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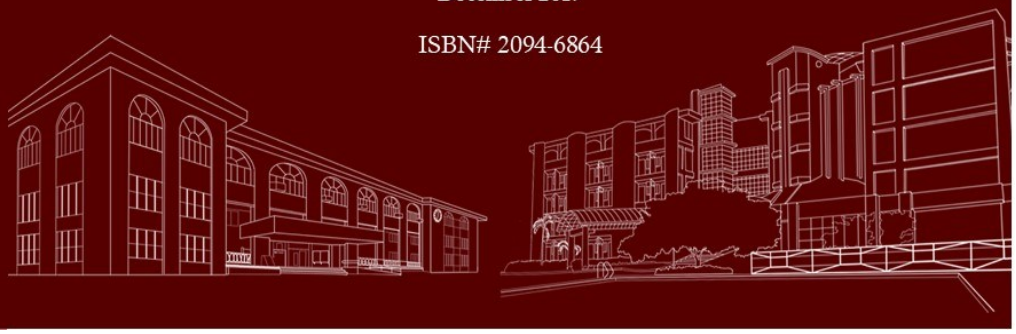

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Message from the President

Greetings in the Name of Our Lord God Almighty!

DR. MYRNA Q. MALLARI

University President

The Tarlac State University through the University Research Office is very proud to launch the Inquest (ISBN 2094-6864) January-June 2019 Issue. The University presents and publishes outstanding and relevant research works of the various colleges and units for scientists, researchers, faculty, and students to learn and be updated on the latest findings and developments. Even with the pandemic which shifted the conventional to the new normal, TSU in the Neo-Academia, more than ever, continues to conduct research works to advance the frontiers of knowledge, solve human problems, and improve the quality of life of the people. This is scientific work at its best. That is why research of the people, by the people, and for the people, will never cease at the Tarlac State University!

I gratefully thank the readers and subscribers of the Inquest for getting hold of this journal and appreciating its contents for the fondness of learning and studying, and applying it to our daily and future lives.

God bless you and God bless the Editorial Staff and the contributors of the *Inquest* journal.

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Arts, Business, Law, Education, and Social Sciences

Science, Technology, Engineering, and Mathematics

An Ergonomic Risk Assessment in Relation to Productivity in an Aerospace Components Manufacturing Company

Anna May M. Angeles
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Abstract

This study was conducted to assess the ergonomic risk factors involving man and his interaction with the workspace in an Aerospace Manufacturing Company and establish a relationship between the level of ergonomic risk factors and the workers' productivity. This study was accomplished by observing the postures of the workers while doing their tasks, and these were assessed using the Rapid Upper Body Assessment worksheet, Rapid Entire Body Assessment worksheet, and Workstation Design Checklist. Pearson Product-Moment Correlation was used to determine the direction and strength of the relationship between ergonomic risk level and productivity. and T-distribution was used to determine if there is a significant linear relationship between these two variables. This study utilized both the descriptive-evaluative and methodological research designs. Descriptive-evaluative was first used since this study aims to conduct an assessment of the ergonomic risk factors present at the shop floor area of an Aerospace Components Manufacturing Company and to establish the relationship of these to productivity. Methodological research was then utilized to identify necessary ergonomic interventions and design modifications to tools and workstations as a result of the analysis.

The study was conducted at the Shop Area of the Components Sector of an Aerospace Components Manufacturing Company, where 95 employees are distributed across three work shifts. The company has been chosen as the locale of the study since it is one of the largest manufacturing industries in Baguio for aerospace components for Boeing and Airbus, both leaders and competitors in the aircraft industry. Aside from aerospace components, the company also manufactures components for automobiles, industrial equipment, and health care. The research subjects of the study were the shop floor workers at workstations K-15, K-12, K-29, K-11, K-17, K-18, and the Deburr area of the Components Sector.

Ergonomic interventions like the redesign of tools and workstation and a training module have been produced as a result of this study. Workers at K-18, K-17, and K-11 are at medium risk, and change is necessary in these areas. Shop floor workers at K-15, K-29, and K-12 are at low risk. Based from the results, the workers at K-18, K-17, and K-11 who deal with bigger components have greater risk to injury while workers who deal with smaller components like those in

areas K-15, K-29, and K-12 have smaller risk to injury. This could imply that if the company wants to pursue another ergonomic study in other areas/areas, priority should be given first to those that handle bigger components. Workers at the Deburr area are at low risk. Continuous observation is necessary, but ergonomic interventions are not required as of the moment. Repetition and awkward postures are evident in this area, but not forceful exertions based on the RULA worksheet. Workplace is conducive for working; however, there are no inclined footrests, areas are not adjustable, lumbar support and armrests are not adjustable, and tools are not ergonomically designed to fit the workers. A high/strong relationship between ergonomic risk level and the productivity of workers was determined using Pearson Product-Moment correlation at areas K-18 and K-17. For areas K-11, a moderate/substantial relationship between ergonomic risk level and productivity have been determined. There was a negligible to slight relationship between ergonomic risk level to productivity at areas K-29, K-15, K-12, and Deburr. There is a significant linear relationship between ergonomic risk level and productivity for areas K-17 and K-18 when T-distribution was used. No significant linear relationship was determined for other areas.

Student Publications Management practices and Challenges in State Universities in Region III: Basis for a Proposed Management Framework

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Abstract

This study investigated the practices and challenges of student publications in the different state universities in Region III. Included practices and challenges of student writers and advisers were the following: selection and functions of writers and advisers, student publication management of funds, compliance to publication policies, and other problems encountered in managing the school publication. A total of 79 student writers (96.34%) and 3 advisers (3.66%) were the participants of this study. Mixed method was employed in this study. Survey questionnaires and interviews were used to collect quantitative and qualitative data. Results revealed that majority of the state universities and colleges still adhere to using existing policies in selecting and in the functions of the student writers and advisers. Problems and challenges encountered by the participants are the following: appointment of advisers, content of the articles to be published, budget allocations, liquidation process and hearings as determined by the administration, delays of budget release, implementation of scholarship grants to student publication staff, and more training, seminars, teambuilding activities and the like.

Student publications in state universities in Region III follow the provisions in the Campus Journalism Act of 1991 in terms of publication practices. However, under the selection of student publication advisers, there are two state universities that appoint and replace advisers each year. There is a significant difference among the State Universities in terms of the functions of publication staff, incentives for advisers and staff, and the financial management of the student publications. The following were the challenges encountered: replacement of adviser every year; insufficient budget allotted to seminars and trainings; administration determines the budget, no budget hearings being conducted, lack of scholarship grants; lack of trainings and seminars for the improvement of writing skills, and attendance to budget management seminars/workshops.

A proposed management framework on student publications for the different state universities was recommended. Student publications in state universities should comply with the provisions of Republic Act 7079 or Campus

Journalism Act of 1991 in the selection of the student writers and publication adviser. Administration and the student publication must agree on opening a bank account exclusively for the student publication fund in order to avoid the administration's control of funds. A budget proposal and budget hearing must be conducted in order for the administration and student publication to monitor their funds/ budget. Trainings on the following must be provided for the student publications such as media ethics, awareness on freedom of speech and expression, write shops and journalism trainings and technical writing. The state university or college may enhance or improve the following: a.) Maintenance of the printing press; b.) Selection of quality printing press; c.) Publication of quality student publication, and d.) Training on the management of student publication writers for the editorial board.

Career Success and Acquired Competency Skills of the Graduates of the Bachelor of secondary Education-Physical Science of the College of Education, Tarlac State University

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Abstract

The study aimed to find out the general profile, educational attainment, employment profile and acquired competencies, and the teaching and competency skills of the BSED-Physical Science graduates of TSU-COED for the past years (2009-2013). The results are expected to provide feedback for the improvement of the curriculum and instruction.

The researcher made use of descriptive research design and was integrated into the questionnaires because this research involves collecting of data in order to answer questions concerning about the general profile, educational attainment, employment profile, and acquired teaching and competency skills of the graduates of BSED-Physical Science from year 2009-2013.

Based on the data gathered, it was found out: a) BSED-Physical Science Curriculum is a curriculum for young single female residing in the province of Tarlac who is good in high school science subjects, b) Only a small number of graduates of BSED-Physical Science are pursuing graduate studies, and the majority of the graduates have pursued graduate degree in line with specialization, c) Graduates of BSED-Physical Science are equipped and trained to pass the licensure examination for teachers on the first take, d) Most BSED-Physical Science graduates did not find it difficult to land in a teaching job after graduation, e) Graduates of BSED-Physical Science have highly developed competency and teaching skills that qualify them to meet the demand of teaching. Among all the skills Human Relation Skills is the most highly developed and the research s,kill is the least. f) The different major and professional subjects in the BSED Physical Science curriculum are very helpful in the teaching career of the graduates.

The study revealed the following: Most of the respondents are residing in the province of Tarlac (Capas, Concepcion, Gerona, Paniqui, La Paz, etc.) Majority of the graduates are ages 23-26 years old with the percentage of 76. The respondents rated the development of teaching and competency skills from highly to very highly developed. The grand mean of 4.06 means highly

and competency skills, human relation skills got the highest weighted mean of 4.45, the only skill that got a very highly developed mark. On the other hand, research skills to the lowest weighted mean of 3.77. The graduates are satisfied with the major subjects having a grand mean of 4.16, which is very useful.

Amidst Difficulties: Challenges and Coping Mechanisms of Farmers in a Flood-Prone Community

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Abstract

The study aims to determine the specific challenges that confront farmers in the flood-prone Municipality of Lapaz, Tarlac, and their consequent coping mechanisms to cultivate a program that will benefit the farmers.

The study was conducted using the quantitative research design employing the descriptive-narrative method. As such, several interviews with farmers were done which yielded the following findings: the farmers flood-related challenges centered on basic needs concerns, financial difficulties, and anxious anticipations while their coping mechanisms concentrated on planning with their families, observance of disaster preparedness, seeking help and support, and personal psychological fortification. From the findings, a program was developed for the farmers addressing three areas of concern, namely, basic needs and financial difficulties, anxious anticipations, and moving forward.

On the basis of the results presented, the following are recommended: (a) The concerned local government officials may be encouraged to utilize the present study and other related investigations as research-based references for enacting realistic policies that will redound to the effective provision of assistance to affected farmers. (b) In the same manner, various professionals may be encouraged to rely on the findings of the study and other pertinent factual data in order to design programs that will develop the farmers' resiliency to flooding and other effects of climate change that are beyond their control. (c) The program developed by the researchers from the result of the study may be considered for implementation through the collaborative efforts of the local government and NGOs. (d) Further investigation can be conducted to evaluate the cited program toward its applicability and appropriateness to the affected farmers of Lapaz and other communities, which may be in similar situations.

Fuel, Electricity, and Water (FEW) Consumption at Tarlac State University: A Baseline Study

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Abstract

This paper is a descriptive baseline study on the use of fuel, electricity, and water (FEW) in Tarlac State University (TSU) with three campus extensions. It aims to describe the FEW consumptions and trends for the past four years and correlate such usage to the population of students, faculty, and personnel. It also looked into areas where consumption is high and recommend ways to reduce consumption. Using simple linear regression, data from the past four years were considered to forecast the FEW consumptions for the next five years.

This study employs a descriptive-correlational research design with linear regression analysis. The status and trend of fuel, electricity, and water consumption of TSU were described using tables and graphs to show its current situation, giving a true picture of what is happening with regards to the use of fuel, electricity, and water, thereby giving quantifiable information for consumers and decision-makers to take appropriate actions to save energy. The Pearson Moment Correlation coefficient was used to determine if there exists a significant correlation between student population with FEW consumptions and faculty and personnel population with FEW consumptions at 0.05 level of significance. Moreover, linear regression analysis was employed to forecast the FEW consumptions of TSU for the next 5 years to prepare consumers and decision-makers in addressing the growing demands of FEW in the years to come.

The fuel and electricity consumption of Tarlac State University showed an increasing trend from 2015 to 2018 and is expected to increase for the next five years, while water consumption has revealed a decreasing trend. There was no significant relationship between FEW consumptions with that of the student population as well as faculty and personnel population. Fuel and electricity were two identified areas at TSU, showing high consumptions. It is highly recommended that the second phase of this study include 2019 data be conducted to confirm the increasing trends of fuel and electricity and to adjust forecasted data up to the year 2023. For the reduction of fuel consumption, drivers are to be educated and be trained to switch off the engine when idling is expected beyond 5 minutes while sustaining carpooling policy. Likewise, for the reduction of electricity consumption, TSU should conduct a detailed energy audit of all its buildings in the three campuses to determine the potential savings

in the lighting, power, and air conditioning unit usage as well as its potential contribution to the reduction of CO2e emission. Furthermore, it is highly recommended that a renewable source of electrical energy, such as solar, be installed in the rooftop of the identified buildings where electrical consumption is very high.

