Undergraduate student, National University of Laos

Motivating Students is the Key to Prosperity of A Nation

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Abstract

Thailand's economy is transforming from a resource-intensive, industrial-based, and now to an innovation-driven platform in which many more skilled manpower is needed across all disciplines. Thai government has deployed and worked very quickly in many new and exciting policies, initiative projects, and incentives, but in some areas such as education cannot be built over a night. For many years education has evolved to prepare new generation to best meet economic and social demands of manpower in that era. But now with industrials and social changes around the world, the gap between who is needed and who university can actually prepare is even wider than that in the past. This fact seems to contradict what was observed in the society today: young generation is better in internets and information technology than older ones, despite of the fact that technology is the key to all industry. We must address many important questions such as what industry really want, how to prepare students that equipped with necessary skills for the 21st-century job, what the classroom strategies and management that enhance students' ability to meet industry demand, etc. We as educators have to remember that students are in schools for mere 15-25 years but they must acquire necessary knowledge, skills and attitudes for 40-50 years of their careers. We must together help linking today's demand-driven economy to today's education. It all starts with a simple strategy of "motivating students," following by engaging them in deep thinking and thus giving them feedback to help them learn. My presentation will give details of what a nation needs to what a university should do, and discuss on how a university can build a nation.

Language and Cultures

Problems with Spelling in the Lao Language

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Abstract

There have always been problems associated with the spelling of words in the Lao language. Before the founding of the Kingdom of Lanxang, the practice of spelling was guided by the conventions of local pronunciation. Even though the principle of spelling according to local conventions is not a standardized system, it is possible to work out the meanings of words that are spelled in this way. In the last part of the French colonial period, the Lao language was revived as the national language. During this period, there were two main streams of thought. The first stream of thought advocated for etymological spellings. The second stream promoted the development of a system that enabled spelling to be done according to heritage pronunciation. Neither of these streams of thinking was able to establish itself as the agreed method in a satisfactory way. The first stream was used only in a limited area of linguistic practice, and did not last ten years. The second stream ended up becoming the foundation for the development of a spelling system for the Lao language. This paper will examine the roots of this problem, and make a proposal for the solution of these problems, based on the natural use of the Lao language, but based in relevant linguistic principles of phonology – that is, research into and use of the natural phonemes of the Lao language for the solution of problems with the spelling of Lao words.

**The Phonology of Tai Khang dialect in Mueang Viengthong
Bolikhamsay Province, Lao PDR**

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Abstract

Tai Khang is one of Tai ethnic groups who moved from Xiangkhouang Province to the area of Mueang Viengthong, Bolikhamsay Province, Lao PDR. Most of people have perceived that “Thai Khang” ethnic group is the same as “Lao Khrang” in Thailand.

This article aimed to study the phonology the Tai Khang dialect in Mueang Viengthong, Bolikhamsay Province, Lao PDR. Moreover, this study will use linguistic methods of descriptive and comparative linguistics by comparing the phonology of Tai Khang dialect and Lao Khrang dialects. The result of the research found as the followings. Firstly, Tai Khang is composed of 18 initial consonant phonemes, 20 vowel phonemes, and 6 tone phonemes. Secondly, in comparison to Lao Khrang dialects, Tai Khang has changed, i.e. from voiced stops to voiceless stops; while Lao Khrang’s voiceless stops have changed into aspirated stops. In terms of vowel system, Thai Khang vowels have changed from $/*-\leftrightarrow\alpha-$, $*-e\alpha-$, $*-o\alpha-$ / to $/-\leftrightarrow]- /$; while Lao Khrang vowels have shifted to $/-a- / +/j/$. For the tonal system, Tai Khang’s tonal system is the two-way split and B and DL tones have merged; while Lao Khrang’s tonal system is the three-way split and B and DL tones have not merged. In conclusion, The Tai Khang language is the member of p group in Tai language family, and is able to be classified in non-Lao language group.

Keywords: phonology, Tai Khang

Law and Public Administration

Study the Manner of Administrative Conflict on Water Use Rights

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Abstract

The Study the Manner of Administrative Conflict on Water Use Rights, which has objective to study the relevance regulations on administrative conflict on water use rights and to study the method of administrative conflict resolution on water use in Lao PDR, this study uses survey method, which qualitative data was collected from Department of Water Resources -Ministry of Natural Resources and Environment, Department of Natural Resources and Environment of Viengchanh province and Champasack province. Grouping of comments as data analyzed method, and research findings were compared to principles of laws.

The result of this study found that: the laws and regulations of administrative conflict mediation on water use rights in Laos provide the processes and methods of mediation such as the process of water resources management authorities, which includes village environment unit, forest and water resources of district natural resources and environment office, water resources division of provincial department of natural resources and environment, department of water resources under the ministry of natural resources and environment.

Almost of administrative conflict methods on water use rights in Laos always use mediation process by ad hoc committee, which means that the result of mediation is based on mediation between the committee decision and conflict parties, after mediation process have done, the committee have to make copy of result for all committee members and conflict parties to following the result, while the committee have to inspect the enforcement of mediation result as well.

According to the result of study the Lao Government should create regulations, mechanism and method for water allocation between users in the same river in order to avoid conflict, government should promulgate regulations and mechanism for water use between users in both upstream and downstream river in order to make sure of sustainable use, adequately and prevent the issues or conflicts, should assign responsibilities on administrative conflict mediation on water resources use to water resources authority, which conforms to rights and responsibilities by the laws and related regulations; water resource sectors should be more action on water resources use monitoring to prevent issues or avoid the conflicts as well.

Labor Experience Child Rights and Gender justice for Workers on Banana Plantations in Bokeo Province

A Research Study contributing to the Project entitled Strengthening civil society to protect and promote social, economic and cultural rights of ethnic communities in Bokeo province

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Stuart Ling, Independence consultant

Abstract

The research on labour experiences, child rights and gender justice for workers on Banana plantation in Bekeo Province was conducted in June 2016. The rights of women and children working in plantations are of particular concern to CAMKID, a local Non-Profit Association (NPA) based in Bokeo, and Plan International, which also has a program in Bokeo. Little is understood, however, about the perspectives of plantation workers and their families on their labour rights, priorities and future aspirations. With support from the European Union, Plan has partnered with CAMKID to implement a project entitled *Strengthening civil society to protect and promote social, economic and cultural rights of ethnic communities in Bokeo province*. The method used for data collection was based on both quantitative and qualitative survey. The quantitative data was collected from worker households (60 samples) using a structured questionnaire, which would be easy to implement for inexperienced researchers (government counterparts), and which would provide standardised data in a format which could be statistically analysed and the qualitative data was collected from two groups, being households living in the camps and key stakeholders. Semi-structured interviews were chosen as the preferred tool by the lead researchers, and were focussed on those research questions that required a nuanced response. According to the result, firstly, the workers are sub-contracted, rather than being employees, meaning that the Labour Law does not fully apply to them. Secondly, those tending bananas are the poorest segment of society – they are largely illiterate and lack the capacity to negotiate for improved working conditions. The contracts specify that dangerous chemicals are be used on the banana plantations. Banana plantations in Bokeo provide paid employment for thousands of households, and women make up a slight majority in those tending plantations fulltime. The workers work in plantations to earn money that they cannot earn on their own farms.

This research will provide practical recommendations to clarify the focus for Plan and CAMKID's work in banana plantations and identify a pathway towards aimed-for changes.

Keywords: labour right, labour law, women and child right, Banana plantation

Child Labour and Social Protection in Sekong Province, Lao PDR

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Abstract

This research aims at firstly searching for network and factors leading to child labour practice; secondly examining the factors and reasons that children and their families to decide work at early age; thirdly examining the comprehension of local authority on child labour; and finally investigating the relationship between child labour and social protection in Sekong Province; The qualitative research method was majorly employed while quantitative was also used. The in-depth interviews were conducted among district head of cabinet office, director of secondary school (upper and lower secondary schools), teachers and students, head of education and sport office, students, head of labour and social welfare office, head of office of justice, head of office for the advancement of women and children and the chiefs of villages and community members with total of 350 persons with double sampling of 12%, 42 persons. That is 42 hours of the interviews. The content analysis were used while frequencies were also analyzed.

It is firstly found that the network or factors leading to child labour practice were poverty, the distance from their home to schools and the family needs for labourers to help their parents generate household incomes. Some key informants mentioned about those victims who experienced being trafficked to work in other residences including in the neighbouring countries. It was secondly found that children and their parents decided to work since they cannot continue their education after their primary education because the lower secondary school is far from their homes and the children have to walk to schools. These children sometime have to leave schools at their early age. The key informants also mentioned that the parents decided to have their children left schools to work for their family farms, especially the oldest children in the families. It was thirdly found that although there was formal system for social protection or assistance, many key informants have not clearly understood what really child labour since they normally worked for families at their early ages. It was finally found that Sekong still used traditional social protection or social assistance for solving child labour, the formal system for social protection has not been practice due to the limitation of social protection knowledge and shortage of fund. According to one key informant the child victims experiencing worst form of child labour have not been assisted by local authorities. Many child key informants mentioned that they did not know with whom to consult when they have problems.