Gauging Sustainable Competitiveness in the Philippines: An Analysis of the Cities and Municipalities Competitiveness Index (CMCI)

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Abstract

Ranking 56th out of 140 countries and lagging behind ASEAN neighbors such as Malaysia, Thailand, and Indonesia based on the World Economic Forum's Global Competitiveness Index 2018, boosting the Philippine's performance in terms of competitiveness is a relevant aspect which calls for action. This is a task not only relegated to the national government but at most, to the country's first line of defense, the local government units (LGUs), hence, the Cities and Municipalities Competitiveness Index (CMCI). The index aims to regulate competition among local units by guiding them in determining areas of development that can propel economic growth. It is also hoped to serve as a diagnostic tool, business guide, and take-off point for further research. With the index already administered for six (6) years, do the CMCI breed results parallel to what it intends to measure? Is it effective in spurring competitiveness among LGUs?

To address such questions, the study delved into the methodologies employed and knowledge resources tapped into by local officials in complying with the data requirements set by the CMCI. Data gathering was done by the researcher through analysis of secondary data and interviews with CMCI focal persons.

The research bred significant findings such as that since CMCI is a self-regulation measure, LGUs are not coerced to participate and submit complete data. Non-participation to the said index does not entail any penalties or deprives the LGU of any privilege. Then relative to knowledge management, CMCI focal persons change due to change of leadership coupled with poor turnover affect LGU data. CMCI data are not used by local units for development planning due to poor technical competence in doing so. This, therefore, indicates that CMCI should not only be held for the purpose of complying with memoranda and other directives. Data should be utilized as a needs assessment, which is one of its raison d'etre.

Hence, analysis led to results along with themes, namely, knowledge creation, storage, analysis, and utilization. In particular, as CMCI data and results have little to no use among local planners, the National Competitiveness Council must call for academic symposiums that would review and analyze CMCI

raw data to allow LGUs to translate these into development plans and investment promotion strategies. These findings are deemed useful in crafting extension partnership programs between academic institutions and LGUs to help local units present their complete competitiveness profile. Thus, the LGU-academe partnership is realized.

As this paper conducted an in-depth analysis of the index, it is anticipated to generate results that may help in improving the coordinative mechanisms involved among government agencies in terms of data generation to ensure that the index truly reflects a local unit's performance. Consistent with United Nation's Sustainable Development Goal 11 of having sustainable cities and communities, the country, with CMCI, hopes to fulfill such by having economically dynamic, efficient, infrastructurally equipped and resilient cities and municipalities, hence, highly competitive LGUs.

Continuing Professional Development of the Teacher Education Faculty among State universities and Colleges in Region III

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Abstract

This study is about the availed and pursued CPD of the teacher education faculty among state universities and colleges in Region III. The mixed method (qualitative and quantitative) was used in doing this research. The following are the findings of the study: the respondents obtained 100% participation in the local conferences, seminars, and workshops; coach, sports trainer, or adviser of student organization; membership in professional organization; participation in community outreach or extension program; and teacher's board examination.

The research found out that there are significant differences among the academic ranks in all availed CPD programs except coaching, sports training or advising of student organizations, and participation in community outreach or extension program. The most important reasons why faculty pursued CPD were to enhance employability, to increase their confidence, to improve protection and quality of life, and for the renewal of their license. Personal challenges ranked as the main reasons that hinder the respondents in their CPD.

Based on the findings and conclusions, the following are recommended: 1. The PRC and CHED may carry on and strengthen their information dissemination of the positive effects of CPD through up-to-date posts in their respective websites and regular communication with the SUCs; 2. The schools' administration must safeguard that they target to lead teacher learning, and are comfortable talking about and engaging in their own learning; 3. Those teacher education faculty members pursuing or availing the CPD programs must feel the security in the fact that CPD is developmental and feel prepared to take risks and try to venture on other things; 4.The trainer, obviously, needs to deliver high-quality information with expertise. They must also be equipped with the skills to become a good trainer, most particularly because of their audience's age and knowledge; 5. Quality improvement should be a key focus and a core component of any CPD program. Teachers are continually improving their practice in order to optimize new technology and knowledge. CPD should allow them to evaluate their own practice (preferably using their own practice data), make improvements based upon standard practice guidelines or best-evidence, and implement remedies of identified needs into their everyday practice; and 6. The entire CPD process should attest to the satisfactory maintenance of all core competencies deemed necessary for an individual to practice as a specialist

in education. Ultimately, it should attest to the teacher's commitment to improve practice and professional responsibilities.

Archetypes of Women in Philippine Fictions and Real-Life Situations

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Abstract

This study is about the archetypes of women in Philippine fiction and real-life situations. The literature-based methodology and quantitative method were used in doing this research. The following are the findings of the study: 1) the women characters are the sufferers and the cause of their sufferings are women as well; 2) the women characters do not enjoy equal status with men; 3) the major cause of the women character's misery is the philandering activities of their husbands; and 4) the real-life women are a combination of strong and weak female archetypes.

If given more opportunities, both the reel and real women can become effective instruments of the success of the society. They can also become assets of the society whose abilities can be compared to their opposite sex. The society therefore, must recognize women's contribution and gender equality. Based on the findings and conclusions, the following are recommended: 1. The curriculum planners must ensure that curriculum development involves consultation at all levels of society about gender equality and what decisions mean for women and girls, especially those who may be marginalized because of language, social practice, or environmental degradation; 2. Training may be provided for literature teachers about feminism approach in teaching; 3. Teachers may establish set a of rules that promote equality; 4. Guidance counselors may set programs and activities that promote gender mainstreaming and mental health awareness; and 5. Gender and development office may conduct will address issues of the oppressed female students.

Citizen Satisfaction on Governance and Response in the Municipality of Concepcion, Tarlac: An Evaluation

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Abstract

This study aimed to evaluate the satisfaction of the citizens on governance and response in the Municipality of Concepcion, Tarlac, by way of determining the level of awareness, availment, and satisfaction of the citizens on these services. This was patterned on the Citizen Satisfaction Index System (CSIS) conducted by the Department of the Interior and Local Government (DILG).

Based on the findings of the study, in awareness, the Barangay Day Care Center obtained the highest awareness at 261 out of 300 or 87%. The Fire Safety Evaluation Clearance obtained the lowest awareness at 99 or out of 300 or 33%. In availment, the reproduction of barangay records, data, and similar documents obtained the highest availment at 152 out of 160 or 95%. The issuance of Certification for Senior Citizen and Solo Parent garnered the lowest availment at 114 out of 214 or 53.27%. In satisfaction, the issuance of Certificate to bar Counter-Claim obtained the highest mean of 2.71, which was rated high satisfaction. Publication of Municipal Ordinance and Barangay Ordinances having the mean of 2.26 rated moderately satisfied. The overall satisfaction of governance and response was rated as moderate in satisfaction with a total grand mean of 2.49. Among indicators, the delivery of frontline services and traffic management were rated high in satisfaction with a mean of 2.54. The Public Information Services obtained the lowest mean of 2.27, which was moderate in satisfaction. Major problems encountered by the citizens on governance and response were no Fire Safety Orientations/Seminars/Trainings were conducted. While for the implementers, roadsides were used to dry palay and corn by the farmers, which causes traffic congestion. From the conduct of this study, the top recommendation agreed by the citizens and implementers was that the barangay should maintain a Barangay Disaster Risk Reduction Management Plan.

Victim Survivor of Forced Labor among Aetas: A Case Study in Tarlac

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Abstract

Forced labor is all work or service which is exacted from any person and does not offer voluntariness. It is the fastest growing means by which people are enslaved, the fastest growing international crime, and one of the largest sources of income for organized crime. This study entitled Victim Survivors of Forced Labor among Aetas: A Case Study in Tarlac was conducted among eight (8) Aetas who were of legal age, victims of forced labor, and who are residing at Sitio Ye Young, the specific locale of the study. The major purpose of this study was to determine what form of forced labor was experienced by the respondents, to assess the coping strategies practiced by the respondents, and to look into the impact of the previous victimization to their current life. It was further the purpose of this study to present a clearer picture of the lives of the forced labor victims in the hope of clarifying or understanding how they have coped or dealt with, surpassed, and lived their lives after the experience. This study utilized the qualitative research design and used key informant interview as the main data gathering tool. Moreover, Thematic Analysis was employed to treat the data that were obtained from the interview. The recurrent themes extracted from experiences of Aetas towards forced labor involve the withholding of salary, domestic work, irregularities in compensations and benefits**,** false promises, maltreatment, threat, failure to give assistance, land grabbing, forced to a sign document, involuntary servitude, and good treatment. The coping mechanisms adopted by the respondents included time healing, displacement, and maladaptive avoidance. As regards the status of their living, the survivors' lives remained the same though some claimed that after the victimization their life improved. An action plan aimed at aiding Aetas and Local officials was recommended.

Employability Self-Efficacy for Technical-Vocational Senior High School Students

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Abstract

The Senior High School (SHS) Curriculum, specifically the technical-vocational tracks, aims to produce graduates who are holistically developed, equipped with 21st century skills, and be prepared for future employment. The Employability Self-Efficacy Scale (ESSTVS), a counseling assessment tool for identifying employability self-efficacy among technical-vocational senior high school, is an enabling tool that could facilitate the realization of these goals. To come with this tool, the researcher employed the descriptive developmental method of research. It was constructed following the standard procedure in test construction. Focus group discussion, review of related literature, consultation with experts, and statistical analysis were employed to come up with a valid and reliable tool. ESSTVS draft was revised 3 times, and pilot tested twice to two different groups of students. Concurrent and discriminant validity of the final draft were estimated at r=.662 and r=.008, respectively. Reliability coefficient was estimated at alpha = .955. Inter-item correlation coefficients among items per domain were also established. ESSTVS comes with a validated user's manual.

The researcher acknowledge that the study has some limitations. First, the scale may be prone to the tendency of the examinees to be dishonest in their choices and other forms of biases; that is why the examiner has to read the instructions carefully. Second, ESSTVS needs to be validated with a larger sample for a more robust result and provide normative data across Filipino population. Third, the scale has not proven to be valid and reliable to predict success for employment screening purposes, so follow through with graduates who have taken the ESSTVS is recommended.

Assessment of Extension support Services to Micro-Food processors' Compliance to RA 10611 or Food Safety Act of 2013

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Abstract

This study presents the assessment of the extension support services of the Tarlac State University (TSU-ESO) under its Industry Development Extension Services (InDEx) Program to micro food processors' compliance to the Republic Act 10611, otherwise known as Food Safety Act of 2013. It explores how the extension support services were carried out in terms of the team composition, the methodology, and the number of its beneficiaries. Furthermore, it also examined the effectiveness of the said assistance and presented a case study to the pilot micro food processor who has been assisted under the said technical assistance and has already acquired LTO from FDA.

This study utilized the Daniel Stufflebeam's Context -Input-Process-Product (CIPP) Assessment Model as it focused on the process and the product while exploring the context (needs and challenges) of the extension support services provided by the UESO. A descriptive research design was utilized in describing the technical assistance on FDA-LTO registration of the Tarlac State University-Extension Services Office (TSU-ESO) under the Industry Development Extension Services (InDEx) Program to the micro-food processors in the province of Tarlac, Philippines. The researchers utilized documentary analysis, interviews, and surveys, or questionnaires in gathering data.

Based on the results of the study, it shows that out of thirteen (13) micro food processors assisted from the pilot, batch 1 and 2, three (3) firms have already acquired LTO registration, one (1) firm have applied and uploaded the documents online, one (1) are waiting for an on-site inspection, one (1) firm deferred the application, and the remaining seven (7) has completed the documents and ready for online application. It also revealed that the said technical assistance is very effective in assisting the micro-food processors, and it opened convergence with other national government agencies.

Furthermore, one of the recommendations in the study is the participation of other stakeholders such as LGUs, SUCs, and NGOs, and the citizens themselves in monitoring the firms without LTO to ensure that they will comply with the food safety regulations.

Linking Smallholder Farmers to Markets (LinkSFarM) Project in Hacienda Luisita: An Evaluation

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Abstract

This study focused on the evaluation of the Linking Smallholder Farmers to Markets (LinkSFarM) Project in the Hacienda Luisita from the year 2015-2017. The study evaluated the project in terms of project goals and objectives, project management, and project outputs and outcomes. Furthermore, this study used a descriptive-evaluative research design. The respondents of the study were randomly selected from the clustered agrarian reform beneficiaries (ARBs), agro-enterprise field facilitators from the Department of Agrarian Reform-Tarlac (DAR-Tarlac), Local Government Units (LGUs), and State Universities and Colleges (SUCs). A total of thirty (30) AEFs coming from the mentioned partner institutions and a total of seventy (70) clustered ARBs responded to the said study.