Keywords: child labour, social protection

Natural Resources and Environment

Sound level and Potential Effect of Sound to Employees in Nightclub and Bars at Xaythany District Vientiane Capital

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Abstract

The aim of this pilot study was to estimate sound levels in different areas where amplified music was played and measure hearing of employees who work served in those places. One night pub and three restaurants were selected in Nathom Village and Huayhong Village, Xaythany District, Vientiane Capital. In that two villages include Tonkhoun restaurant, Parmuang restaurant, Nuanta restaurant and Heartbeat Pub. Sound measurement was conducted during May-June 2016, at 18:00-24:00. By using software Sound meter to measure the sound level of places and measurement hearing of employees who have served the deck regularly by used Audiometer. The result of measurement the sound level of restaurants and Night pub were shown that the sound level average of heartbeat pub was maximum level at 102.96 dB, followed by Nuanta restaurant, Parmuang restaurant and Tonkhoun restaurant at 91.28 dB, 87.98 dB and 87.62 dB, respectively. All of these restaurants and pub sound level average were above ministry of industry and trade issue at 85 dB. In addition, the hearing measurement of 22 employees who passed the criteria and agreed to take part in the study, only 4 people have normal ears, 17 people have slight hearing loss and 1 person has mild hearing loss at most frequency. Besides that, there are 10 people have slight hearing loss in both ears, 8 people have slight hearing loss in right ear at frequency 250 and 500 Hz majority, 1 person has slight hearing loss in left ear at frequency 3000 Hz majority. Most of them are ages rank between 20-22 years. From our result suggest that sound in night pub and restaurants might have some affect to employees hearing who work and service regularly. To provide protection against dangers caused from noise, the entertainment places should be lower their volume to meet the standard regulation, employees should have a rotational time at close source of audio to prevent from direct expose.

Keywords: Noise pollution, Hearing loss, Sound meter, Sound level, Restaurants and pub

Mycoremediation of wastewater containing lignin with white-rot fungi

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Abstract

Lignin is one of the largest industrial wastes from pulp industry which has caused water pollution. This research aim to evaluate the potency of five fungal isolates from Research Center for Biosciences and Biotechnology laboratory to degrade lignin. Five fungal isolates were evaluated based on their growth on sawdust based substrate and also on Potato Dextrose Agar (PDA) medium added with 10% and 100% of artificial wastewater. The growth rate on two kinds of medium showed that *Phanerochaete chrysosporium* and *Ganoderma Lucidum* grew were faster than other isolates. Therefore, they were selected for further experimental step. *P.chrysosporium* and *G. Lucidum* were tested to decolorize artificial lignin wastewater. Color reduction of the artificial wastewater over five days was obtained from *P.chrysosporium* by 94-97% and by *G.lucidum* was 90-93%. In addition, pH observation result for *P.chrysosporium* was 6.8, 6.3, 6.2, 6.6, 7.06 respectively and *G.lucidum* was 6.3, 4.9, 4.2, 4.1, 4.1 respectively. The activity of ligninolytic enzymes from both fungi to break down complex structure of lignin, two enzymes laccase (Lac) and manganese peroxidase (MnP) were detected by using ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)) at 420 nm and sodium malonate at 240 nm. The result of Lac activity was 0.0049U/ml in *P.chrysosporium* and 0.0018 U/ml in *G. lucidum*, while the activity of MnP in *P. chrysosporium* was 0.1163U/ml and in *G. Lucidum* was 0.2801U/ml. These suggest that Lac activity in *P.chrysosporium* was higher than in *G. Lucidum* in contrast MnP activity in *G.lucidum* was higher than in *P.chrysosporium*.

Keywords: *Phanerochaete chrysosporium*, *Ganoderma lucidum*, xenobiotic, bioremediation, laccase (Lac), manganese peroxidase (MnP)

Determination of Arsenic and Chemical Pollution of Ground Water at BrajiengJalern Souk District Champasak Province

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Abstract

This research determined the concentration of Arsenic and chemical pollution of ground water at Brajieng Jalern Souk District, Champasak Province. In these areas there is no local piped “town water” supply in use, and almost all people rely on ground water for human consumption. Because farmers use insecticides and herbicides that are compounds of Arsenic (As), ground water of these areas is degraded by Arsenic (As) compounds. On 18 February 2016 samples of ground water were collected from 6 stations: HouyHair, UdomSouk, MOUNGKHAI, HouSiew, Houy Pheun, and Nong Khok villages of Brajieng Jalern Souk District, Champasak Province. Experiments were conducted on these samples and the results compared with standard values. This research employed a pH meter for analysis of pH, a Conductivity meter for analysis of conductivity, Thermometer for temperature analysis, a Photometer MD600 for analysis of chemicals and gases: Sulfate (SO_4^{2-}), Sulfide (S^{2-}), Iron (Fe^{2+}), Manganese (Mn^{2+}), Ammonia-free Nitrogen (N-NH_3), Arsenic (As) by Method APHA, AWWA, WEF. (2012), 3030E. Experiment results showed that the pH of each station is lower than the standard 4.74 – 6.42 (the value standard 6.5 -9.5). Conductivity at each station is standard 24.6 – 287 $\mu\text{s}/\text{cm}$, except for Houy Pheun village which is over the standard 1077 $\mu\text{s}/\text{cm}$ (the value standard $<1.000 \mu\text{s}/\text{cm}$). Sulfate (SO_4^{2-}) is standard at each station 2 – 40 mg/L (the value standard $<200 - 250 \text{ mg}/\text{L}$). However Sulfide (S^{2-}) is over the standard 17 – 24 mg/L (the value standard 0.1 mg/L). Iron (Fe^{2+}) is standard 0.18 - 0.29 mg/L, but Houy Pheun village is over the standard 2.38 mg/L (the value standard 0.3 – 1 mg/L). Only MOUNG KHAI village falls within the Manganese (Mn^{2+}) standard 0.24 mg/L (the value standard is 0.5 mg/L). At each station Arsenic (As) has a standard of 0.001- 0.002 mg/L and Ammonia -free Nitrogen (N-NH_3) a standard of 0.15 – 0.53 mg/L (the value standard 0.5- 1.5 mg/L). These results showed that overall the quality of ground water of all 6 stations is quite degraded when compared with the value standard quality of ground water used for household consumption. Villagers need to heed advice on how to boil and filter water before using in the home. We advise these areas to access and to use the piped water supply nearby.

Keywords: Determination of Arsenic and Chemical Pollution of Ground water

Enhancing cash crop production through groundwater and agricultural waste applications: A case study growing morning glory at pilot trial, Faculty of Water Resources, National University of Laos

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Abstract

This study focuses on groundwater irrigation techniques and agricultural waste application to enhance cash crop production (morning glory). The objectives are to determine the efficiency of water irrigation techniques and soil properties improvement. This study used experiments by applying sprinkler irrigations; and by using rice husk char, cow manure, and compost at the rate of 2kg/m² (20 t/ha) and crop water demand of 4 mm/day. The results show that efficiency of the soil properties was visible through compost application. This revealed enhanced crop growth appearance such as stem size and root size which were increased rapidly. This also correlated to bulk density improvement, soil moisture content capacity enhancement, and high yield production. In conclusion, using groundwater and agricultural waste improved both soil properties and crop production.

Sustainable Utilization of rice field ecosystem: a case of Fueng and Vangvieng districts, Vientiane Province

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Abstract

The rice field is not only provided a rice yield for consumption, it also base of food security and provide nutrients for dairy consumption of farmers. Demand of agro-biodiversity consumption has been on the rise in parallel with population growth in recent of lowland areas especially in the basin and sub basin of Laos. As such, the Lao government set a strategy to reduce and eradication of poverty in 2020 as well as behaviors on rice field organism consumption of farmers and general population and regarding recent infrastructure development situation of the country, the sustainable utilization of rice field ecosystem still remain as important component to support national food security program as well as sustainable development goals of Laos. Nevertheless, diverse species of agro-biodiversity is an indication of sustainable utilization of rice field ecosystem. Therefore, consumption demand of agro-biodiversity and agriculture performed in rice field is indispensable for sustainable utilization of rice field ecosystem promotion for farmer and agriculture developer. With this in mind, this paper aims at observation result for rice field organism consumption and estimating trend its supply in the future, more precisely seasonal trend consumption in the public markets in Fueng and Vangvieng districts. Actual seasonal observing data of 2015 and household survey data analyzed and described consumption trend, Venn diagram and SPSS is main programs using to analyze correlation between consumption need and supply from the actual market and household collectors. The accuracy of the correlation used as a criterion to explain the trend of the consumption and correlation between agriculture performed such as the using of agriculture chemical (Herbicide, pesticide...) and sources of rice field organism collection used as explanation the trend of sustainable utilization of rice field ecosystem in the future and appropriate possible awareness performed using as behaviors solution promotion in long term.

A Varied-Utilized Soil Type in LP Model for Irrigation Planning

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Abstract

Improving performance of irrigation planning for an operation and maintenance project is an obvious issue for agricultural development. An irrigation scheme under poor irrigation planning and management is one of the classical problems in water resources management. Improvement of irrigation planning not only can improve equity in water distribution and can minimize the gap between crop water requirement and actual water use. Before starting of each irrigation season, an Operation and Maintenance staff of the irrigation scheme should prepare appropriately of irrigation planning to ensure that required total of land-area from the farmers for each seasonal cultivation and how much water to be distributed into paddy fields, while the seasonal water supply is pumped from the river or from the reservoir administration for serving the irrigation project. Oppositely, the farmers need to have the optimum cropping pattern which will maximize the economic return. In consequence, it will lead to the determination of the effectiveness of water use and lead to the improvement of the livelihood of people. Farmers can use lesser water or low input in investment while obtaining higher production, reducing electricity costs and remaining more water in source which can maintain the ecological cycle and environment of river basin. The objective of this paper is to find an optimal crop pattern for irrigation planning in a varied-utilized area of the Van Vieng Phi irrigation scheme, Khammouan province, Central Region of Lao PDR. An allocation Linear Programming (LP) model was applied to find the optimal crop pattern in dry-season (November-April). The considered irrigation project was divided into several sub-areas, based on suitable soil type of each crop representing the varied-utilized character. The existing suitable soil type of each crop was used to represent the varied-utilized in term of water requirement and crop yield for each sub-area. The records of seasonal flow from pump station, requested and actual implementation of irrigation area, crop water requirements, evaporation, percolation, and effective rainfall were used for this illustrative application. The results have shown that the net benefit of varied-utilized character and unvaried-utilized character (existing consideration) were obvious difference. The obtained crop pattern of the proposed model corresponded to the suitable soil type for cultivation crops. Furthermore, the results presented that the proposed model gave higher net benefit than the existing unvaried-utilized character. The proposed LP model is appropriately for finding the optimal crop pattern for irrigation planning.

Keywords: Optimal model, Linear programming, Irrigation planning, Cropping pattern.

**Science, Technology and Innovation, Agriculture and
Engineering**

Modeling of an energy conservation and strategy control based photovoltaic system using MATLAB

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Abstract

A PV system can be generally used either for solely or complementary supplying electricity to consumers. In this research, a PV system with backup batteries is designed considering the management of energy produced (by system) and supplied (by EDL grid) to complementary meet energy demands in laboratories of the Department of Electrical Engineering, Faculty of Engineering, according to load types. That is, certain types of loads will be supplied with electricity by the PV system whilst others remain being fed by EDL grid.

The concept of the system design involves with simulations of loads categorizing (load types), an energy management and control strategy system. Firstly, loads are categorized into lights, cooling (fans and air conditioners) and equipment and tools. With load types being identified then the control strategy system will be deployed. Finally, an energy usage will be managed to meet loads using different types of energy sources (batteries and grid). This energy management is carried out using a control strategy system. For the purpose of simulation the software tool MATLAB, Simulink and a state flow toolbox is used. Simulink is used to model the system components. The communication among all system components e.g. loads, control strategies and energy management system is carried out using the state flow toolbox.

Keywords: photovoltaic system, energy conservation, energy management, control strategy

Optimal Tilted Surfaces for Solar Cell Systems in Laos

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Abstract

Optimal tilted surface is crucial for operation of solar cell systems. This paper is to propose the method for estimating the optimal tilted surfaces is to estimate the monthly and yearly optimal tilted surface for each province in Laos and is to estimate solar radiation based on the optimal titled surfaces in some province. Besides, on yearly optimal tilted surfaces at various azimuth angles examine in order to foresee the yearly solar radiation. The obtained results show that the yearly optimal tilted surface has found directly by a deduction of the respective latitude. Furthermore, the energy harvesting increases by using the monthly optimal titled surface instead of fixing it at the yearly optimal one. Lastly, optimal tilted surfaces at non-zero azimuth surfaces causes the yearly solar radiation of Vientiane capital to be lower than the amount in the case of zero azimuth surface.

A Design of Low Cost Capacitive Based Power Supply for LED Light Bulb

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Abstract

In this paper a design of low cost capacitive based power supply for LED light bulb is presented. One of the basic method to be done in an electronic circuit design is the production of low voltage DC power supply from mains to power the circuit. The conventional method is using the AC capacitor that parallel with high ohm resistor to step-down the 220 Volt AC to a desired level of AC low voltage by using reactance of those capacitor. Then this AC low voltage is connected to half or full wave diode rectification circuit to obtain a DC voltage and current for the load. Those circuit do not provide a reference point and when it's coupling with the DC capacitor for filtering the higher ripper from the rectification the circuit become a nonlinear device and it generates a current distortion (harmonics). Therefore, in this circuit design aims to create that can do two functions such as purely DC power supply for the DC load and power quality approach with capable of converting from the AC line 220 Volt voltage into a low AC level without current and voltage distortion in line by using doubling voltage technique for the load. The goal to be achieved by connecting AC line high volt through thermistor, then connect to the one arm of the diode bridge and the other side of the AC line is connected to the capacitors arm to build up a double of the voltage in the DC load (LED). To perform the optimum operation for the design topology the simulation software MathLab/Simulink was utilized. A simulation and experimental results, for the design methodology especially for selection of capacitor size and the calculation were presented. The DC12 Volt/10W power supply with LED for replacing the conventional incandescent bulb have been developed to confirm the design strategy.

Keywords: Step-down line voltage, LED, Thermistor, Voltage Doubling Technique Capacitors Reactance, Diode rectifier, incandescent Bulb.

An Investigation on the Feasibility of Wireless Electrical Energy Transmission Using Tesla Transformer for Fluorescent Lamp Lighting

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Abstract

This research designs the Tesla transformer that can light up fluorescent lamp without interconnecting wires. In order to interpret how the fluorescent lamp lighting, the high voltage transformer with ratio of 230 V/15 kV was applied to the primary coil of Tesla transformer which connecting with the capacitor and spark gap. The capacitor with rated of 1.5 μ F was connected in series for 15 capacitors in one set, there are two sets. Two sets of capacitor were connected in parallel. The autotransformer was used to adjust the output voltage of the transformer from 0 to 15 kV. The flash over had occurred in the spark gap when elevated the voltage up to 12 kV. The output of Tesla transformer has a rate of 200 kV and 138 kHz. The result of the experiment showed that the Tesla transformer can light up the fluorescent lamp in the maximum circular range of 40 cm around the toriod.

Keywords: Tesla transformer, wireless electrical energy transmission, fluorescent lamp lighting

Process Development of Soil Moisture Sensor for Agriculture Control System

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Abstract

Water or soil moisture is essential for plants. The plant has enough water, nutrients, sufficient appropriate environment. The plant photosynthesis is produce food to grow or collect food for the production of a human being and animals. Because all plants when there is not enough water to make growth slowdown, resulting in low productivity. As a result, both the quantity and the quality is not as good as a detriment to the income of the farmers.

With the key, this article has conducted research to control the movement of soil moisture by creating a moisture sensor with resistive method through out of plaster material. The values have to create a model for the control of soil moisture through processing from the microcontroller.

The results of this research showed that soil moisture include five reservoirs affect the relationship of electricity to be imported from the sensor control unit assigning watering conditions, high-precision, the system can turn water on dry land and stop watering when the soil is moist correctly designed so as to be regarded as acceptable. So that, this research is helping to Lao farmers using technology in to production for agriculture, reduced labor for agriculture, reduce water loss relief and using water has efficiency. Along those same by this method can also be used in industrial drying species.

Keyword: Soil Moisture, Soil Moisture Sensor.

Comparison of different solar drying methods on quality and appearance of chilli (*Capsicum Frutescens L.*)

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Abstract

Chilli (*Capsicum Frutescens L.*) is popular and important ingredient for Lao dishes. Lao farmers not only produce for domestic consumption, but it also becomes commercial crop. In the pick production, its value is low in the local market and big loss due to high humidity during rainy season. Solar dry method is a common method for preserving chilli in rural area. However, natural solar drying is still insufficient.

Hence, this study was introduced plastic and glass solar drying. The aims are to compare efficiency of different solar drying methods on duration, weight, humidity and appearance of dried chillies. Chilli samples were collected from wet market in the same time and same lots which were subjected to natural sun dry, plastic solar dry box and glass solar dry box. Chilli samples and data logger were placed in net bags. Then observation is made daily and final assessment is conducted to see the appearance of chillies. The result showed that the glass solar drying method is the most efficient that plastic solar drying method and natural sun drying method. The glass solar drying container can dry quicker and low humidity. The different temperature between inside and outside is 25°C (65°C and 40°C respectively). The average loss weight is (237g/day or 21.52g/hour and humidity is about 34.15%. the stable weight is taken around 3 days. In addition, appearance of chillies by glass drying method is clear red color and homogenized. The plastic solar drying method was also showed similar results as glass solar drying method. The average weight loss was 235g/day or 21.33g/hour and internal humidity is 38.06% and duration of drying was 3 days. However, natural solar drying method showed low efficiency comparing to other methods. The average sun drying temperature is about 36.37% and average weight loss is 178g/day or 16.14g/hour so it could take 4-5 days for drying. Appearance of chillies is dark red color due to sun burn.

In conclusion, glass solar drying method is the most efficient in term of weight loss, stable drying temperature and humidity. It provides also nice red color after drying. It could protect chillies from wind and moderated rain during drying.

Keywords: Chilli, solar drying, temperature, humidity, quality, appearance

Ensiling Leaves of Taro (*Colocasia esculenta* (L.) Shott with Sugarcane Molasses

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Abstract

An experiment was carried out at laboratory scale to determine the optimum level of molasses for ensiling taro (*Colocasia esculenta* (L.) Shott) leaves. The leaves were collected from Nongveng village, near Vientiane City in Laos, and were chopped into small pieces (2 to 3 cm) and ensiled in plastic bags (capacity 2 kg) with levels of sugarcane molasses of 0, 2, 4 and 6% (dry matter [DM] basis). The mean total sugar content (°Brix) of the molasses was 77. Each molasses level was repeated five times, corresponding to ensiling periods of 0, 7, 14, 21 and 28 days. At each ensiling date samples were taken for determination of pH, DM, ammonia nitrogen (NH₃-N), water extractable DM and N, and total N. Physical characteristics, such as smell and colour, were observed and recorded.

After 7 days the colour for all treatments had changed from green to yellow-brown and was darker at higher levels of molasses. Each treatment had an acceptable smell. The pH values for all treatments were around 6 at day 0 and then quickly fell below 5, the value being dependent on ensiling time and the level of molasses ($P < 0.05$). At day 0 the concentration of NH₃-N was very low on all treatments, but from 7 days onwards the concentration had increased with the time of ensiling on all treatments; the highest value was 5,900 mg/kg DM on the 0% level of molasses at 28 days. The ammonia-N concentration decreased as the level of molasses increased. Ensiling for 28 days with 4% molasses reduced oxalate concentration from 2.20 to 0.37% of DM.

A level of 4% molasses and an ensiling period of between 14 and 21 days appeared to be the most appropriate procedures for ensiling Taro leaves as determined by pH, ammonia concentration and water extractable DM and N.

Key words: ammonia, *Colocasia esculenta* (L.) Shott, ensiling, leaves, nitrogen, pH, taro, water extractable DM and N

The Role and Contribution of Cattle in Smallholder livelihoods in Lao PDR¹

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Abstract

Cattle productions are considered important livestock products to ensure food security and for generating income. Smallholder farmers in Lao PDR often face difficulties and challenges in cattle development in both supply and demand perspectives. In the supply side, the key challenge has been the gradual decline in land availability for free grazing due to expansion of cash crop and industrial tree plantation in such grazing lands. In the demand side, the increase in demand for cattle in both domestic and international markets has presented both opportunities and challenges for cattle smallholder farmers in Lao PDR.