Findings revealed few ARBs only participated in the conduct of collective marketing, resulting in the inability to complete the eight-step clustering approach to Agro-Enterprise Development (AED). Besides, only one (1) cluster (HL hot chili producers) have added value to their product and delivered it to an institutional market. The rest still marketed their products to local traders. This means that the farmers are still dependent on traders. Meanwhile, the most common problems encountered by both clustered ARBs and AEFs are the lots are under lease and "the wait and see" or "to see is to believe" attitude of the farmers.

The support of the partner institutions such as LGUs and SUCs to the project was viewed as strong based on the findings. A flexible approach to agro-enterprise development to be implemented in Hacienda Luisita and other farms in the country that would be adaptable in different context or situation; market linkages through the partnership with other public and private institutions and linkage to credit financing or lending institutions to support the farmers in the production and marketing of the product are the top recommendations proposed by the researcher in the study.

Mangrove Rehabilitation for Storm Surge Protection in Upper Calauag, Quezon Philippines

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Abstract

Mangroves play an important role in protecting coastal communities from storm surges. With this at hand, using the market price method and contingent valuation method, the monetary value of the storm surge protective function of mangroves in Brgy. Santo Angel, as well as the community's willingness to pay (WTP) for the enhancement of this ecosystem's function through rehabilitation, was determined. The calculated monetary value of the mangroves' storm surge protective function has amounted to Php 356, 008.00 (1 USD = 52.01 Php). This value was derived from the averted house damages provided by mangroves against a Haiyan-like storm surge inundation. On the other hand, the WTP of the locals for mangrove rehabilitation was computed at Php 15.44/household/ month or equivalent to Php 86, 525.76/year considering the total number of households in the barangay. The willingness to pay of the respondents was influenced by the bid amount, their income, sex, age, membership to the environmental organization, their awareness on the importance of mangroves as well as to the ecosystem services it provides. The recent valuation study successfully monetizes the value of mangrove rehabilitation aligned to improve the ecosystems' protection against storm surges. Moreover, decision-makers can utilize such data to increase the success of mangrove rehabilitation in the country, particularly those aligned for coastal protection.

Assessment of the Compliance of Food Processors to Regulatory Requirements Based on Risk-Based Food Safety Audit Recommendations and Interventions

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Abstract

This study is an attempt to assess the implementation of the recommendations for the compliance of micro food processing enterprises to food safety regulatory requirements of Food and Drug Administration – License to Operate (FDA-LTO). The recommendations and interventions were provided through a food safety consultancy program to 15 selected processing enterprises in Region III, Philippines. The assessment on the implementation of processing enterprises on the recommendations enables the food safety consultants to understand the compliance capabilities and identify the possible problems and challenges that processing enterprises encounter which inhibits its compliance to the regulatory requirements of FDA-LTO. The data and information gathered will provide the consultants with an avenue in improving future intervention programs and other offerings to be provided in assisting the processing enterprises. A risk-based food safety audit was conducted wherein the results served as bases to formulate the recommendations and interventions. The result of the audit on the compliance of the enterprises before and after the implementation of program intervention on food safety consultancy was assessed using a diagnostic scoring system and paired samples t-test.

The results showed no significant difference in the compliance of the enterprises in almost all the areas of food safety regulatory requirements before and after the intervention program. Hence, the diagnosis did not improve much from the initial audit to the final audit. In general, the condition of parameters under the contextual factors was diagnosed to imply the average risk of compromising food safety; the quality control and quality assurance activities performed by the enterprises were diagnosed to be on

the basic level of compliance; and the system outputs of the enterprises were diagnosed to have moderately low to average compliance. According to the interview, the top three most common problems and challenges responsible for the low compliance to recommendations include the lack of technical knowledge on the conduct of quality control and quality assurance activities, time constraints, and having few to no technical personnel. These and the other problems and challenges served as input in the need identification of the firms. To address these, recommendations on appropriate strategies for improving future intervention programs were provided accordingly, such as the provision of technical assistance in the fields of food quality control, food quality assurance, and business and personnel management, the conduct of write-shop on the preparation of document requirements, and others.

Exploring the Experiences of Men as Early Childhood Educators

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Abstract

This study explored the experiences of ten (10) male teachers of kindergarten in the public school in the province of Tarlac, focusing on four (4) areas such as; classroom management, teaching strategies, colleagues' relationship, and parental involvement. The participants' crucial experiences served as essential inputs to the pre-service early childhood teacher education program. Using a qualitative approach, it attempted to recognize male involvement in the field of Early Childhood Education (ECE) as a journey toward gender equality and setting value on male nurturing behavior. The participants tried to break the stigma or male stereotypes by providing young learners with a sense of warmth and emotional security. They displayed positive coping strategies such as commitment, partnership, or collaboration with parents, and altruism. They also believed that the task of laying the first foundation of learning is a source of fulfillment, and it is seen as an opportunity more than a responsibility.

Based on the findings of the study, the following conclusions were drawn: 1) Teaching in the ECE level is also a rewarding, fulfilling, and socially meaningful career option for men. The thought of being the first formal teacher of very young learners and the task of laying the first foundation of learning is a strong source of motivation for male teachers. It is more like striking the first paint in a blank canvass, and this is seen as an opportunity more than a responsibility; 2) firmness and consistency must be observed as part of the classroom management practice. "You mean what you say and say what you mean" is a mantra of male teachers. Being firm and consistent means being true and faithful to set rules all the time, and being fair in their implementation will teach the children self-discipline. The involvement of males in the education of young children can provide them the proper model of authority, strength, and discipline; 3) The presence of male teachers in ECE exhibited flexibility, creativity, and innovation in the way things are done in the classroom but at the same time address different kinds of learners. Teaching is more meaningful if

classroom interactions would be triggered by the correct matching of appropriate instructional materials and diverse teaching strategies with a suitable topic; 4) The development of a professional link with colleagues is a mechanism to work stronger for the learning and development of young learners. The engagement of male teachers in the ECE can help female teachers come up with different perspectives in discussing issues about the curriculum and in improving the teaching-learning process. The way male teachers handled and managed children's behaviors can be benchmarked by other teachers, especially females. It is important that working with colleagues out of collegiality, caring, and concern maximize learning and produce accomplishments; 5) Developing good communication with parents requires creative planning. Also, open communication must be established for parents, and teachers can share valuable insights into children's performance and behavior. The presence of male teachers encouraged a meaningful exchange of views and opened for queries but avoids favoritism and no compromise of personal requests and demands; 6) The stigma, stereotypes, or double standard associated with men pursuing a teaching career in early childhood education was still a major challenge to male teachers. They are being affected by the societal perception that the ECE field is not considered a career path for them. The journey of a male teacher in the teaching profession and the ECE field involves rewarding experiences but at the same time demanding condition; and 7) Early childhood educators need to deal with the different challenges and changes in the field through strong advocacy towards child development, professional judgment, and greater accountability. The male teachers tried to break the stigma or male stereotypes by manifesting the highest level of professionalism as expressed by their commitment to work with children, collaboration or partnership with parents, and altruism. They believed that they are the greatest factor in determining the quality of the children's school experiences.

Local Public Enterprise: Its Impact in the Local Economic Development in the Province of Tarlac

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Abstract

Generating sufficient resources is among the basic tasks of the government to carry out its pivotal role in delivering services to the public. This is true not only among national but also subnational levels of the government. Thus, apart from the mainstream internal revenue allocation, these local government units are empowered to explore intensive revenue generation programs apart from tax imposition. This can be done by governments adopting their corporate character by putting up economic enterprises.

Issues relative to the exercise of the entrepreneurial nature of local governments in the province of Tarlac was the main focus of the study. To address such, the study explored the following aspects, namely establishment and operations, management structure and staffing in the office, and financial performance of local public enterprises. Furthermore, challenges on the operation of these enterprises were also determined.

To satisfy the data requirements of the study, the descriptive research method was used where analysis of secondary data and interviews were done with subject matter experts including local chief executives (LCEs), local economic and investment promotion officers (LEIPOs), local public enterprise managers and employees and citizens.

Findings led to results under the following themes of personnel support, the efficacy of enterprises, and goal orientation. Public enterprises, whether owned by the national or local units, when properly managed, are contributory instruments to various aspects of development, be it economic, social, and others. Though there had been challenges in local economic enterprise management in the province of Tarlac, solutions are available to be tested and explored through policy reforms. First, data management must be introduced and, consequently, applied. Then, LEEs must be oriented to behave as corporate units bringing with it the orientation of attaining efficiency. Finally, it was provided by DBM (2016) that one of the considerations for LGUs to establish LEE is the conduct of feasibility studies covering technical, market, and financial aspects.

These are necessary steps to improve public enterprise management in the country not only to respond to the needs of the public but also for LGUs to become major players in the development and fully realize their corporate, thus entrepreneurial nature.

Level of Competitiveness on Resiliency in the 3rd District of Tarlac: An Analysis

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Abstract

The study was conducted to analyze the level of competitiveness on the resiliency of LGUs in the 3rd District of Tarlac. The descriptive evaluative research method was used in the study. The researcher also utilized documentary analysis, focused interviews, and surveys to achieve the needed data.

The findings of the study showed that the majority of the municipalities in the 3rd District were able to comply with all the said indicators on the organization and coordination on Disaster Risk Reduction Plan, Annual Disaster Drill, and Early Warning System. These municipalities are also consistent in updating their DRRM Plan. In addition, all of the municipalities are actively conducting their LGU-wide disaster drill once a year. While in terms of budget, LGUs experienced changes in their total budget, which latter affects the budget allotted for DRRMP for the years 2016 and 2017. Since 5% of the total LGU budget was the total budget for DRRMP as mandated by under Section 21 of RA 10121. The DRRMF covered the 30% allocation for Quick Response Fund and the 70% allocation for disaster prevention and mitigation, preparedness, and recovery.

Moreover, according to the different heads of DRRM of each municipality, geohazard maps were available in the municipality. These maps were posted in all evacuation centers in the different municipalities as well as in the Disaster Risk Reduction and Management Office. Also, all the municipalities have come up with an effective warning system in their areas such as rain gauge, flood level monitoring gauge, and immediate announcement/information dissemination through the use of a megaphone in the barangay or *sitios*.

Furthermore, the majority of the municipalities have an available water source, power source, and generator set for two (2) consecutive years, except the municipality of Bamban since it doesn't have a generator set. Correspondingly, all four (4) municipalities have an accessible sanitary landfill. It can be noted however, that only Capas has its autonomous landfill. Also, garbage collection is also done among the municipalities. However, its frequency varies depending on the area size and number of garbage trucks and personnel of the LGU. The most prevalent is that of Capas, which is done 150 times per month.

As to the problems, the majority of the residents are not oriented about waste segregation, and most of the far-flung areas has narrow roads that why trucks cannot pass to collect, so the majority of the residents burned their garbage this was also considered as the topmost problem encountered by the respondents. The resident also doesn't attend assemblies, especially those who are living in far-flung areas.

With all the data presented, the municipalities under the 3rd District are said to be competitive in terms of resiliency, but further improvement of facilities and equipment and proper information dissemination should be done by these municipalities on all indicators of resiliency.

Lingguwistikong Etnograpiya ng Filipinas

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Abstract

Ang pag-aaral na ito ay may layuning i-dokumento ang lingguwistikong etnograpiya ng Ayta Mag-antsi bilang wikang katutubo ng mga Aytang naninirahan sa mga liblib na lugar at sa mga paanan ng mga kabundukan ng mga Lalawigan ng Tarlac, Pampanga at Zambales..

Sa pag-aaral na ito, inalam ang heograpiya ng mga lugar; ang pagkakakilanlan ng pangkat; ang sitwasyon ng kanilang wika; ang estruktura ng kanilang lipunan o komunidad; ang sistema ng kanilang pamamahala; ang sistema ng kanilang kabuhayan; ang kanilang relihiyon; ang kanilang kultura at mga tradisyon; at ang iba't ibang pamamaraan ng kanilang pamumuhay.

Upang mabatid ang kahalagahan ng naisagawang pananaliksik, mag-imbita ng mga chieftan ng mga wikang idodokumento sa panahon ng pangkalahatang oryentasyon ng KWF upang mapadali ang proseso sa pagkalap ng mga datos. Magtatag ng mga seminar at pagsasanay para sa mga magdodokumento ng wika ng mga katutubo ng 3 araw man lang upang maging mas malinaw ang proseso at pamamaraan sa pagsasagawa ng mga ganitong uri ng pananaliksik. Magpatayo ng mga gusaling paaralan, pagamutan at mga establisiyimentong pangkabuhayan sa kanilang dako upang maitaas ang kalidad ng kanilang pamumuhay. Ipagpatuloy ang mga ganitong proyekto ng KWF upang makatulong sa preserbasyon ng mga katutubong wika sa Filipinas at maisalba ang mga wikang unti-unting namamatay.