The research findings indicate that cattle raising fundamentally served two livelihoods functions for smallholder farmers. The first is income generation and the second as household assets or saving. Cattle as household assets/saving seem to be associated with holding small number of cattle and low experiences of raising cattle. With such livelihoods functions, the productivity and market outputs from such cattle smallholders are expected to be low. In contrast, smallholder farmers raising cattle for household income generation tend to hold more cattle. These all indicate that there is high potential for improving and developing smallholders' cattle raising as their main livelihoods activities.

Keywords: Pro poor policy, value chains, cattle development of smallholder farmers

¹ This research paper is implemented under 'Pro-poor Policy Analysis on Cattle Productivity and Industry in Lao PDR' which is a part of the Project of "Pro-poor Policy Approaches to Address Risk and Vulnerability at the Country Level. This is a regional project jointly supported by Food and Agriculture Organization of the United Nations and International Fund for Agricultural Development. The project is cooperating with the Ministry of Agriculture and Forestry (MAF), particularly National Agriculture and Forestry Institute (NAFRI).

Assessment of Lactic Acid Bacteria inoculants in TMR Silage on Feed Intake, Digestibility and Growth Performance of Beef Cattle

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Abstract

The objectives of this experiment were to determine effects of Lactic Acid Bacteria (LAB) inoculants in Total Mixed Rations Silage (TMRS) on feed chemical composition, in vitro digestibility, voluntary feed intake and growth performance of Laos Native beef cattle. Twelve bulls Laos Native cattle with an average live weight 130 ± 5 kg and 8 months of age, according to completely randomized design (CRD) with three treatments as total mixed ration (TMR=T1), total mixed ration silage (TMRS=T2), total mixed ration silage with LAB at a rate of 5 mg/kg of fresh matter basis (TMRS+LAB=T3). All animals were fed ad libitum and clean water provided all day, the experimental period was 12 weeks. The results showed that the pH value of silage with in TMRS+LAB was lowest than TMRS and TMR (3.8, 4.3 and 7.5; $P < 0.05$) respectively. The in vitro digestibility of TMR, TMRS and TMRS+LAB resulted that total gas production: 119.9, 125.7 and 138.8 ml/0.5g of DM feed ($P < 0.05$); In vitro dry matter digestibility (IVDMD) at 24 hours: 34.2, 37.5 and 45.2 % ($P < 0.05$) respectively. The voluntary feed intake on %BW were increased from first week and it was highest in TMRS+LAB, TMRS and TMR (3.42, 2.75 and 2.92 %BW, $P < 0.05$). and the average daily gain (ADG) showed that not significant difference in TMR=0.71, TMRS=0.67 and TMRS+LAB=0.67 kg/head/day ($P > 0.05$) respectively. Based on the pH value in silage fermentation quality shown the supplementation lactic acid bacteria (LAB) can be well preserved in silage making. In addition, it is without having any affected in growth performance of Laos Native cattle.

Keyword: Lactic acid bacteria, Silage, Total mixed ration, Growth performance, Lao native cattle.

Collaborative research on the generation of added value for traditional fermented fish products in Laos

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Abstract

Various traditional fermented foods made from local agricultural and fishery products have been part of Lao food culture, and are used to secure household livelihood in Laos. In addition to in-house production for self-consumption, some products are now commercially produced by small- and medium-sized local enterprises that are expected to contribute to the creation of regional food value chain for sustainable agricultural and rural development. Faculty of Agriculture, National University of Laos (FAG, NUoL), Japan International Research Center for Agricultural Sciences (JIRCAS), and Institute of Food Research and Product Development, Kasetsart University (IFRPD) have been engaged in collaborative research on traditional fermented fish products, such as sour fermented fish (*pa-som*), and salty fermented fish paste (*pa-daek*) since 2012. Through this research, we have proved the value of scientific approach in clarifying the key factors needed in the stabilization of product quality. The collaborative research also contributed to develop the capacity of research and education of microbiology in FAG, NUoL. We first conducted the culture-independent microbial identification, namely, PCR-DGGE to efficiently explore the microbial diversity in the products to elucidate the fermentation processes at the microbial level. Moreover, lactate production, pH and salt concentration were monitored to see the correlation between bacterial community and the taste components. In the *pa-som* production, lactate content and pH continued to increase and decrease, respectively, until 4 days of fermentation. Among the lactic acid bacteria detected, two *Lactococcus* and one *Weissella* species were detected in samples after 1–4 days of fermentation, suggesting these species play major roles in fermentation of *pa-som* tested in this study. The results also indicated that pH measurement should be useful to monitor the fermentation status. In the analysis of *pla-ra/pa-daek*, 13 lactic acid bacteria and four other indigenous bacteria species were detected in 10 samples collected from Laos and Thailand. Salt-tolerant *Tetragenococcus* species were common in products with salt concentrations higher than 10% while *Lactobacillus* species were common in those with less than 10%. In short, salt concentration is the key factor that determines the representative lactic acid bacteria and lactic acid production in *pa-daek* fermentation. Simple measurement of salt concentration as well as pH can therefore be used in monitoring *pa-daek* production to ensure product quality and meet different consumer preferences in various regions. Furthermore, the amount of glutamic acid (the source of delicious taste) in the products was found to increase in a fermentation-time dependent manner over a 4 to 6-month period by the digestion of fish protein. The results were graphically illustrated so that the producers and consumers become more conscious of the importance of long-term fermentation. We will further advance our research to promote and maximize the use of the varieties of traditional fermented foods in Laos in order to drive forward the development of regional food value chain. To achieve this goal, scientific elucidation of key factors of good fermentation practices as well as microbial characterization and screening will be implemented to develop a science-based fermentation control for stable production, and to obtain high-value added products.

Identification of microbiological hazards and comparison of effective cleaning agents for fresh vegetables from local wet markets in Vientiane Capital

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Abstract

Clean and safe foods are required by consumers. Fresh vegetables are not only important parts of our dish but also main ingredients of foods. Generally, fresh fruits and vegetables were contaminated by microorganisms included non-pathogenic or pathogenic agents. Hence, vegetables from wet markets have high potential in contamination of microbiological hazards due to poor hygienic condition. In this research, clean agents (potassium permanganate, sodium carbonate, calcium hydrochloride and running water) were applied to sanitize fresh vegetables. Selected fresh vegetables were mint, lettuce and cabbage which were consumed in Vientiane capital and they were collected from Thatlouang, Thongkhankham and Kouidin wet markets respectively. The experiment was conducted in the laboratory of Department of Agricultural Economics and Food Technology, Faculty of Agriculture, National University of Laos.

The samples were subjected to microbiological examination for safety and hygienic condition before and after treatments. We found that fresh vegetables in open uncovered wet markets were potentially risk of microbial contamination, for instance, higher total bacteria presented in mint, lettuce and cabbage (145, 139 and 121 CFU/g respectively) comparing with vegetables from Thonkounkham wet market (119, 75 and 71 respectively). In addition, they were also higher contamination by coliform (80, 53 and 52 respectively). We observed that causes of contamination is due to uncovered market, vegetables were came from provinces and placed directly on the muddy floor.

The result after treatment showed that selected cleaning agents had significant effect on generic and pathogenic bacteria in fresh vegetables. Calcium hydrochloride is the most effective on both total bacteria and pathogenic bacteria like coliform. For instance, the efficiency of washing agents on total bacteria was decreased from calcium hydrochloride, potassium permanganate, sodium carbonate to running water (23, 35, 43 and 62 CFU/g respectively). It found that unwashed vegetables consist of 93 CFU/g. It means that calcium hydrochloride could reduce the potential risk of 75%. Furthermore, total coliform presented in unwashed fresh vegetable was 50 CFU/g and the effective cleaning agent like calcium hydrochloride showed only 21 CFU/g.

In conclusion, applying cleaning agents for washing fresh vegetables could reduce potential microbiological risk for consumers and the most effective agent in our study is calcium hydrochloride. Even there is still microbiological contamination in fresh vegetable, but this amount is relative low compared to safety standards. Hence, washing well with clean water and cleaning agents are recommended.

Keyword: Microbiological hazards, Coliforms, sanitization, cleaning agents

Combination Dry Needle and Roulement in Chronic Pain of Lao Patients in Vientiane Capital

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Abstract

This study is to compare benefits of pure Dry Needle and Combination with roulement in Chronic Pain patients in Vientiane Capital. Five hundred and twenty chronic pains aged 34 - 50 were registered from February to December 2014 at Sethathirath Hospital. Male and female were selected for 520 cases with same criteria, 260 farmers and 260 officers. They were separated into two groups with 130 farmers and 130 officers. Group A was handled by pure dry needle. Group B was performed by combination Dry Needle and roulement technique. The first and second follow up treatment was 5 minutes and 1 day. The results found that the average age of both genders was 42. They were high school 78% and primary 22 %. Middle income 76 % and the rest was low. Pain severity was 7.35. Group A obtained pain relief immediately after 2 minutes of dry needle 52% and 3 minutes later 37 %. After pure dry needling 20 second 74 % of them complained muscle soreness at dry needle point and 26% presented this terrible feeling in 24 hours. Group B 88% of them pain released immediately after 10 second of combination dry needle and roulement without muscle soreness at dry needle point, 12 % pain disappeared 2 minutes later. No significant different between farmers and officers in two groups. Pain location and pain severity were higher in female. Quality of Life of male was higher than female. In conclusion, Combination of Dry Needle and Roulement technique was an excellent method of pain relief in Chronic Pain dramatically and immediately without muscle soreness, safe for social economic for pain patients.