Ang kabuoang proyekto ay maituturing na mahalagang ambag sa kasaysayan ng mga katutubong Ayta Mag-antsi. Ito ay nagbukas ng kanilang kaisipan upang lalo nilang pahalagahan, mahalin at ipagmalaki ang sarili nilang wika at kultura, Ang malugod na pagtanggap at kooperasyon ng mga katutubong Ayta sa mga mananaliksik ay lubos na nakatulong upang malikom ang mga datos na kailangan. Ang masinop na Gabay sa Lingguwistikong Etnograpiya mula sa KWF ay nakatulong upang maisaayos ang saklaw at limitasyon ng bawat kategorya ng proyekto. Ang mga katutubong Ayta ay may iba-ibang paniniwala sa pinagmulan ng wikang Ayta Mag-antsi. Dahil sa isyu ng migrasyon, lumiit ang bilang ng porsiyento ng mga gumagamit sa kanilang wika. Ang kanilang paniniwala at rituwal ay sagrado kaya maselan na ito ay talakayin at ibahagi sa

mga taga labas. Ang mga kabataan sa kasalukuyang henerasyon ay unti-unting nakakalimot magsalita ng wikang Mag-antsi bunga ng impluwensiya ng makabagong teknolohiya. Ang pabago-bagong panahon at mga bagyo ay nagpatagal sa pagkalap ng mga datos, lalo na yaong mga nakatira sa liblib na dako ng Zambales.

The Role of Authentic Leadership and Authentic Followership to Self-Efficacy, Work Engagement, and Organizational Commitment Among Nurses

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Abstract

The Authentic leadership and authentic followership are a growing interest of study in leadership in nursing practice. In leadership research, authentic leadership is found to be the newest area of interest, which is centered on the projection of the genuine or real self of the leader. It demonstrates self-awareness, an internalized moral perspective, balance processing, and relational transparency. Hence this study was a response to that interest as it aimed to examine the extent of the relationship between authentic leadership and authentic followership and their effect to self-efficacy, work engagement, and organizational commitment of nurses. It seeks to address the gap in the extant authentic leadership literature that arises from a failure to consider the follower's influence in the assumed positive outcomes of authentic leadership.

The study made use of descriptive correlational research design and purposive sampling technique with a sample of 106 nurse leaders and 397 nurse followers from different institutions in Tarlac Province. There were five (5) standardized instruments used. Data were examined using descriptive statistics, Pearson's r, Multiple Regression Analysis, and Partial Least Square Structural Equation Modelling. Results of the study indicated that authentic leadership and authentic followership were significantly related and are both significant predictors to self-efficacy, work engagement, and organizational commitment. The hypothesized model of authentic leadership and followership was significantly supported by the findings as predictors to self-efficacy, work engagement, and organizational commitment. Promotion of authentic leadership is highly suggested. The statistically supported model may serve as a working model for leadership and staff development initiatives.

Results of the study shed light on various assumptions about the effect of authentic leadership and authentic followership in the nursing practice. Hence, this study serves as an impetus for further studies that can explore other aspects of authentic leadership and authentic followership, which in turn will contribute to the betterment of nursing practice and higher learning. Thus, this study suggested that nurse leaders should adopt this kind of leadership style with the

followers that motivate them and perform well in the organization. Further research may be considered to examine the mediation effect of self-efficacy, work engagement, and organizational commitment on authentic leadership and authentic followership. Partial replication of this study is suggested with consideration of alteration of the sample, additional variables, and methodology.

Modified SHA-1 Algorithm

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Abstract

Cryptographic hash algorithms play an important role in information security as data files use hashes to verify its integrity. The hash assures that the recipient obtains the message from a source without alterations done throughout the message's transmission. A message can only have one distinct hash value; thus, no two messages should have the same hash, making the hash value known to be as the message's or file's digital fingerprint. Otherwise, if the hash value differs from its original footprint, hackers certainly have compromised the integrity of the message.

This paper modified the SHA-1 Algorithm by increasing the output to 192 -bits and strengthening the hash function. The hash function, meanwhile, is strengthened through the adjustment of the compression function by the incorporation of additional mixing method in every round with the intention of attaining better diffusion. Therefore, increasing the output would mean intensifying the strength.

The performance of the modified SHA-1 was evaluated through avalanche effect, time, and message complexity. The Avalanche effect is a suitable characteristic in a hash function, which indicates that a change in the input bit of the hash results to a difference on the probability of the output bit. If the chance is close to 50%, the hash function is considered good. A 50% avalanche percentage shows that the difference of the output hash value and the input change is at least half, and a probability higher than 50% displays improved statistical performance. Time notes the speed to generate the hash in seconds. Classification of the message type includes the two messages with 1-bit change; 24 messages with a difference in a few bits; two messages with distinction in the last few bits; length difference, and random strings.

In this study, character hit was evaluated as to the performance of the hash function, which is measured by comparing hash values with each other and then counting characters located at the same location with the same content. In addition, the different messages were tested for performance analysis and avalanche effects.

Based on the different message types, avalanche percentage of modified SHA-1 showed better diffusion at 51.64% (higher than the target 50%), while

SHA-1 achieved 46.61%. The average execution time noted for modified SHA-1 is 0.33 seconds, while SHA-1 is 0.08 seconds. Time increases as the number of messages hashed increases; the difference is negligible in fewer messages. In addition, no similar character existed in the same position for character hits. The modified SHA-1 achieved lower hit rate because of the mixing method added. The result of the test program after inputting 1000 hashes from random strings showed no duplicated hash. Therefore, the modified SHA-1 can be used to test the integrity of messages. Further improvement is suggested to minimize the time consumed by the modified SHA-1 hash by studying the effect of lessening the number of rounds.

QR Code Integrity Verification Based on Modified SHA-1 Algorithm

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Abstract

Quick Response (QR) codes are a low-cost tagging technology known for its efficient production and implementation. The utilization of QR codes to mobile phone services is necessary because of its speed to recognize and process. Various fields use QR codes for its services like product authentication, online registration, and business transaction. Therefore, document verification and authentication is indispensable to circumvent bogus operations.

This paper identified the requirements needed in the certificate verification that uses the modified SHA-1. The modified SHA-1 algorithm was applied in the data integrity verification process of certificates with QR code technology.

A requirement for building the application is a camera with an Android 4.0.3 smartphone with access to web applications. The web application will involve the capturing of the QR code printed on the certificate using the phone's camera to send the obtained message and hash code to the web server. The web application is best viewed using Mozilla Firefox, a fast and free Android browser. The software used Microsoft Web Server Internet Information Service (IIS) Version 7.5, which is a general-purpose web server developed by Microsoft running on Windows Operating System.

In this study, IIS runs the Active Server Page (ASP). The ASP.NET framework is a server-side script engine that creates interactive web pages. The application uses a server that has an Intel (R) Core (TM) i5-6500 CPU @3.20GHz 3.19 GHz processor, 8.0 GB RAM, running a 64-bit Windows Operating System for testing. On the client side, the required smartphone should have a camera running on an Android platform to use the certificate integrity checker. Three modules identified were the QR code generation module, QR code printing module, and QR code scanning and verification module.

The application was tested using legitimate and fraudulent certificates. Based on the results, the application successfully generated QR codes, printed certificates, and verified certificates with 100% accuracy. During the trial run of the application, four test cases were seen which involve correct names and QR codes, and three other possible test cases of faking certificates such as modification of the name, regeneration of QR codes using valid hash and a fake

name, and modification of the QR code. Although these cases exist, the application successfully verified all thirty certificates correctly. Also, it is noticed that during the scanning, the smartphone camera should be in focus to capture the QR code clearly. As for future works, the application can be further applied to degree certificate verification and may use optical character recognition algorithms as a supplement to the manual inspection of the certificate.

Improved MSHA-1 Algorithm with Mixing Method

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Abstract

Recently, a Modified SHA-1 (MSHA-1) has been proposed and has claimed better security performance over SHA-1. However, the study shows that MSHA-1 hashing time performance was slower. In this research, an improved version of MSHA-1 was analyzed using avalanche effect and hashing time with 160-bit output and mixing method in every round to attain better diffusion.

The SHA-1 algorithm from the National Institute of Standards and Technology under the Secure Hash Standard was translated to a Visual Basic for Applications in Office 365. From here, the modifications were inserted.

Different message sets were considered during the evaluation of the Improved Modified SHA-1. From these different message sets, the avalanche test was performed. For message type two messages with 1-bit change, the Improved MSHA-1 achieved 51.88%, while MSHA1 obtained 51.56%, and SHA-1 got 45.63%. For message type twenty-four (24) messages with difference in a few bits, the avalanche effect of the Improved MSHA-1 acquired 50.49% while MSHA -1 attained 50.09%, and SHA-1 got 48.37%, which was slightly lower than the desired 50% ideal value. For message type two messages with difference in last few bits, the Improved MSHA-1 achieved 57.50%, which was very much higher than the ideal value, while MSHA-1 attained exactly 50.00%, and SHA-1 got 38.75%, which was significantly lower. For message type length difference (24 messages), the Improved MSHA-1 achieved 50.49%, MSHA-1 attained 51.13%, and SHA-1 got 49.76%. For message type five hundred (500) random strings, the Improved MSHA-1 achieved 49.99%, and MSHA-1 got 50.19% and SHA-1 attained 49.90%. Lastly, for message type common substrings arranged in different orders, the Improved MSHA-1 achieve 50.95%, while MSHA-1 attained 50.23%, and SHA-1 got 49.76%. Testing showed better diffusion result because the average avalanche percentage of the Improved MSHA-1 was computed to be 51.88%, which is higher than the 50% standard to be considered secured. Meanwhile, the MSHA-1 attained 50.53%, and SHA1 achieved only 47.03% avalanche effect showing that the Improved MSHA-1 performed better security performance by having an avalanche effect improvement of 9.00% over SHA-1 and 3.00% over MSHA-1.

Hashing time was also recorded using 500 random strings for ten trials (n=10). The average time was computed in milliseconds. Using 500 random string for ten trials, the Improved MSHA-1 has better hashing time performance by having 31.03%improvement. Testing for effectiveness by using a hash test program and inputting 1000 hashes from random strings showed no duplicate hashes.

These results show that the Improved MSHA-1 algorithm by modifying the output to 160-bits with additional mixing method in every round improved the security of the algorithm by attaining better diffusion and improved the hashing time performance. As an offshoot of this study, further researches may be undertaken by modifying MSHA-1 hash through lessening the number of rounds to improve the hashing time performance.

Implementation of a Bit Permutation-Based Advanced Encryption Standard for Securing Text and Image Files

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Abstract

In this paper, the commonly-used Advanced Encryption Standard (AES) is modified to address its high computational requirement steaming from the complex mathematical operations in the MixColumns Transformation, which makes the encryption process slow.

The standard and modified AES algorithm were developed in .NET Framework using the Microsoft Visual C# 2015 version 14.0.2543.01. The developed program was used to encrypt text and images. Matlab R2017a was used to test the performance of the modified algorithm in image encryption in terms of histogram analysis, entropy, correlation coefficient, NPCR, and UACI. The study was developed and tested on a desktop computer with Intel ® Core ™ i5-2400 processor, 3.10GHz CPU speed, 4GB RAM with 1TB HDD storage, and running in a 64-bit Windows 10 OS. Ten eBooks in text file format were downloaded from www.gutenberg.org. The text files ranging from 10KB to 100 KB were used as input to test the efficiency of the proposed modified algorithm. Four images were downloaded from the USC-SIPI Image Database site for the implementation of image encryption. Images were tiff and BMP file types, either in RGB and grayscale format with 128x128 and 256x256 image size.

The modified AES used Bit Permutation instead of the MixColumns Transformation since the use of bit permutation in an encryption algorithm achieves efficiency by providing minimum encryption time and memory requirement. Results of the study showed that the modified AES algorithm exhibited increased efficiency due to 18.47% faster encryption and 18.77% faster decryption for text files. The modified AES algorithm also yielded 16.53% higher avalanche effect compared with the standard AES, thus improving the security performance. Application of the modified AES in encrypting images in Cipher Block Chaining mode showed that the modified algorithm also exhibited 16.88% faster encryption and 11.96% decryption compared with the standard AES. Likewise, modifying the algorithm achieved the ideal result in the histogram analysis, information entropy, and correlation coefficient of adjacent pixels to resist a statistical attack. The ideal value in the number of pixels change rate, and unified average change intensity was also achieved, making the modified algorithm resistant to differential attack. These results show that modifying AES by using bit permutation to replace MixColumns Transformation was able to

address the high computational requirement of the algorithm resulting in a faster and more secure encryption algorithm for text files and images. As future studies, the modified AES may be extended to 192- and 256-bit AES and may be extended to encrypting other multimedia files such as audio and video files.