Parasitic food-borne diseases in Southern Laos – a case study: Approach, practices and challenges

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Abstract

Incidences of parasites (including zoonoses) in livestock and fish have been widely found in Laos as foodborne diseases, significantly impacted on economy, public health and international food trade. Current animal production practice and food consumption habits in Laos may promote zoonotic disease transmission. The objectives of this study are to assess parasitic zoonosis distribution, improve animal health, reduce animal and human health risks factors and develop a cross-sectorial collaboration platform, “good practices” and dissemination strategy. Through the companion modelling (ComMod) approach that has been applied in the field of participatory natural resource management and the OneHealth approach, the study strongly focuses on community involvement and collective learning and collaboration among key stakeholders from diverse sectors. A cross-disciplines research team consists of vets, public health and social scientists has been established. A literature reviews has been accomplished to reveal key zoonosis distribution in Laos, to guide and verify the study sites selection. Currently, the research team is conducting PRA and PE survey in the three selected provinces of southern of Laos. The expected outputs are clarified distribution for prioritized parasitic zoonosis, better knowledge of stakeholder’s perception and practice, and common understanding on parasitic food-borne diseases and related risk factors, a set of feasible control options that can be recommended to policy makers and a cross-sectorial collaboration platform. Apart from the PRA and PE results, this paper attempts to share an insight practice and experiences the research team gained during the implementation; difficulty and inconveniences working in off-discipline arena – social and qualitative method, multi-disciplinary team, and multiple levels of stakeholders involved which are key challenges to the interconnected trans-disciplinary and one health issue.

Keywords: Parasites, Food-borne disease, Zoonoses, Prevention and Control, Cross-sectorial collaboration

Consumer perceptions of organic food in the Lao PDR

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Abstract

The consumer awareness survey on organic food product was conducted in 2015. The objective of the study was to understand the current perceptions and attitudes of end-users (e.g. consumers, traders, restaurants) towards organic food in the Lao PDR. Seven principal provinces of Laos where the organic food is dominated were chosen as target sites of study, such Luangprabang, Xiengkhoang, Vientiane Province, Vientiane capital, Borlikhamxay, Khammouane and Champasak. The method used for data collection was based on quantitative survey, The data was entered manually into three separate databases using SPSS then merged together before being converted into STATA format for further statistical analysis. This study aimed to unveil the knowledge, perception and attitudes of consumers, traders and hotel/restaurant owners towards organic products in seven provinces of the Laos. According to the result, most of the consumers said that Organic food is good for health and then good for the Environment. There is no link between conditions of production or production methods and better health or environment, no specific interest for the farmer. The consumers did not seem totally impervious to the idea of paying a little bit more for organic products. The lessons from this study that may be valuable in view of promoting organic agriculture in Laos are the following: Laotian customers are little aware of organic agriculture and its benefits, so the first step of any action towards the promotion of organic agriculture is indeed the organization of an awareness campaign to inform the population about what is organic agriculture and its benefits in terms of health and environment. The visibility of organic agriculture is essential, be it through the variety of organic food outlets available, through projects or fairs. Information need to be clarify, such the confusion between “organic” and “natural” product. They understood that the products grown naturally, without using any chemical fertilizer, pesticide or herbicide, are all organic product. This confusion is important and need to be taking into account when communicating about organic products.

Keywords: organic food, consumer, market, consumer survey, consumer awareness

Impact of Contract Farming on Small Farmer Indebtedness in Northern Uplands of Lao PDR “Case study Boun Neua district, Phongsaly province and Xaybouly District, Savannakhet Province”

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Abstract

Laos is a developing country, the production still mainly produced for consumption in households with only a few can produce for commerce due to lack of production cost, knowledge of production techniques and marketing, especially in rural areas, where the agricultural land still widely available and fertile for dry season crops. Therefore foreign investors are attracted and invested in Laos since 1990. The foreign investment has many advantages of doing agribusiness in Laos such as low production cost, low labor cost, other production factors cost are low as well. Contract farming has important roles of generate revenue for the farmers in rural areas, and elimination of slash and burn cultivation or opium substitution crops. However, contract farming also created negative impacts mainly to the environment which cause of agrochemical utilization, created debt to farmers and so on. Hence, we are interested in studying the effects of contract farming with the debts of small farmers. This research used both quantitative and qualitative survey by selected 2 provinces as study sites such: Phongsaly (Bounneua District with 7 villages, 72 samples/families and 5 products) and Savannakhet (Xaybouli District with 5 villages, 67 samples/families and 4 products). In addition, some data relative to contract farming are gathered from concerned administration offices and agency as well. This research is aimed to analysis the factors which causing debt of farmers who produce under contract farming, to know the opportunities and challenges, policies and way solutions in the future.

The result of research showed that, the main factor which causes the debt to the farmers is low yield, production cost which should be responsible by the producers, the delay payment of the contractor, the claims on loans to other purposes, and the credit of the companies. As for the debt issue, the farmers were able to pay back all to the buyers and there were no serious problem in the past. Contract farming created many opportunities in the two study sites such as: creation of jobs, revenue generated to the households, develop agricultural knowledge and skill, ability of access to market and credits. Meanwhile, contract farming also faced of some challenges such insecurity of the market due to the falling of price, production cost remain responsible by the producers, the quality of products still not yet reached the market standard, and for long term the utilization of agrochemical might cause negative impact to human, animal and environment. In conclusion, contract farming engaged in causing debt to farmers in direct and indirect ways by many factors. Nevertheless, contract farming was not created any significant debts to farmers. And, this mode of contract has good opportunities to the development in the future and potentially be part of poverty alleviation for the rural households in the upland areas of Laos.

**Northern Upland Development Program (AgriNet-2) Impact of Contract Farming on Small Farmer Indebtedness in Northern Uplands of Lao PDR
“Case study Boun Neua district, Phongsaly province and Xaybouly District, Savannakhet Province**

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Abstract

Laos is a developing country, the production still mainly produced for consumption in households with only a few can produce for commerce due to lack of production cost, knowledge of production technique and marketing, especially in rural areas, where the agricultural land still widely available and fertile for dry season crops. Therefore foreign investors are attracted and invested in Laos since 1990. The foreign investment has many advantages of doing agribusiness in Laos such as low production cost, low labor cost, other production factors cost are low as well. Contract farming have important roles of generate revenue for the farmers in rural areas, and elimination of slash and burn cultivation or opium substitution crops. However, contract farming also created negative impacts mainly to the environment which cause of agrochemical utilization, created debt to farmers and so on. Hence, we are interested in studying the effects of contract farming with the debts of small farmers. This research used both quantitative and qualitative survey by selected 2 provinces as study sites such: Phongsaly (Bounneau District with 7 villages, 72 samples/families and 5 products) and Savannakhet (Xaybouli District with 5 villages, 67 samples/families and 4 products). In addition, some data relative to contract farming are gathered from concerned administration offices and agency as well. This research is aimed to analysis the factors which causing debt of farmers who produce under contract farming, to know the opportunities and challenges, policies and way solutions in the future. The result of research showed that, the main factor which cause the debt to the farmers is low yield, production cost which should be responsible by the producers, the delay payment of the contractor, the claims on loans to other purposes, and the credit of the companies. As for the debt issue, the farmers were able to pay back all to the buyers and there were no serious problem in the past. Contract farming created many opportunities in the two study sites such as: creation of jobs, revenue generated to the households, develop agricultural knowledge and skill, ability of access to market and credits. Meanwhile, contract farming also faced of some challenges such insecurity of the market due to the falling of price, production cost remain responsible by the producers, the quality of products still not yet reached the market standard, and for long term the utilization of agrochemical might cause negative impact to human, animal and environment. In conclusion, contract farming engaged in causing debt to farmers in direct and indirect ways by many factors. Nevertheless, contract farming was not created any significant debts to farmers. And, this mode of contract has good opportunities to the development in the future and potentially be part of poverty alleviation for the rural households in the upland areas of Laos.

Keys words: contract farming, small farmers, marketing, debts to farmers, impact to environment

Experience of Agribusiness Investments in Lao PDR

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Abstract

This document presents the experiences of two investors, Stora Enso Lao Co. Ltd (SEL) and Outspan Bolovens Limited (OBL), who have invested in agri-business plantations (eucalyptus and coffee respectively) in the south of Lao PDR. It discusses the lessons learned on four key topics related to responsible investment: (1) land acquisition, (2) compensation and benefit sharing, (3) community engagement, and (4) grievance mechanisms. They are the result of a week-long multi-stakeholder engagement and dialogue involving the companies themselves, government, civil society and the communities concerned.

From 7th to the 10th December 2015, the Ministry of Planning and Investment (MPI) co-led the ‘Responsible Investment Study Tour’ on a visit of two companies in Champasak and Salavan Provinces in southern Laos. The intention of the Study Tour was to (a) gain a deeper understanding of good investment practices, and (b) examine the challenges and opportunities related to implementing responsible agriculture investments, particularly as they related to protecting and promoting land tenure for rural communities.

The two companies – SEL and OBL – were approached to participate in the Study Tour to allow participants to see first-hand the realities of implementing responsible investment practices in Laos. The companies were identified as two examples of land-based investors which can provide examples of promising Corporate Social Responsible practices which are replicable for other agro-forestry investors, to improve the quality of investment in Laos. The Study Tour was part of a multi-stakeholder working group on Responsible Investment in Lao PDR.

The case studies provide useful lessons for potential and existing land-based investors in Laos, NGOs and government alike. Key ‘take home messages’ from these case studies are: 1. Investors need to go beyond compliance with national laws to achieve business objectives; 2. Engaging with communities prior to investment reduces long-term risks to investment projects; 3. Government plays a key role in promoting and setting standards for responsible investment practices; 4. Implementing responsible investment requires a multi-stakeholder effort and increased cooperation between private sector and civil society; and 5. All stakeholders involved require a deeper understanding of how to implement responsible investment practices.

Study on sustainability for the Management and Administration of Land and Natural Resources in Lao PDR

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Abstract

Due to the problematic conditions mentioned above, the party-state is more likely to face the loss more than the gain, and will experience the risks that might be occurred in the future. Such risks can be related to the scarcity of foodstuff, dry up of natural streams, lack of ability to supply inadequate water capacity to the hydropower generation during the rainy season, as well as the impact to the natural tourism. In many places of the mountainous area, land use are largely carried out in steep land with the gradient exceeding the limit standard of 45 degree which has caused degradation to soil quality (soil erosion, flash flood or drought), and has affected the living area and permanent production land of the people.