Modified AES for Text and Image Encryption Scheme

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Abstract

The security of digital data is still one of the significant challenges in the increased demand for the use of computers and for the need to communicate from one location to another. Securing digital data is needed to protect the confidentiality, integrity, authenticity, and availability of data only to the intended recipient. Encryption provides a solution to ensuring the security of data before transmitting it over the network by encoding the data in a manner that is unreadable to the unauthorized parties and is decoded only by the authorized party.

Advanced Encryption Standard (AES) is one of the most frequently used encryption algorithms. In the study, the Advanced Encryption Standard is modified to address its high computational requirement due to the complex mathematical operations in MixColumns Transformation, making the encryption process slow. The modified AES used Bit Permutation to replace the MixColumns Transformation in AES since bit permutation has easy application ,and it does not have any complex mathematical computation. Text files and images were encrypted to analyze the performance of the modified AES algorithm. During the experiments, different sizes of text files and images were tested for ten trials to get the average encryption time and CPU usage of the standard AES and modified AES. The standard and modified AES algorithm were both written in Microsoft. Net Framework and simulated on Core i5-2400 CPU @ 3.10 GHz with 4GB RAM and 64-bit Windows 7 OS.

The paper used bit permutation to replace the MixColumns Transformation of AES to improve the efficiency of AES. The paper compared the performance of the standard and modified AES algorithm by encrypting text files and images. The two algorithms were evaluated based on their encryption time, CPU usage, and avalanche effect. Based on the results, the modified AES has increased the efficiency of the standard AES as it has faster encryption time in text files and images. The modified AES also consumed lesser CPU usage than the standard AES. During the testing, the modified algorithm also produced a higher avalanche effect. Therefore, the use of the bit permutation in modified AES increased the efficiency, level of security, and overall performance of the algorithm in encrypting text files and images. For future work, we plan to implement the modified algorithm in the transmission of images across a network. Also, future work may extend the modified algorithm to audio and video standards like MPEG.

Implementation of Modified AES as Image Encryption Scheme

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Abstract

Securing images is an important process in medicine, remote sensing, military, government, telecommunications, and other fields. The widespread usage of digital images on the internet requires a fast, reliable, and robust security to store and transmit them over the network. Image encryption is needed to enforce content access control, identity authentication, and provide protection of images by transforming the original content of the image into a texture-like or noise-like information that is hard to understand. The use of encryption techniques provides a solution to the security issues in image and video processing. Since images have bigger size than text, a faster encryption algorithm is needed to provide higher security in digital images.

The paper presents a modified AES algorithm that addresses the requirement in image encryption. The modified algorithm used bit permutation in the replacement of MixColumns to reduce the computational requirement of the algorithm in encrypting images. The encryption algorithm in images was simulated using Microsoft .NET framework, and the generated encrypted images were evaluated using the functions in Matlab (R2017a). The evaluation of the encrypted images is on the encryption and decryption time, key sensitivity analysis, histogram analysis, correlation coefficient, information entropy, NPCR, and UACI. Encryption Time refers to the amount it takes to process the plaintext image to its equivalent encrypted image, while decryption time refers to the amount it takes to convert back the encrypted image to the plaintext image. A faster encryption algorithm for images is needed to provide better security of digital images.

The implementation of the proposed modified AES as an image encryption scheme is to address the requirement in encrypting images. Comparison with the standard AES is carried out concerning encryption time, key sensitivity analysis, histogram analysis, the correlation coefficient of adjacent pixels, information entropy, Number of Pixel Change Rate (NPCR) , and Unified Average Change Intensity (UACI).

The experimental result showed that the modified algorithm produced an entirely different encrypted image and that there is a significant difference in the encrypted image whenever there is a small change in the plaintext image. The result also showed that the modified algorithm is faster

than AES, has a comparable value of predictability with the standard and is resistant to statistical and differential attacks making it suitable for image encryption.

In the future, the implementation of the modified AES algorithm in partial image encryption and a comparison of the modified algorithm with other image encryption algorithms can be considered.

The Development and Fabrication of the Automated Machine for Smoked Fish System

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Abstract

One of the reasons why Automated Smoked Fish Machine (ASMF) is preferred is because of its capacity to reduce the cooking time of the product. This project was designed to ensure time conservation, cleanliness, and safety of the smoked fish to be sold in the market. The machine will automate the process of making a smoke fish with the application of Mechatronics Engineering principle. Automation is the process of reducing human intervention to a minimum. The process is faster, more precise, and more convenient because it is automated.

The conceptual modeling and the design of the automated smoked fish machine involved mechanical, electrical, and electronics system.

The systems integration of this research designed and identified the components and materials for the fabrication of the Automated Smoked Fish Machine through Arduino Programming. Meanwhile, the testing of the ASMF went through test runs, design adjustment, pre-testing, and final testing.

This study proved that there were improvements in the processing of smoked fish through mechatronic principles and supported the idea of automation in processing. The process by the number of operations improved the total time to finish a product. An average of 3.5 in 6 processes produced a total of 120 kg smoked fish. This has shown that the machine can be profitable with a return of investment of 23% per year with an increase in production up to 12,000 kg of smoked fish.

On the other hand, no rejected product was found since there was no contact between the boiling and the smoking processes, which makes the products marketable at a marked-up price value. The machine was not limited only to three types of dish; moreover, but can also process different types as long as it meets the standard time for boiling and smoking.

This ASMF can contribute to the increased production of smoked fish in Tarlac Provinces as there were only 3% in 2015 or 8,156.9 MT of fisheries production in Region III. This would also serve as a solution to critical issues such as fisheries production on depleted resources, inequitable distribution of benefits from resource use, physical losses, and reduced value of catches due to improper post-harvest practices and inefficient marketing.

An Improved Overlapping Clustering Algorithm to Detect Outlier

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Abstract

MCOKE algorithm assigns a data object to multiple clusters and is known for its simplicity and effectiveness. Its drawback is the use of Maxdist as a global threshold in assigning objects to one or more cluster because it is sensitive to outliers. Moreover, having outliers in the datasets can significantly affect the effectiveness of MCOKE with regards to overlapping clustering.

In this paper, the researcher proposed an outlier detection to improve the performance of MCOKE algorithm by removing outliers that can participate in the calculation used in assigning objects to one or more clusters. The study considered the use of Median Absolute Deviation (MAD) as a tool to detect outliers. MAD is known to be the most robust measure that is easy to use and is not sensitive to outlier. The performance of the proposed outlier detection technique was tested to see if the improved MCOKE algorithm's accuracy is acceptable. The original MCOKE algorithm is known for its simplicity and effectiveness, specifically in the identification of data objects to multi-cluster. However, having outliers in the datasets affects the effectiveness of MCOKE in assigning objects to one or more clusters. In this study, outlier detection is added to the original MCOKE to detect outliers that might be included in the processing of overlap clusters. Based on the experimental results, the proposed outlier detection improved the performance of MCOKE in the identification of data objects to multi-cluster.

Furthermore, F1 score performance criterion using median absolute deviation as the proposed outlier detection method demonstrated a higher outlier detection accuracy rate compared to LOF, LoOP, and LPOD methods. Since MCOKE still uses K-means, it is still sensitive to the random initialization of the clusters center. Another issue of the algorithm is its discovery of overlapping clusters. The proper way of assigning objects to one or more clusters should not focus only on the distance of objects and centroid of the clusters. Based from the results, an alternative approach to the random initialization is recommended. Evaluation results revealed that the outlier detection demonstrated higher accuracy rate in identifying outliers when applied to real datasets. Modification of the algorithm to include additional parameters aside from distance of objects and centroid of the clusters can be considered for future works.

OCA: Overlapping Clustering Application Unsupervised Approach for Data Analysis

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Abstract

Data mining and knowledge discovery in databases have been an active area of research lately. Data mining applications are useful for commercial and scientific sides. Clustering can be considered as an unsupervised learning technique. In data mining, clustering is one of the widely use fundamental task, and it is used to detect hidden structures. Clustering aims to find groups from unlabeled data such that all similar data objects is within the same cluster while dissimilar data objects from a different cluster. However, one of many challenging issues is noise or anomalous data, also known as an outlier. Having outliers in the dataset may result in an inaccurate analysis of data, provide a misleading statistical result, and may potentially decrease the quality of the data analysis task. Due to this, outlier detection is an important data analysis task,. Its main objective is to detect anomalous or abnormal data from a given dataset .

In this regard, this paper focused on the development of an overlapping clustering application (OCA) that can identify overlapping clusters and outliers, respectively. The study considered different research methods and algorithm for the development of the application. One of the algorithms used is the k-means algorithm because of its simplicity to solve known clustering issues. The study also considered the use of Median Absolute Deviation (MAD) as it is known to be one of the most robust measures that is easy to use with the presence of outliers. Maximum distance (Maxdist) is another method used to identify data objects assigned to multi-cluster. The OCA application is limited only in handling numerical data. The study presented an overlapping clustering application or OCA for data analysis. Based on the experimental results, the developed OCA demonstrated its capability in terms of detecting the abnormal values (outliers) and identification of clusters with overlaps. OCA is a very useful data analysis tool for outlier detection analysis, data clustering, and detection of overlapping clusters. Despite providing a good result, it is recommended that more tests need to be done. The developed OCA only works with numerical datasets; therefore, modification of the application can be considered for future works. Furthermore, it is recommended that an alternative approach, which is not sensitive to the random initialization of the cluster center, be considered for future researches.

An Enhanced Overlapping Clustering Algorithm for Data Analysis Approach

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Abstract

Multi-Cluster Overlapping K-means Extension (MCOKE) algorithm assigns a data object to multiple clusters and is known for its simplicity and effectiveness. However, its use of Maxdistas, a global threshold in assigning objects to one or more cluster presents a problem because it becomes sensitive to outliers in the datasets, which can significantly affect the effectiveness of MCOKE with regards to overlapping clustering.

In this paper, the Median Absolute Deviation (MAD) is incorporated into MCOKE to enable the algorithm to detect and remove outliers that can participate in the assignment of objects to one or more clusters. Furthermore, additional parameters such as radius of cluster and distance between clusters are added into the procedures. The evaluation was done through experimentations using synthetic and real datasets.

The performance of the Enhanced MCOKE was evaluated via F1-measure criterion, speed, and percentage of improvement. Evaluation results revealed that the Enhanced MCOKE took less time to discover overlap clusters with an improvement rate of 22% and achieved the best performance of 91.5% accuracy rate via F1-measure in identifying overlapping clusters over the Original MCOKE algorithm. This proved that the use of the Median Absolute Deviation as a distance measure in MCOKE and incorporation of radius of clusters and cluster distances were able to significantly improve identification of overlapping clusters.

The incorporation of outlier detection before clustering improves the performance of the Original MCOKE to detect and remove outliers. This has led to better identification of overlap clusters. The use of the additional parameters also contributed to the improvement of the original MCOKE in terms of runtime execution. Thus, the study has successfully achieved its objective of producing an Enhanced MCOKE algorithm with better performance compared to the existing MCOKE algorithm.

Based on the findings and conclusions of this research, the following recommendations are presented: a) Other test measures such as FBCubed and Pair-based evaluation may be considered to evaluate the performance of the Enhanced algorithm; b) Since the Enhanced MCOKE still uses the traditional

k-means algorithm, it is still sensitive to the random initialization of the cluster's center. An alternative approach to the random initialization is recommended; c) Since the developed clustering application only works with numerical datasets, modification of the application may be done for it to accept textual inputs, and d) New applications of the Enhanced algorithm may be exhausted.

Development of Molding Machine for Petal-Shape Gum Paste

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Abstract

This paper describes the design and development of a molding machine that was used in the process of making edible gum paste petals for export-quality cake decorations of Company A, which distributes to United States, Australia, Belgium, Italy, Hungary, France, and others. During the period of the study, Company A employed manual labor in their production. The processes of making these cake decorations include kneading/sheeting of sugar gum paste followed by manual cutting of petals or herbs, then manual thinning and forming the cut petal tips, and finally, manual joining or sticking of petals to form a rose decoration. In line with Company A's setup, this study designed and developed a molding machine for forming edible rose petals considering safety, quality, and productivity improvement to meet the high consumer demand. The main objective was to speed up Company A's cutting, thinning, and forming processes of rose gum paste.

This study covered the design and development of a molding machine with the application of 3D molding, Pneumatic Technology, and computer-aided design and manufacturing (CAD/CAM) techniques. The machine was designed only to form a petal-shaped gum paste of 7% moisture with the same size and geometry only. Materials used during the study are based on their availability within the Philippine market. Meanwhile, an upper and lower mold was designed based on the shape of the rose petal. The number of pair of molds were delimited to sixteen pairs only and are based on 1m length of High-density Polyethylene (HDPE) rod, and all materials used in contact with the food materials are food grade. In addition, the air compressor unit used is based only on the available compressor, which can be used by the research. However, compressor and reservoir size design was not considered during the study. The inside room condition is monitored by the company and during the testing of the molding machine, the relative humidity and dry bulb temperature are at 45% and 320C, respectively. The payback period is 6 months, and the production capacity can be increased by 58.72%.

The researcher was able to develop a molding machine for petal shape gum paste with the use of CAD/CAM and Fluidsim software. The molding machine was fabricated based on the final design, and its components were selected based on design calculation, availability, and costs. Also, the trial shows that the molding machine was able to meet the desire functions to produce 3D molded gum paste

of rose petal in shape. Manual cutting of the existing process was eliminated and the process was improved, but in addition, the operator risk of being lacerated was also eliminated.

Since the production capacity can be increased by 58.72% or 4, 397 roses/ month, therefore Company A' cutting, thinning, and forming processes for rose gum paste can be improved with the use of the molding machine.

With a monthly net income difference of Php 9, 469.43, the investment can be recovered based on a payback period of 6 months; therefore, the project is feasible and good to invest.

9-Element Electronically Steerable Parasitic Array Radiator Antenna for Ultra High Frequency Band

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Abstract

Antenna systems are efficient if most of the radiated power is transmitted to its receiver, more so if the major lobe at the receiving end is directly positioned to the transmitter for maximum reception. Since there is an imminent switchover to Digital TV and the frequent use of remote controls and telemetry systems in the country, UHF frequencies will be utilized even more. In the previous years, to achieve a better line of transmission and widen subscriber coverage, the antenna orientation has to be physically adjusted. With this, electronically steerable antennas have been in major focus in terms with antenna designs as it has the ability to alter radiation patterns without physical orientation. However, electronically steerable antennas may be popular on bands which operate on Gigahertz range, this design seems to be limited in frequency.

The study aimed to design a 9-element parasitic radiator array suitable for Ultra High Frequency Band (UHF Band) and to simulate its characteristics, develop a working prototype and evaluate its gaining performance, radiation pattern maneuverability, and standing wave ratios. Also, this study also developed an experimental controller and algorithm to use it in testing and evaluation of the performance of the antenna. The importance of the conduct of the study is to further enhance the development of antenna systems that will be used by general consumers. The results and data that may come up with this study can be used to further enhance the development of steerable antennas. Since this study is aimed at 9-element of design, an ESPAR antenna array intended for UHF Band, including its performance evaluation, other applications aside from UHF bands, however relevant, is beyond the scope of this study, therefore not included on design and testing considerations.

A prior data gathering and research have been done to conceptualize a design for the ESPAR antenna, which includes the possible and most suitable components; then, materials compatible with the required specifications and actual design specifications, measurement, and dimensions are conceptualized. After the design conceptualization, the acquisition of necessary tools and materials has commenced, followed by the actual construction. A microcontroller based electronic device is developed afterward that will control the designed antenna array and measure the capability of the antenna array. Multiple tests and evaluation parameters have been gathered such as plotting the pattern and

testing for its standing wave ratio. For comparative purposes and to test the acceptability of the performance of the prototype antenna array, a simulated antenna characteristic based on the parameters and specifications of the designed prototype antenna is quired.

9-element ESPAR for Ultra Hight frequency antenna has been developed and is at par with expectations. Based on the testing and evaluation, the antenna's radiation characteristics can be reshaped, oriented on a specific azimuth, and altered by modifying the electrical length of its parasitic arrays. The use of variable reactance through inductor-diode in series with the parasitic element and applying reverse bias switching voltage modifies the overall reactance of the parasitic element; thus, increases or decreases its electrical length. The reverse bias switching voltage can be produced by utilizing digital programmable electronic devices such as microcontrollers and provide the necessary control mechanism for the antenna. By arranging the variable reactance elements into a Yagi-like array gives the antenna system flexibility to reshape its radiation pattern. The antenna also has produced 8 configurable azimuth orientations with two gain values. It exhibited an acceptable amount of front-side lobe gain and relatively narrow beamwidth but not as quite as much as to be used in long haul transmission or highly sensitive reception, but enough to be used on practical applications. With respect to its Standing Wave Ratio, the antenna exhibits a relatively large value but can be corrected if a proper matching circuit will be installed if it is intended to be used as a transmitting antenna.

In general, the continuous development of ESPAR antenna can greatly affect the method of transmission or reception of wireless applications. Through the proliferation of wireless devices and the eagerness to efficiently transmit information wirelessly.

Modified Blowfish Algorithm

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Abstract

Security is involved with the protection of network and data while communicating over the public networks. It is one of the prominent areas of concern in communication and data transmission, particularly in open networks, like the Internet. One way of guaranteeing the protection of information is through the application of cryptography such as Blowfish.

Developed by Bruce Schneier, Blowfish is a 64-bit variable-length symmetric block cipher that aims to replace the outdated Data Encryption Standard (DES). Blowfish is one of the fastest, compact, easy to understand, and implement. It is a free alternative to existing encryption algorithms that features variable security level except when changing keys. Despite the fact that blowfish is a remarkably fast block cipher, extending it to act on 128-bit is the most natural manner. In 1997, a request for candidate algorithm nominations for the Advanced Encryption Standard listed minimum functional requirements and asked for a symmetric block cipher capable of supporting block lengths of 128 bits and a key length of 128 bits. Twofish, an encryption algorithm based on Blowfish, accepts 128-bit block size and also provides a substantial level of security but lacks encryption speed as compared to Blowfish; hence, Twofish has seen less widespread usage.

This study modified Blowfish encryption to use a 128-bit block size and a 128-bit key to comply with minimum requirements as an encryption standard. The modification retained the original structure for easy migration but utilized two S-boxes to save memory. A derivation was added to prevent symmetry. Experimentation was done using different file sizes ranging from 10kb to 1000kb. The average time is computed using 20 trials of each file size. During the experimentation, the researcher used Intel® Core TM2 Quad CPU Q6600 @2.40 GHz with 4G RAM. The file and key used for all testing done were the same.

The algorithm's performance was evaluated using time and avalanche. Upon testing, the Modified Blowfish is slower with key, encryption, and decryption average of 26.99ms, 1651.83ms, and 2765.04ms compared to blowfish with 21.65ms, 1297.76ms, and 2176.59ms due to block size difference. Applying a 128-bit block size increases security by decreasing the chances of having duplicate blocks that may leak information. The Modified Blowfish is faster compared to Twofish with an encryption and decryption average time of

2418.08ms and 4002.70ms. The added derivation improved the avalanche of the Modified blowfish. Blowfish achieved 47.14% while Modified Blowfish attained 52.86%. For future works, other researchers may study hardware optimization implementation of the modified algorithm.

Modified Blowfish Algorithm in Securing Electronic Medical Records

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Abstract

An Electronic Medical Record (EMR) is a controlled document that contains essential and sensitive patient information. Protecting patient privacy is deemed valuable that is why laws control and regulate access to medical information to protect patient's confidentiality. EMR helped improve services to patients by delivering organization and accuracy of patient information, but issues regarding security breaches and medical identity theft are growing concerns. Data security and the most identified form of protection of these EMR applications ranges only from utilizing passwords and some backup mechanisms while storage and secure communications are lacking. Secure communication is a priority requirement for EMR, so the use of encryption approaches and traffic shaping algorithms are placed to ensure secure access to data

This paper enhanced the current EMR system by integrating modified encryption. The simulation used the modified Blowfish Algorithm in an EMR system that focuses on four goals: 1) define the requirements, 2) design and identify features, 3) develop the EMR incorporating added security mechanism using the modified Blowfish algorithm, and 4) test the application with sample data.

RAD is based on prototyping and iterative development focused on gathering customer requirements through workshops or focus groups, early testing of the prototypes by the customer using the iterative concept, reuse of the existing prototypes (components), and continuous integration and rapid delivery. Since RAD fits into the time frame, this model was adopted in the system development. An interview was conducted both on the Medical Clinic and Management Information System Office for data gathering of Tarlac State University. After a series of questions and answers, requirements were formulated. Sample data were taken from the medical records of employees and medical record samples. Since health records are considered private, the actual name of the persons involved will be replaced with dummy names during the testing phase. Data privacy was strictly imposed. The structure of the database was taken from the existing database of the TSU medical records system.

Simulation work using medical records on the algorithm will be carried out by using the .net framework (pronounced dot net). VB.NET (Visual Basic) is an

object-oriented programming language developed by Microsoft that runs on the .NET Framework on a Microsoft Windows operating system. An HP computer system with Intel® Core™ i5-7200U processor performing at a speed of 2.50 GHz with windows platform and 8GB installed memory will be used to carry out the proposed work.

Based on the results, the incorporation of the encryption was successful based on testing and checking done on the input terminal and the database server. Data inputted on the EMR system was successfully encrypted before transmission and decrypted only on the terminal for viewing. Performance results show that without encryption, saving took an average of 87.8ms; meanwhile when it was encrypted, it acquired 88.8ms – a difference of 1ms. The minimal difference is because of the size of the data. The average decryption time of all records using the modified algorithm took 1342ms while using plaintext took 1322ms. The decryption time is higher by 20ms due to the application of the decryption algorithm.

Modified Blowfish Algorithm Analysis Using Derivation Cases

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Abstract

This study analyzed and enhanced further the Modified Blowfish Algorithm encryption by introducing different derivation techniques. The study retained the original structure, process, and the use of two S-boxes in the Modified Blowfish Algorithm but presented two derivation processes in the f-function, which was originally placed to prevent symmetry. The derivation case's performance was analyzed using the avalanche effect and time efficiency to determine the improvement between two derivations.

For the avalanche test, the hexadecimal values of the encrypted input string with the different keys were used as input in a spreadsheet application to compute for the average avalanche effect. Three plaintext messages were used in the trial, and for one plaintext message, five keys were used, varying 1 bit for each key. An algorithm should possess an avalanche effect minimum of 50% to be considered good. After comparing the first and second derivation process presented in the Modified Blowfish, the second derivation further improved the avalanche effect by 5.47%, thus improving security.

The derivation process of the MBA's speed was compared using the execution time of the algorithm's key generation, encryption, and decryption. The Visual Basic implementation of David Ireland was adopted for Blowfish Algorithm. Consequently, modifications were inserted into the original Blowfish algorithm to create the Modified Blowfish algorithm. The selection of files to encrypt and the setting of the encrypted and decrypted file destination were added on to Blowfish. Software implementation of the modification was carried out using Visual Basic 6.0. The operating system used was running a 64-bit Windows 7 on a PC with an AMD A10-7860K Radeon R7, 12 Compute Cores 4C+8G 3.6GHz processor with 8.00Gb RAM.

The performance also showed that the second modification is faster by 39.48% in encryption time, and 38.34% faster in decryption time. The first derivation case in the modified Blowfish was slower in time because of the difference in the placement of the shift rotation. The key generation time was found to be independent of the input size, while the encryption and decryption time was found to be directly proportional to file size.

For further improvement, the use of different block cipher mode operation, block size, and other key size consideration scan be done. Researchers may explore other security measures aside from the avalanche effect to further analyze the performance of the MBA. Lastly, this modified encryption can be used for encrypting text files, images, and non-text data as an additional supplementary attachment in EMR implementation.

Optimization of Traditional Muscovado Cook Stove in Gerona Tarlac

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Abstract

The Muscovado Industry in the Philippines earmarks promising markets within the country and abroad. However, the production process and equipment remain traditional. It is in this light that the researcher ventured on the optimization of the traditional muscovado evaporation cook stove. Prior to the development aspect, it is a requisite to investigate the existing performance of the traditional muscovado evaporation cookstove used in Gerona, Tarlac in terms of its thermal efficiency, specific fuel consumptions, and evaporation processing time.

The geometry of the combustion chamber, such as fuel feeding diameter, depth of the chamber, and the exhaust diameter of the muscovado cookstove were used as the control factors in the design of the experiment. The three common cooking procedures – cold start high power, hot start high power, and simmering processes were treated as noise factors in the experiments since these factors are difficult to control in the evaporation process. Taguchi Method was utilized in this study to come up with a robust design of experiment with minimal experimental run. Meanwhile, assessment of the muscovado cook stove was conducted using Controlled Cooking Test (CCT) and Water Boiling Test (WBT) protocol.