This situation led to the increase of resettlement and shifting cultivation among the local population, while many of them move to live in city in order to seek daily labour hiring, and some get involved in drug addiction which has led to social problems to be burdensome by the party and state. In connection with the difference length in the lease-concession period which ranging from 20, 50, 70 or 100 years, the potential impacts to the future socio- economic, environmental and political circumstance are likely to arise unless the party-state set out measures for the management in a systematic approach, in particularly the issue concerning the documentation (contract, agreement, and other documents relevant to the state land lease or concession), or the matter concerning the control of local and foreign workers seeking employment in the special economic zone, specific economic zone, and in the rubber plantation area. The same situation as applying in the field of land use planning, urban planning, and urban development zone, if the government sector fails to formulate strict regulations for preservation or safeguarding and comprehensive zoning, it will led to the future crisis in terms of land scarcity in order to be used for building public facilities, public infrastructure (road communication, public building, service providing zone, and other types of land use arrangement).

Keywords: Land, Natural resources, Land use planning, master of land use planning, policy and regulation, food security, NTFPs, NPAs and CAs, SEZ, Watershed, Agro-industrial plantation and Environmental impacts...etc,

An assessment of *Trichoderma* and *Chaetomium* spp. for the biological control of chili anthracnose

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Abstract

The aim of this study was to assess the ability of antagonistic fungi to control anthracnose of chili caused by *Collectotrichum* spp. Four species of fungi namely, *Chaetomium cupreum*, *Ch. lucknowense*, *Trichoderma harzianum* (FAG1) and *Trichoderma* sp. (FAG2), were selected to determine their effectiveness as biological control agents against the most aggressive isolate of *Collectotrichum*. All fungal isolates were tentatively identified by morphological characteristics. The pathogenicity test of *Collectotrichum* isolates was determined by inoculation onto fruits of three varieties of chili.

Five isolates of *Collectotrichum* (PS01, PS06, NT01, LS01, PPC01) were shown by Koch's postulates to cause anthracnose in chili. The most aggressive *Collectotrichum* (PS01) was chosen for the biological control experiment. *Trichoderma harzianum* (FAG1) inhibited the in-vitro growth of *Collectotrichum* (PS01) on potato dextrose agar by 75%; followed by *Trichoderma* sp. (FAG2), *Ch. lucknowense* and *Ch. cupreum* at 69, 40 and 39%, respectively. Moreover, all four isolates of antagonistic fungi inhibited the sporulation of *Collectotrichum* (PS01), with *T. harzianum* (FAG1) the most effective by inhibiting growth by 61%. This study showed that the application of these four antagonistic fungi as biological control agents has potential as a way for farmers to control chili anthracnose and reduce the application of chemical pesticides.

Key words: *Collectotrichum* sp. (PS01), Chili anthracnose, *Trichoderma harzianum*, *Chaetomium* spp.

Some diseases of cultivated crops in Champasack Province

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Abstract

Some important diseases of vegetable and coffee crops in Champasack Province were identified during surveys in 2015 and 2016. Diseased plant samples were collected from the field and then the causal organisms were identified in the laboratory at the Faculty of Agriculture, Nabong. Species identification was based on symptoms and morphology of the pathogen. The results found 9 fungal diseases and 1 bacterial disease. Fungal diseases identified were anthracnose disease of chilli (caused by *Colletotrichum* sp.); leaf spot of chilli (*Cercospora* sp.); leaf spot of Chinese cabbage (*Cercospora* sp.); leaf spot of Chinese lettuce (*Cercospora* sp.); leaf spot of strawberry (*Cercospora* sp.); leaf spot of onion (*Alternaria* sp.); leaf spot of brassica Chinese (caused by *Alternaria* sp.); rust of coffee (*Hemileria vastatrix*); and leaf spot of coffee (*Cercospora coffeicola*). Bacterial soft rot of Chinese cabbage was also frequently seen.

Key words: Plant pathology, vegetable diseases, and survey.

Common weeds and their effects on cassava production in Borlikham District, Borlikhamxay Province

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Abstract

The species composition and density of weeds in cassava plantations at Borlikhan District, Borlikhamxay Province was determined from May 2015 to April 2016. The effects of weeds on cassava yield was conducted at three villages, Piengdee, Huana and Nalong, with farmers eradicating weeds either 1, 2 or 3 times per a season. The most common weeds were broad-leafed species (*Eupatorium odoratum* L., *Ageratum obtusifolium* Lam, *Praxelis clematidea*) as well as narrow-leafed species (*Mimosa pudica* L., *Penisetum polystachyon* (L.) Schult., *Imperata cylindrica* (L.) Raeusch, *Digitaria ciliaris* (Retz.) Koel, *Cyperus irria* L.). The density of weeds at Piengdee, Huana and Nalong, when farmers eradicated weeds once was 113, 47 and 104 plants per square meter, respectively. While the farmers that eradicated weeds three times had lower densities of 47, 13 and 22 plants per square meter, respectively. The yields of cassava at Piengdee, Huana and Nalong, showed that single weed eradication provided a yield of cassava at 6.4, 9.6 and 12.3 ton per rai, respectively. The farmers that eradicated weeds three times had higher yields of cassava at 11.7, 12.8 and 17.6 ton per rai, respectively. However, the percentage of cassava flour was not significant increased when weeds were eradicated three times as compared to two and one times.

Key Words: weed species, density, cassava yield, percentage of flour, weed eradication.

The effects of material beddings to increase the population of earthworm var. *Eisenia foetida* and quality of vermicomposte

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Abstract

The purpose of this study was to evaluate the increasing population of earthworm *Eisenia foetida*, nutrient levels and its effects on kale growth. Four different material formulas were used to raise earthworm *E. foetida*. All treatments were allocated to a completely randomized block design, including 4 treatments and six replicates per treatment. The treatments were (1) rice straw + manure ratio 1:1, (2) coconut coir + manure ratio 1:1, (3) old leaf + manure ratio 1:1, and (4) soil + manure ratio 2:8. Vegetable waste was used to feed the earthworms every 7 days up to 90 days. Earthworms were collected and counted. Vermicompost was collected in each experiment unit then analyzed for nutrient content. The cost and benefit of raising earthworms in each treatment were analyzed. The results showed that the bedding, made from soil + manure gave the highest increasing earthworm populations up to 440% from the initial number, followed in order by bedding 2, 3 and 1 (100.5%, 18% and 10.75%). Nutrient content, Vermicompost prepared from all material had fairly high levels of nitrogen (1.17-1.42%), phosphorus (0.17-0.25%), and potassium (1.77%). The average cost of treatment number 4 was 185,000 kip per time period, a higher cost than other formula material, the cost of treatment number 4 was the most expensive compared to other treatments. All formulas of Vermicompost were an experimental research with 5 treatments and 4 replications, by applying 2 kg/m² of four Vermicompost formulas. The treatments were (1) Vermicompost from treatment 1, (2) Vermicompost from treatment 2, (3) Vermicompost from treatment 3, (4) Vermicompost from treatment 4, and (5) non-fertilizing. The characteristics measured were height, leaf width and number of leaves. The data of fresh weight and yield was collected. The experiment research was continued in the field with number 4 treatment, with six applications and four replications. The applications were (1) non-fertilizing, (2) applying 1,600 kg/acre, (3) applying 2,400 kg/acre, (4) applying 3,200 kg/acre, (5) applying 4,000 kg/acre and (6) applying 4,800 kg/acre. The characteristic measured were the same type as performed with pot experiments. The result showed no difference in height, number of leaf, leaf width, fresh weight, root weight and dry root weight of Chinese broccoli. However, application 6 and 4 showed the highest yield compared to other applications.

Keywords: Earthworm, vermicompost, *Eisenia foetida*, rice straw, dry manure, coconut coir, old leaf, Chinese broccoli.

Survey of insects at Phu Khao Khuay National Protected Area

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²Faculty of Agriculture, National University of Laos, Laos PDR

Abstract

Survey of insects were conducted at Phu Khao Khuay National Protected Area, middle region of Laos PDR, on June 2016 for the purposes of insects collecting and photographing. Insect specimens were collected by sweep net at daytime and light trap at night time from six collecting sites; Tad Xay Waterfall, Pha Sad, Tad Luak Waterfall, Nam Mang Dam, Ban Wang Rour I and II. Elevations and forest habitats were varied from 200-1,000 m above sea level and mixed deciduous forest at low land to pine forest at top mountain respectively. The study resulted in collection of mainly 10 insect orders namely Coleoptera, Lepidoptera, Hymenoptera, Diptera, Hemiptera, Odonata, Blattodea, Mantodea, Phasmatodea and Orthoptera. Mostly insect species from this survey are new records and new to science. All insect specimens were preserved and deposited in insect collection at Faculty of Agriculture, National University of Laos.

Taxonomy of subfamily Olethreutinae (Lepidoptera: Tortricidae) in Phu Khao Khuay National Protected Area

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Abstract

A taxonomic study of leaf roller moths in subfamily Olethreutinae were conducted at Phu Khao Khuay National Protected Area, middle region of Laos in June 2016 for the purpose of initially study of micromoths in Laos and setting the moths collection at Faculty of Agriculture. The olethreutine moths were collected with light trap, 125 watts mercury vapor and 2 m x 2 m white sheet, that operated by generator. Specimens were collected during 6.00 pm-6.00 am from different six collecting sites; Tad Xay Waterfall, Pha Sad, Tad Luak Waterfall, Nam Mang Dam, Ban Wang Rour I and II. Elevations and forest habitats were varied from 200-1,000 m above sea level and mixed deciduous forest at low land to pine forest at top mountain respectively. The study resulted in collection of 45 morphospecies in 4 tribes namely Olethreutini 20 morphospecies, Enarmoniini 8 morphospecies, Eucosmini 12 morphospecies and Grapholitini 5 morphospecies. Many species will be published as new record for Laos PDR and new to science.