The performances of the nine modified cookstoves were computed using Minitab Statistical Software. Based on the result, the following measures are the optimum dimension of the critical components of the muscovado cookstoves: eight-inches fuel feeding section, 20-inches combustion chamber depth, and eight -inches exhaust diameter. The specific fuel consumption of 0.62 gfuel/kgwater boiled is 39% lower as compared to the 1.092 gfuel/ kgwater boiled specific fuel consumption of the traditional muscovado cookstove was observed. The processing time of 167 minutes of the optimized muscovado cookstove is 21% lower as compared to the 212 minutes of the traditional muscovado cookstove. It was also shown that the optimized muscovado cookstove has 37% thermal efficiency which resulted to 67% improvement as compared to the 22% thermal efficiency of the traditional muscovado cookstove.

A total of nine modified cook stove with different combinations of fuel feeding diameters, chamber depths, and exhaust diameters were subjected to

and 8 inches exhaust diameter. The optimum setting of the cookstove was also evaluated using controlled cooking methodology. Based on the result, the optimized muscovado cookstove has 0.662 grams/ kg of water boiled, 167 minutes processing time and 37% thermal efficiency.

Based on the series of testing, it is concluded that the optimized muscovado cookstove has 39% improvement in terms of specific fuel consumption, 21% improvement in evaporation processing time, and 67% improvement in terms of thermal efficiency.

Energy Consumption Analysis in a Computer Laboratory

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Abstract

This paper presents an Information System Model, which is used for Tarlac State University – College of Computer Studies to provide an analysis of the energy conservation application through IOT applications. The prototype on this study is one of the many technologies, schemes, and practices that it is needed especially in analyzing the power readings of a certain facility and identify which equipment unwantedly consumes power. It puts the data collection in a convenient way, making it easier for the data analyst to work without physically seeing the equipment. In the province of Tarlac, there were many Information Technology (IT) studies made for businesses, web applications, transaction-based, and the like, but only a few took a facility-based application study. This is a contribution to the few good examples of building management systems where the use of Information Technology is on electric-powered equipment and how it can be monitored.

This paper concludes that when all factors are realized and considered in small cycles of planning, requirement selection, and evaluation, the attempt to pursue the next phase in building a prototype with a specific task is easier. The study was successful after subjecting the prototype in three different kinds of evaluation and passing them all. The components were refined to work harmoniously as a working prototype through the evaluation by the users, which scored the ASCon's looks and functionality, and the evaluation by the electrical experts which scored the PRM's electrical safety. The researchers' use of the criteria for evaluating the prototype as guidelines was significantly helpful in achieving the objectives of the study. The criteria correlate to the target objectives. In addition, the prototype passed the evaluation of the end user and is considered as an input to policies on energy conservation. Meanwhile, electrical safety not only includes the type of materials used, the appropriate sizes, and the design layout. It also includes the behavior of the devices. Each component should be carefully studied and tested before finalizing the design. Moreover, this prototype is envisioned to be one of the models in its kind in Tarlac province.

Mapping and Improving the Composition and Process of Producing Sweet Potato-based Desserts: An Extension Driven Action Research and Technology Transfer for Livelihood of Women in the Community

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Abstract

This action research generally relates to the conduct of process mapping towards addressing prevailing product quality and stability problems of Extension Service beneficiaries under Industry Development Extension program of the university. This covers the improvement and development of the process and composition of producing sweet potato-based desserts, namely sweet potato custard and sweet potato steamed native cake with fruit toppings or "Puto de Fruita". This presents the results of the process mapping conducted as well as how the product variation and the improvement of the stability of the sweet potato-based desserts are developed. This further describes the improvement on process and composition of the products to address the identified quality problem of the beneficiaries.

The study utilized qualitative descriptive and experimental method of research through an Extension-Led Integrated Development (E-LID) Approach. E -LID Approach for MSMEs was developed as an innovated action research approach for micro food processors. It also employed Trial and Error Method of Product Development to address the identified quality and product stability problems. Qualitative Descriptive method was used to describe the improvement in the process and composition, the critical control points, the quality control points, and the estimated shelf-life of the resulting products. The study was conducted in the production sites of the partner-beneficiaries using their own machines and cooking tools and implements to ensure the suitability of the results to the unique requirements of the production process. Partner-beneficiaries are likewise capacitated on the proper conduct of product development during the entire research process.

The study revealed that the existing process and formulation of sweet potato-based desserts was improved with the addition of significant steps in processing such as the addition of chemical preservative, proper monitoring of process schedule, control of mixing and cooking time and method. Furthermore, the addition of fruits to traditional steamed native cake added acceptable new variants and flavors. The study also established the estimated shelf-life of the product from the improved process and formulation as indicated by the changes

in the color of the product. Finally, the acceptability was determined based on the preference of the partner-beneficiary.

Sediment Characterization and Heavy Metal Pollution Assessment in Laguna de Bay, Philippines

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Abstract

Laguna de Bay, the country's largest and most economically important lake, is being planned for dredging by the Philippine government. However, the sediments to be dredged are not yet well-studied, especially its heavy metal levels. This study conducted such investigation with the addition of geophysical characterization of sediments as input to the lake management and to the establishment of sediment quality guidelines in the Philippines.

Sediment cores were obtained from eight stations across the South Bay of the lake, subsampled at 2.5 intervals, and analyzed for heavy metal (HM) concentrations using inductively coupled plasma optical emission spectroscopy (ICP-OES) and x-ray fluorescence (XRF) methods. To show the distribution of heavy metals, geospatial analyses were done using ordinary kriging interpolation in ArcGIS. The pollution levels were comprehensively assessed using indices, namely, enrichment factor (EF), geo-accumulation index (Igeo), contamination factor (CF), anthropogenic factor (AF), pollution load index (PLI), Nemerow pollution index (NPI), modified degree of contamination (mCd), and potential ecological risk index (RI).

In general, Laguna de Bay sediments were found to be grayish-green in color and contain a varying abundance of unfragmented shells. The sediments are generally muddy with large fractions of fine sand. Radiocarbon dating of a sediment sample taken from one of the longest cores (~1.30 meters long) showed that the cores were as old as 600 years old. These geophysical characterizations imply that the retrieved samples came from the bioturbation zone of the lake and are, therefore, active sediments.

In terms of heavy metal pollution, the enrichment of Sn was found to be very high, Pb to be significant, Sb to be moderate, while other heavy metals are minimal. In Igeo, Sn was found to be strongly polluted, while Pb and Sb were moderately polluted, the rest are moderately unpolluted. There is very high contamination of Sn and Pb and considerable contamination of Sb. Lead and Zn contaminations were found to be anthropogenic.

The most heavily polluted area is between Cabuyao City and Calamba City, at the San Cristobal River mouth. The intense industrialization and urbanization

in the area due to the presence of several industrial parks could be worsening the environmental quality in this side of the lake. It is the only area that was assessed to have a considerable ecological risk while the rest of the South Bay are moderate. The mid-lake area, which was found to be heavily enriched with Pb, was assessed to be moderately polluted with moderate ecological risk.

Decision and policymakers should consider the heavy metal pollution, particularly of Sn, Pb, and Sb, in the management of Laguna de Bay sediments, should they be dredged soon. There should be close monitoring in the western side of the South Bay were several industrial zones are located just to ensure that their discharges do not accelerate the degradation of the lake as can be monitored in sediments. It is recommended that further studies be conducted on sediments in other areas of the lake.

Grid-based GIS Analysis of Relationship between Urbanization and Water Quality in Laguna de Bay, Philippines

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Abstract

Laguna de Bay, the largest lake in the Philippines, is located near the country's capital, Metro Manila. The increasing urbanization around the lake basin, mainly on the West Bay and South Bay, has placed an environmental pressure on the lake. The lake is a major economic resource in the Southern Tagalog region, with more than 10 million people depending on it for food, drinking water, livelihood, and other ecosystem services. However, the water quality of the lake has been shown to decline in recent years. Monitoring of its tributary rivers and creek systems showed consistent 'failed' readings from water quality standards.

Analysis of the relationship between urbanization and environmental quality is needed in the planning for the sustainable management of the lake. In this study, urbanization and water quality in Laguna de Bay were analyzed spatially and temporally using Geographic Information System (GIS). Urbanization was described in terms of annual population growth rate and urban sprawl pattern, while water quality was described in terms of biological oxygen demand (BOD), dissolved oxygen (DO), total coliform, and phosphate. Critical areas of intensive urbanization and worsening water quality were identified using grid overlay from the open-source software QGIS ver. 2.14 ('Essen').

Shapefiles were freely obtained from PhilGIS and reduced to cover only the municipalities in West Bay and South Bay (San Pedro City, Biñan, Santa Rosa City, Cabuyao, Calamba City, Los Baños, Bay, and Calauan), and river tributaries (Tunasan River, San Pedro River, Biñan River, Santa Rosa River, Cabuyao River, San Cristobal River, San Juan River, Molawin Creek, and Bay River). The maps were intersected with a vector grid having 0.01 decimal degrees spacing (1000 m x 1000 m). Furthermore, water quality data (2007 to 2016) were obtained from the Laguna Lake Development Authority (LLDA) e-library, summarized per parameter and per set of years (2000-2007, 2008-2010, and 2011-2015) based on population census from the Philippine Statistics Authority (PSA). Population growth rate was classified as decreasing, stagnant, and increasing, while urban sprawl data, obtained from Google Earth, was classified as dense and dispersed.

Results show that the lake water quality has become very polluted from 2007 to 2015, while urbanization decreased from 2007 to 2010 however

increased again in 2015. Maps of water quality and urbanization data showed that from 2007 to 2010, critical areas were San Pedro, Cabuyao, and San Cristobal, while Bay and Los Baños remained to be least critical. Critical areas with respect to inorganic phosphates and urbanization have increased overtime for the last eight years since 2007. Meanwhile, the volume of inorganic phosphates in San Pedro River, Cabuyao River, Binan River, Santa Rosa River, and San Cristobal River has surpassed the thresholds to maintain a sustainable river system. Cabuyao, Biñan, and San Cristobal are the most critical areas, attributed to their fast-growing population and development. Furthermore, this study demonstrated the usefulness of GIS grids in analyzing the spatial and temporal trends in urbanization and water quality of a lake.

Delivery of Health Services in an Adopted Community: Positive Outcomes and Areas for Refinement

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Abstract

Community extension is an opportunity for growth and development for both the beneficiaries and the benefactors or the extensionists. The skills of the benefactors are strengthened as they work with communities while the beneficiaries acquire skills and assistance to improve their living conditions. In 2017, Tarlac State University – College of Science (COS) adopted a barangay in Victoria, which is one of the smallest barangays in the town, with only 323 households. Findings of the survey showed the need to assist the community on health issues. This prompted the development and implementation of extension programs that focused on improving the health of the community.

Moreover, this study then assessed the implementation of the extension programs delivered to the community. The specific objectives were: to assess the extension services delivered to the community; to identify the problems encountered in the delivery of the extension services; to identify best practices in the delivery of extension services, and to identify the areas needing improvement. In addition, the research respondents were 120 community recipients and ten benefactors (extensionists). The study used a validated questionnaire and unstructured interview guide to gather data. The questionnaires were distributed to the target respondents through a community visit. For the interview, the lead researcher scheduled an appointment with the five extension chairs who coordinated and facilitated the delivery of the extension services. They were asked about the difficulties or the challenges they encountered in coordinating the delivery of the extension services. Furthermore, the responses were documented and analyzed.

The following were the conclusions of the study: 1) The health services delivered to the community were perceived to be generally very much helpful.

Health teachings generated the highest level of helpfulness as the benefactors acknowledged the value of the knowledge and skills that they acquired in managing the health of their families; 2) Although there was a general success in the health services delivery, problems were encountered such as the failure to sustain most of the programs because of resource supply limitations; the far distance of the Rural Health Unit if there is a need for health referrals; time constraints for both the target recipients and the extensionists, and negative attitude of some target clients; 3) The best practices in the delivery of the health services included the expertise of the extensionists as some are seasoned nurses who had rendered actual clinical experiences, and therefore, are knowledgeable of the behavior of actual patients. Additionally, they have links with groups that strengthened the health services delivery, such as the Philippine Association of Medical Technologists, Tarlac Chapter, and the Pioneer Project REACH, Inc. These groups provided laboratory diagnoses and donated medicines and vitamins to the community; and 4)The rooms for improvement comprise the need to ensure sustainability of the programs and involve more agencies to link with or resort to other means of sourcing material support such as other private groups or establishments to help provide the materials they need; empower mothers so they become capable of teaching other mothers as well; and look into the possibility of putting up a mini-health center in the community. The study recommends strengthening and expanding more external linkages to provide sufficient assistance and resources to sustain the health programs extended to the community.

Web-based Faculty Promotion Evaluation System using NBC 461 CCE/QCE

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Abstract

Promotion is one important issue for faculty career development. An organization usually has its own promotion scheme, which includes specific criteria for career advancement as well as procedures for evaluating those criteria. Promotion does not only boost morale and confidence of an individual but gives monetary reward or increase in the daily pay of an employee. Moreover, faculty promotion in State Universities and Colleges in the Philippines is given utmost importance by both the administration and faculty members. The Tarlac State University is one of the State Universities and Colleges (SUC), and it follows guidelines from the national government on faculty promotion. The National Budget Circular (NBC) 461 was issued by the Department of Budget and Management to establish and prescribe rules and regulations governing the implementation of the Revised Compensation and Position Classification Plan for faculty positions in State Universities and Colleges (SUC), Higher Education Institutions (HEI) and Technical Educational Institutions (TEI) in accordance with the Common Criteria Evaluation (CCE) and Qualitative Contribution Evaluation (QCE).

This paper presents a web-based faculty promotion evaluation system that aimed to help Tarlac State University in managing the NBC 461 records of faculty members. The research used Developmental Method because the researchers are aware that there is a need to create a system for faculty promotion. Rapid Application Development (RAD) was used for software development methodology. This methodology is used because of the need to deliver the system faster and of higher quality. Initial interviews of the end-users were conducted. The first prototype was given to end-user for initial evaluation. With the suggestions given by the end-user, the refinement for the second prototype was developed. Questionnaire, survey, and interview were used for data gathering. PHP, which is an open source general-purpose scripting language was used for web development and MySQL was also used for the database. Moreover, the source code is stored in the server of Tarlac State University-Management Information Systems Office (TSU-MISO) and the faculty promotion evaluation system can only be accessed within the network of Tarlac State University. Furthermore, respondents of the study were Human Resource Development and Management Office (HRMDO) staff who have access to NBC system.

The system has features that automatically computes and evaluates the points based on the document and evidence presented for specific criteria. The system is also capable of managing and printing NBC records of faculty. With the implementation of the system, the users were able to easily manage NBC records and answer queries of faculty members. This paper recommends that the system be able to provide access and privileges for faculty members so they can view and access their records without going to HRMDO and the system be enhanced to include automatic computation of QCE points.

Developing a Secured Image File Management System using Modified Advanced Encryption

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Abstract

With the advancement of technologies, the frequency in sharing information through images imposes challenges in capturing, displaying, sharing and archiving image as it is vulnerable to security threats. Image sharing is vital to medical, military, government, and other fields that require remote processes. If an organization has an extensive range of images captured and shared within the organization, a system is needed to manage and secure the collection of image files. Development of an Image File Management System (IFMS) will provide a platform to share, distribute and view images in a secured manner by encrypting these files in the central storage. The implementation of an image management system will improve internal communication and can be used in organizations such as clinics, hospitals, schools, and government institutions and will increase staff efficiency and process workflow.

This paper presents an image file management system to provide a platform for distributing and viewing images in a secured manner. The shared image files are stored in the server in an encrypted manner to provide additional security to the owner of the file. A Modified AES algorithm using bit permutation was used to encrypt the image files. Moreover, the Image File Management System was developed using Visual Studio C# and the system database was designed using MS SQL 2016. Meanwhile, the developed system was tested in the local area network of Tarlac State University. The system module consists of login, file, and setup modules. The login module was able to access the designed system where users need to register to the system. Registration of users is to be performed by the administrator of the system. Correct credentials such as username and password are to be supplied to use the system. In addition, registered users can share, search, view, download files from the system. The file module enables the user to add a file, view the uploaded files, and search for files. The files from this module can be shared by the owner to intended users. Furthermore, the setup module is used to add users, group, and modify the user information such as password, name, and role.

Based on the experimental result, image files were successfully encrypted in the server and can only be decrypted by the intended recipient of the file providing an efficient and reliable way of exchanging images. In the future, other

file types, such as a document, audio, and video, can be used to share and distribute using the application.

Method of Reinforced Rice Straw Wall Panel and Product

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Abstract

One of the concepts of sustainability is innovation which entails the development of new and efficient materials. Despite having a high tensile strength, rice straw is being thrown away after harvest. The invention pertains generally to the wall panels for building construction industry but more particularly to a reinforced rice straw wall panel to produce a strong, reliable, and cost-effective material for wall insulation.

This experimental research determined whether rice straw is a suitable core material in a wall panel. Material strength properties such as compressive strength and flexural strength were analyzed in the experimentation.

The following conclusions were drawn from this study: 1) Strawmesh wall panel has a stronger compressive strength when the load is applied perpendicular to the straw strands; 2) Based on the t-test analysis, the compressive strength of the two panels has no significant difference; 3) The compressive strengths of the two panels are approximately equal; 4) Based on the t-test analysis, there is a significant difference between the flexural strength of the two panels; 5) Strawmesh wall panel has a higher flexural strength; 6) The strawmesh wall panel is cheaper than the styromesh wall panel in terms of material costs; 7) The strawmesh wall panel is likely to be more expensive in terms of labor costs, and 8) In general, it can be concluded that the strawmesh wall panel is a more practical choice of construction material than styromesh wall panel.

Disaster Risk Reduction and Management of Tarlac City

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Abstract

In 2010, the Philippine government enacted Republic Act No. 10121 also known as the Philippine Disaster Risk Reduction and Management Act of 2010 (PDRRM Act of 2010). According to Section 2 of the said act, it shall be the policy of the state to adopt a disaster risk reduction and management approach that is holistic, comprehensive, integrated, and proactive in lessening the socioeconomic and environmental impacts of disasters including climate change, and promote the involvement and participation of all sectors and all stakeholders concerned, at all levels, especially the local community. Furthermore, it institutionalizes the policies, structures, coordination mechanisms, and programs with continuing budget appropriation on disaster risk reduction from national down to local levels towards building a disaster-resilient nation and communities.

The study focused on the Disaster Risk Reduction and Management of Tarlac City and the following fundamentals such as the city disaster risk reduction and management structure; the identified hazards and evacuation areas; the Tarlac City DRRM Plan in four thematic areas as identified in the NDRRM Plan; the City Disaster Risk Reduction and Management Office's vehicles, equipment, and resources, and the community-based responders are discussed in this paper.

Documentary analysis was the primary source of information for this study. The City Planning and Development Office (CPDO), CDRRMO, and Department of Interior and Local Government (DILG) were the primary sources of information. Interview was conducted to some city officials for data validation. The information derived from Philippine Institute of Volcanology and Seismology (PHILVOCS), as well as from the Mines and Geosciences Bureau (MGB) were used to identify the different hazards which have the potential to occur in Tarlac City.

Based from the results of the study, it is concluded that 1) The CDRRMC and CDRRMO are functioning as prescribed by their mandate. This is evident, by the certificate of recognition given by DILG to the City Government of Tarlac, as regards disaster preparedness; 2) The structure of the CDRRMO is approved by the city council but it lacks funding as to filling up the positions; 3) The CDRRMO has a hazard map with identified barangays prone to flooding, lahar flow, and earthquake. The hazard map is based on that produced by the Mines and Geosciences Bureau. Furthermore, the local development of the hazard map and

its validation were not observed by the city government as evident in the non-inclusion of some hazard prone barangays in its list. The identified evacuation areas need further evaluation as to proximity to possible hazard prone barangays as well as to actual capacity; 4) Meanwhile, the thematic action plans of the City Government are in line with the Sendai Framework for Disaster Risk Reduction. This is evident in the list of programs and projects, with corresponding budget allocation in the action plans of the City Government; 5) On the other hand, the 2013 – 2016 programs in the thematic action plan of the city government are not properly monitored. There is no evidence that all programs in the plan are implemented based on gathered data. The implementation of programs and projects for disaster prevention and mitigation as well as disaster preparedness should be monitored by the city government to mitigate or minimize the occurrence of disaster, and 6) The formation of community based responders is evidence that the City Government is extending its support to the barangay level by training local officials on how to respond in times of disaster .

Energy Audit of Engineering Building of Tarlac State University: An Input to Energy Efficiency Sustainability

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Abstract

The existing Energy Conservation Program of Tarlac State University points out to minimization of energy usage in all of its facilities. The study will serve as a pilot research to give an insight on the existing conditions of the rooms in the College of Engineering and Technology (CET). In general, the action research aims to provide recommendations on how the CET may save energy.

Specifically, the researchers determined the a) lighting levels and temperature of each room in the building; b) other factors that contribute to additional energy cost in the building, and c) improvement plans to attain an energy efficient building.

The researchers recommend the following: 1) the use of rooms that are well-sealed and are installed with reflective glass windows for the whole building; 2) automatic door closers should be installed in each room to avoid hot air from entering; 3) the administrators should consider heat reflective paints for the building; 4) natural lighting is best to minimize energy consumption; 5) plants and shrubs are also recommended to be put around the building to filter the heat reflecting from the ground. Aside from their cooling effect this will also add beauty to the surroundings.

If the administrators will consider it, the researchers strongly recommend for the relocation of the ACUs when budget permits.

Industrial Establishment of a Standardized Process for Producing Crispy Fried Pork/CHICHARON: Development of Prototype Industrial Cooking Equipment (Phase I)

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Abstract

The study focused on the development of prototype industrial cooking equipment that will be used for the establishment of a standardized process for producing crispy fried pork/ chicharon. This will aid the local producers/ manufacturers, especially in the Province of Tarlac, for sustainable production of quality and safe food products.

Moreover, the equipment was designed to use LPG as fuel instead of wood chunks to provide continuous amount of fuel throughout the production period without the sudden fluctuation of heat being produced. It was designed to support two pressurized cook stove and built-in cooking vats with temperature control devices for each cook stove. Furthermore, Trial production runs were conducted in order to determine the capacity of the equipment in producing the product which will serve as an input for the process standardization of the product. The large-size pressurized cook stove was used for the boiling process of meat. The cook stove can boil up to an approximate of 6.3 kg of meat at an internal temperature range of 78.4^{O}C to 84.3^{O}C and a brine solution temperature of 105.6^{O}C to 110^{O}C.

The product yielded meat that is soft and tender on the inside just like the locally made products. On the other hand, the medium-sized cook stove was used for frying the meat after boiling. The cook stove can fry up to an approximate of 4 kg of meat at an internal temperature range of 97^{O}C to 101.5^{O}C and a cooking oil temperature of 168^{O}C to 175^{O}C. The equipment yielded a product that is golden and crispy on the outside, and soft and tender meat on the inside just like the local products sold in the market. Finally, the food safety compliance of the equipment to A.O. 153 s. 2004 was determined using a modified food safety diagnostic scoring system patterned from the FSMI-DI diagnostic tool developed by Jacxsens, Luning et al. in 2009.

The locally utilized equipment gained a diagnosis of high risk whereas, the fabricated prototype equipment gained a diagnosis of low to moderate risk in terms of product contamination. Thus, the industrial cooking equipment is more

compliant to food safety standards than the locally used equipment; hence, more capable of producing safe food. Still, in order to improve the equipment, recommendations include the installation of temperature monitoring device handle, label setting on the temperature control device and conduct batch production run to test the effectiveness and efficiency of the equipment.

Appendix A

Table of Contents

Correction to Table of Contents

In the released Inquest Vol. 12, No. 1, December 2019 Issue, there was an error on the table of contents on the author listed under the articles "Local Public Enterprise: Its Impact in the Local Economic Development in the Province of Tarlac" and "Level of Competitiveness on Resiliency in the 3rd District of Tarlac: An Analysis". The author for the article "Local Public Enterprise: Its Impact in the Local Economic Development in the Province of Tarlac" should be Maria Tiara Fatima F. Galang while the author for the article "Level of Competitiveness on Resiliency in the 3rd District of Tarlac: An Analysis" should be Patricia Ann D. Estrada, as revised above.

The editor sincerely regrets the errors that appeared in the published version of this Inquest issue.

"Tarlac State University commits to promote and sustain the offering of quality and relevant programs in higher education for people empowerment, professional development, and global competitiveness. Towards this end, TSU shall provide high quality instruction through qualified, competent, and adequately trained faculty members and support staff, be a premier research institution by enhancing research undertakings in the fields of technology and sciences and strengthening collaboration with local and international institutions, and be a champion in community development by strengthening partnership with public and private organizations and individuals"

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