Some species of Lepiotaceous fungi (Agaricaceae) from Lao People's Democratic Republic

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Abstract

In this report, we investigate some species of Lepiotaceous fungi from Lao PDR. Of these, a species of *Clarkeinda* and two species of *Macrolepiota* are described by morphological character and compared with related species, and seven species of genus *Lepiota* are investigated and identified using both morphology and nrITS DNA. Furthermore, a new species of *Leucoagaricus* (*La. houaynhangensis*) is described as a new species for science. Although, two known species (*La. flavovirens* J.F. Liang, Zhu L. Yang & J. Xu and *La. viridivavus* (Petch) T.K.A. Kumar & Manim) share some morphological similarities with the newly described taxon here, the differences among them were observed of both morphological characters and nrITS DNA.

Keywords: Distribution, Diversity, Agaricales, Phylogeny, Taxonomy

Social Science

Academic Transformation of Higher Education Institutions

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Abstract

The study matter is Academic Transformation of Higher Education Institutions, Dongdok Campuses includes 2 objective, to review the previous situation of academic management in 1960s to 1977 of Lao higher education institute, Dongdok, and to compare the opinions of administrators/teachers on academic management system in 1977-1996 as the era of Vientiane Teacher Training University and National University of Laos. This research is employee qualitative and quantities methods. The study sample are involved previous academic manager and teachers of Dongdok institute when it used to be Dongsapangmerk Teacher Training College, Vientiane Teacher Training University, and National University of Lao. The main tool is the structural interview and questionnaires, the qualitative presented by descriptive analysis explain truly attribute support while quantitative presented by static descriptive (frequency, percentage, average, standard division value) and pare T-test for have been employ for hypothesis testing. The majority of respondents is male higher than female 10.52%, age is between 50-59 years old (67.86%), education is Master degree (65.48%), their previous position is teachers (64.29%), from the Faculty of Letters (34.52%) and the average of income are between 2,500,001 - 3,500,000 per month (71.43%).

The first finding found that, Lao higher education institute was start from 1st October 1960 with 4 years of study called “National Education Center”, majority teachers are foreigner such as France, England, and American, and however, only few are Lao. The language used in teaching is French as middle language while English is teach as foreign language. This era of Lao education is belong to French system, student has a lot of outdoor learning on vocational training, agricultures, cooking and so on, the grading and evaluation is exam and class activities which used 20 points for the highest score. Students who are final year have to tack internship at the organization/schools nearby. In general learning system is lecture based, materials and medial is seem to be enough regarding to that era, however researching is few because of that time is focusing on produce teacher only.

The second finding is to comparison of two era, the era of Vientiane Teacher Training University and National University of Lao. The statistic showed that the era of National University of Lao has been developed better than the era of Vientiane Teacher Training University in every criteria, however, National University of Lao still has middle to low rating on study media, student orientation, learning advisory, quality assurance, and education promotion thought community and related organization.

Local History of Vernkham Village: Settlement and Change under National Policies of Social-Economic Development

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Abstract

This study aims to investigate the history of settlement and evolution to Vernkham village; to study the development and social-economic change since settlement of the village, a period of collectivization and transition of development guideline under renovation direction until present; and to explore opportunities, challenges and adjustment of social-economic development of local people in the village. This research is a historical and anthropological study by using mixed qualitative and quantitative methods. The qualitative method uses group discussions, in-depth interviews, life history and observation; and uses household survey for quantitative method.

The results of this study show that Vernkham village originated from forming a small community between the late 1940s and early 1950s, which the first group of immigrant settlers in this Nam-Ngeum valley is Lao tribe who displaced from many communities. Then the community had evolved and gradually changed as the living system that related and belonged to natural sources. Since establishment of the Lao People's Democratic Republic Vernkham village has changed faster than in the past, which the changes were linked to the changes of the party's directions and state's policies. The development of the village can distinguish in two phases: development during 10 years of recovery social-economic growth after the war and during the social-economic development over execute a renovation direction of the party. Step into the 21st century, national social-economic development of Lao PDR has accelerated to integrate the Asean Economic Community and to graduate from the LDC in 2020. This context created opportunities for people who have suitable conditions and abilities to organize personal production leading to occurrence of many businesses in Vernkham village. However, the changing environment of development also comes with risks and challenges for local people such as the decrease of the area of paddy field due to local farmers sole to outsiders of the community who have economic power, many villagers cannot determine its potential or household's potential and cannot predict incomes of the future; many families have become debtors of companies or stores that provide vehicles, household's utensils by various types of payment. Another risk is that there are some villagers have migrated to work in Thailand. Additionally, a problem that adults have concerned is change of some social-cultural practices.

Feminization in NTAE production: case of coffee plantation in southern Laos

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Abstract

The aim of this poster is to present gender relation in employment opportunities in the coffee plantation in southern Laos. The study applied qualitative study for data collection and analysis method including observation, interview, focus group discussion (FGD) and in-depth interview (IDI) in 4 villages in Champasak and Salavan provinces Lao PDR during 2014-2015. Findings show, NTAE production, coffee plantation offers as an arena as public sphere for female to work outside of domestic chores. Female have opportunities to work outside home for various positions mostly light works. There are different divisions of tasks between female and male in coffee plantation. Male are working on specific tasks that female can't do mostly heavy takes. Payment is difference between male and female for monthly wage. Labor law specifies non-discrimination toward tasks and wages. Some recommendations are to unlocked the necessary conditions and barriers that impede fair relation. What can you do to improve this unequal labor and wage structure?

Keywords: feminization, employment opportunities, gender relation, coffee production, Laos.

Labor Employment Opportunities in Non-Traditional Agricultural Export Production in Southern Lao People's Democratic Republic

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Abstract

General debate on the issue of labor employment is related to employment opportunity, pattern of labor employment, the contribution to labor employment, and the impact of labor employment on livelihoods. This paper examines labor employment opportunities through different ethnic perspectives, especially labor employment for coffee production, a non-traditional agricultural export (NTAE) product, as a case. The objectives of this study are to investigate the labor employment and to examine the impacts on the labor livelihoods.

Qualitative method was applied to collect empirical data in four villages and five coffee planter/ exporter companies in Pakxong District, Champasak Province, and Lao Ngam District, Salavanh Province, Lao PDR. Stakeholder consultation was held in relation to promotion of NTAE. Data analysis for this paper includes thematic analysis and narrative method.

Findings show that there are many patterns of labor employment in coffee production: daily paid employment, monthly paid employment, and contracting employment. Wage laborers are different ethnic groups who live in the same village and also from outside the village, including nearby villages, other districts in the same province and other provinces. Generally, laborers have got income from wages and other additional benefits rather than losing benefit from coffee production. However, migrant laborers could not avoid some impacts on their livelihood while working in coffee garden such as working long hours, helping housework, changing living style, conflicting with colleague workers and employers.

Keywords: labor employment, income improvement, livelihood impact, non-traditional agricultural export, coffee production, Lao PDR.

**Women's empowerment in Non-Traditional Agricultural Export (NTAE)
Production in the Southern Part of Lao PDR: toward gender equality**

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Abstract

Women's empowerment has been long debated, and is increasingly supported by public policy. Using the women's empowerment index, this study argues that women can be empowered by access to productive resources. The main purpose of this study is thus to examine how women's empowerment takes place in terms of access to productive resources and how women access and manage resources for coffee production. Qualitative research including semi-structured interviews and focus group discussions was conducted in multi-ethnic coffee production villages in the Bolaven Plateau region of southern Laos. Data was analyzed using thematic and narrative methods. Findings show that although women have rather equal access to and decision making power over land and labor, access to capital, knowledge, and markets is still unequal. Nevertheless, greater access to productive resources strengthened women's entrepreneurial skills regarding commercializing coffee products and improved the integration of local products into regional and global markets.

Keywords: gender equality, women's empowerment, productive resources, employment, coffee production, Lao PDR.

Women's decision making power within the household in Laos

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Abstract

This paper aims to examine the decision making power of women at Lak 35 village in the Southern Laos. The coffee production is main source of income of coffee farmers' household. The coffee export led growth improve their livelihood after they shift to Arabica coffee. Decision-making is one importance indicator to measure women's empowerment within the household and in the society at large. Various studies in developing countries reveals that women's participation in decision making in the household is poor in particularly household finance. While this paper argue that women are very importance in all the decision making process. The combination of qualitative as in-depth interview and group discussion and quantitative as survey apply in the paper. The results have shown that women participate in all process of decision making as well as major household decision making. The study also found that women are very important role in household finance. The study suggest that village organization should find the way how to encourage more women involve the organization.

Keywords: gender; decision making; coffee; household Laos

Gender Impacts to Different Ethnic Groups in Non- Traditional Agricultural Export (NTAE) Production Case of Lao PDR

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Abstract

Gender power relation in the society is a cross cutting issues which related to gender equality, poverty and ethnicity. Taking gender impact to different ethnic groups in coffee production, which is a non-traditional agricultural export (NTAE) product, as a case study of Lao PDR, the main purpose of this research is to 1) investigate the forms of gender impact to different ethnic groups in a non-traditional agricultural export (NTAE) product; 2) to examine the contribution of NTAE production to different gender-ethnic livelihood.

The qualitative method was applied for data collection and analysis in 4 villages in Paksong (Champasack province) and LaoNgam (Saravane province) in Lao PDR. The local authority semi-structure interviews were hold in order to get general information about the village and NTAE, and 12 focus groups discussion had been done among men, women and production group, 12 in-depth interviews: 4 head of Lao Women Union and 8 women head of household in the village. The thematic analysis and narrative analysis were used as method for analyzing.

Findings show, gender impact to different ethnic groups in a non-traditional agricultural export (NTAE) production; case of coffee production in southern part of Laos there are 4 aspects: 1) Gender equality promote ethnic family and community; 2) Gender in NTAE impacts on Social status change in rural community; 3) Gender impacts on empower women and self confidence in working NTAE; and 4) NTAE contribution on household economic development and Gender ethnic livelihood improvement. Different form of gender impacts in NTAE is to provide a significant contribution to improve different gender ethnic livelihood and poverty reduction at family and community level. The coffee production created new opportunity for men and women ethnic groups have more income, wealthy, solidarity, and gender equality improvement in the family life and society. This study also confirms that key actors to develop the NTAE products as sustainable production such as agriculture projects and companies' owners should have a corporations with local Government and policy makers, shareholders and community leaders can potentially work together in order to promote and support gender relation in NTAE products in Lao PDR.

Keywords: Gender impacts, women empowerment, ethnic livelihood, coffee production, Lao PDR.

The Study of International Convention Problems in Vientiane Perspective of Governments' Sector

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Abstract

Vientiane international convention is on the introduction stage the convention providers are very new and still lacking of professional experts for organizing the international convention. This study aims to identify the international convention problems in Vientiane. The theories of international convention site selection, proposed by McCabe et al (2000); Crouch and Ritchie (1998) and Oppermann (1996) is employed. The qualitative research methodology was deployed with the content analysis. The purposive sampling techniques was employed by conducting interview with 35 people from four ministries and three organizations namely Ministry of Foreign Affairs, Ministry of Information Culture and Tourism, Ministry of Planning and Investment, Ministry of Public Works and Transportation, Urban City Planning, Lao Woman Union, National Assembly which 14 people are administrative personnel and 21 people are official staffs who deal with international convention in Vientiane. Base on the major findings some recommendations related to convention site selection providers were suggested and recommendations for Lao meeting and convention industry were suggestions.

Firstly, it was found that there has not enough parking space, panel session meeting available and accommodation arrangement in the 5 and 3 star hotels.

Secondly, well trained staff to untrained it was found that the appointment and the replacement of staff responsible for convention organization lead to poor planning, coordination, and communication. The limitation time and number of training related to conventional organization, especially modern equipment's and technology has become failure in use.

It was thirdly found that extra activities supporting the conventions were still at limited level of impression and satisfaction. This included the environmental problems still existing.

It was fourthly; found that modern technology and equipment's were still out of reach since it was effectively used in convention.

It was finally; found that the direct flight to Vientiane as well as public transportation around Vientiane still not reach the demand of the participants and the other limitation of night entertaining such as night clubs or theatres available for delegates to be comfortable and convenient still needs more development.

The researcher would suggested that the comprehensive or complex convention center with easy access, sufficient parking space, accommodation, restaurants, and larger meeting rooms with all sizes fully equipped with modern technology and facilities shall be built in order to enhance capacity of convention and promote tourism industry. The long-term and short-term course for convention management and operation shall be regularly done in order to strengthen junior and senior staff on English language and technology. There should be variety of tourism including night theatre and show in order to demonstrate traditional dance, drama and cultural image. Although Vientiane is reside able city, but it is important to mind the environment as clean city with reachable public transportation to antique and ancient places both days and nights. If possible, there should be direct flights with participants' countries.

The resource development, food security and livelihood nexus

Resource degradation and food security in the Nam Ngum River Basin

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Abstract

This paper examines detailed patterns of land use transition in the Nam Ngum watershed during 1975 and 2014 by using a series of satellite images to detect areas of highly dynamic land use change. It further assesses the effect of resource development and population growth on land use patterns. Nam Ngum watershed is a site where for decades, watershed resource management planning process has been taking place to improve the management of water, forest and land. It is one of the economically critical watershed in Laos, which hosts a cascade of hydropower projects, including the country's first hydropower project, Nam Ngum 1. However, during the last decade increased numbers of resource-based development activities including mining and plantations and rapid population growth are putting pressure on existing resource base. Our study highlights highly dynamic movement of population across the watershed between 1995 and 2005, and despite the movement of population away from remote areas, forest areas continue to decline due to widespread expansion of agricultural and development activities in areas of relatively high population density.

Agricultural livelihoods and food security

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Abstract

The study examines the role of livelihood asset including land, livestock and natural resource for rural households across the Nam Ngum watershed where over 3,500 households were surveyed for the ACIAR Lao Livelihood Project during January and May 2014 in 157 villages. The current paper characterizes main livelihood activities of households and examines relationship between household wealth, and household access to critical livelihood asset including land and livestock. Our results highlight the highly diversified nature of household livelihood that incorporates activities including agriculture for consumption and sales, as well as non-agricultural wage labour in various location. It also highlights the multi-sited activities households are often engaged in suggests that despite the availability of food, stunting among young children prevails in the area. Level of child stunting are higher among the households whose main livelihood activity is based on remittances and non-timber forest products, as well as households without access to land and large livestock. Our study highlight the importance of understanding the varying conditions of livelihood basis and its potential long-term impact on human health. To improve the household wellbeing, our study also highlights importance of understanding principal constraints of households to access livelihoods assets.

Food security and nutritional wellbeing in the Nam Ngum River Basin

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Abstract

This paper examines the food and nutrition status and their determinants in the Nam Ngum River Basin, an area with a long history of resource development and home to 10% of Laos' population including some on the most vulnerable communities. A cross-sectional survey was conducted between January-May 2014 in four topographical zones in the Nam Ngum River Basin. Data was collected at the community, household and individual level and included information on socioeconomic characteristics, environmental characteristics, wellbeing, social capital, food security and nutrition. Analysis of the data was performed using STATA 13 software. The World Food Program Food Security Criteria was used for assessment of community and household food security status. Results showed out of 1333 households interviewed with children under 5, 4.6% were classified as having poor food security. Among the communities experiencing food insecurity, the highest prevalence was found in the highlands zone and among the poorest households. From a sample of 1,333 children under five years, 4.2% were found to be wasted, 12% underweight and 25% stunted. Similarly, the highest prevalence for underweight and stunting was found in the highlands zone. This paper provides an evidence-based insight into the socio- economic, environmental and livelihood context of households experiencing malnutrition and food insecurity in the Nam Ngum Watershed. Although, this area has a lower prevalence of food and nutrition insecurity compared to other parts of the country, it is evident from these findings that certain vulnerable population groups are still suffering and slipping through the gaps which unless addressed will continue to occur. There is a need for more consideration to be given to the specific nutrition and food security needs of vulnerable population groups including poor and ethnic minority populations in future design of policies and programmes including those targeting communities' affected by resource development.

**Narratives and diversity in livelihood adaptation to resource pressures in
Feuang District, Lao PDR**

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Abstract

Resource pressures in Lao PDR arising from large scale resource development projects necessitate livelihood adaptation both by those directly and indirectly affected. The Nam Ngum River Basin has seen a particularly high rate of hydropower, mining and other developments with associated pressures on land, forests and water resources. As a result of inundation caused by the Nam Ngum 2 hydropower project, the establishment of Phonesavath Village in Muang Feuang District, Vientiane Province, has created significant livelihood challenges and some opportunities for more than 6,000 people who resettled there. It has also affected surrounding villages whose land and other resources have been shared with the newcomers. Our research explores livelihood responses to risks and opportunities created by resource development in Phonesavath and surrounding villages through narratives of livelihood change at the household level. It employs a combination of in-depth qualitative interviews and focus group discussions, as well as interviews with key actors in the resettlement and facilitated livelihood adaptation process. Two key sets of findings stand out. First is that the adaptation experience of different households has been highly diverse, and that this can be linked to a range of “capitals” on which individuals and households have different capacities to draw. Second is that the more successful adaptation has been a highly spatialized process, meaning that resources and opportunities are drawn from many different locations rather than from the very limited areas of land and other resources available in and around the village of Phonesavath. In policy terms, the study finds that understanding these diverse and multi-local livelihood strategies provides different options for facilitated livelihood adaptation to those commonly adopted in livelihood mitigation programs.

Impact of Contract Farming on Income of Smallholder Sugarcane Farmers in Lao PDR

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Abstract

Lao PDR, a landlocked located in the Southeast Asia, has been adopted contract farming as a strategy to facilitate Lao agricultural development and connect small farmers to rapidly growing export markets. The present paper wants to provide the first insights on what the potential of contract farming as a rural development tool by revealing its effects on income of smallholders in contract sugarcane production in the Lao context. A randomized survey data of 195 small sugarcane farmers in Xayburi district, Savannakheth province is reported and analyzed using a propensity score matching (PSM) technique to measure the impact of contract farming on smallholder farmers. The study finds that, on average, a contracted farmer significantly earned more per capita household income compared to non-contract farmers, a range of 20-31 per cent. Contract arrangement and investment loan in transforming farmland to sugar field has largely reduced net income and led to increasing debts for small producers, which is considered as a main discussing issue for the Lao government.

Keywords: Lao PDR, ‘2+3’ contract farming, sugarcane, impact, propensity score matching

Challenges and potentials of multi-disciplinary applied “nexus” research in Lao PDR

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Abstract

This paper synthesizes the overall project, Lao Livelihood Project, and points to role and challenges of multi-disciplinary research in examining, and seeking to influence policy on, a key development dilemma for a resource-rich and income-poor Southeast Asian country such as Lao PDR. Simply stated, the dilemma is that rapid economic growth based heavily on large scale natural resource development has had limited success in improving key health, nutrition and certain livelihood indicators of the country’s rural poor, and in many instances the strategy has undermined access to the land and natural resource endowments on which the poor depend most. The “nexus” between water resource development for energy production and land-based livelihood improvement is at the conceptual core of this approach. While this nexus has increasingly taken centre ground in the framing of debates and studies of environment and development in the Mekong Region, this paper explores the specific challenges and potentials of working across disciplines, particularly in an applied research context. In particular, we report on the challenges of conducting and communicating research that employs a multi-disciplinary perspective to examine linkages between resource development, rural livelihood change, food security and the nutritional wellbeing of rural people.