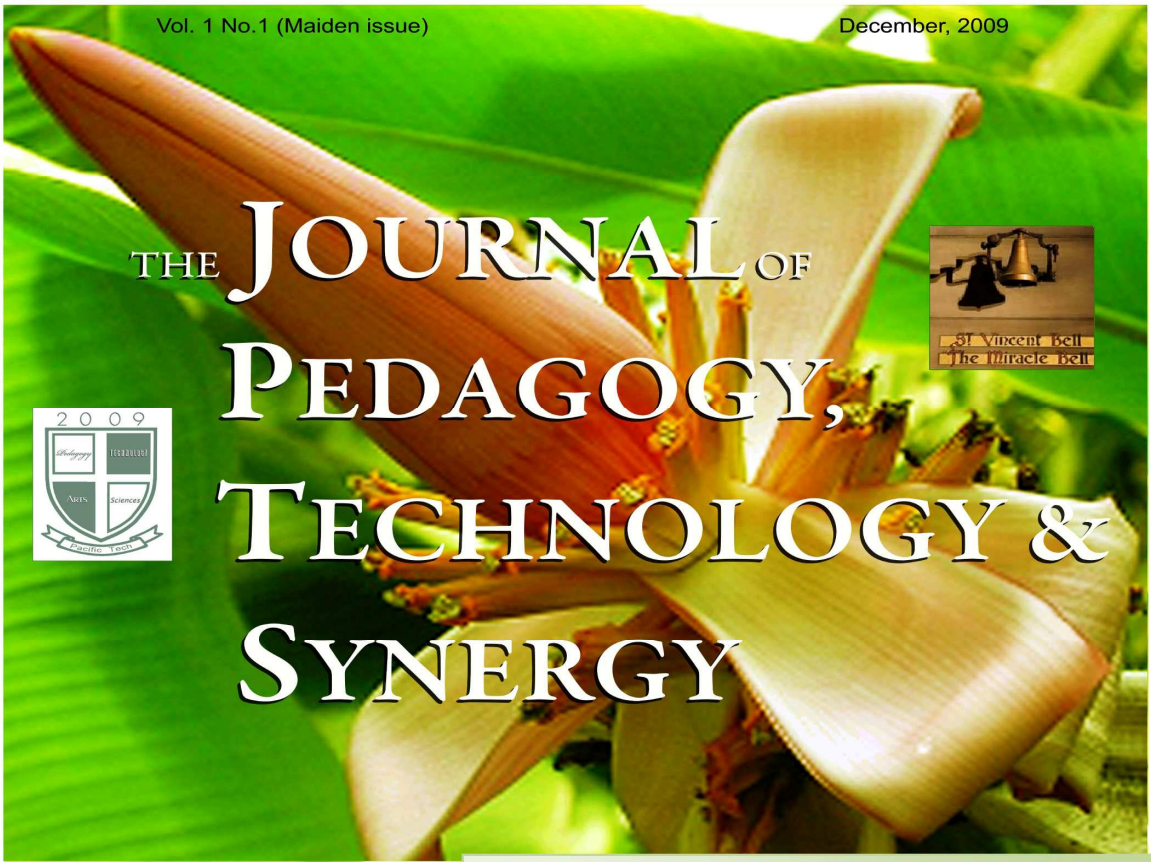
ISSN Print 2094-2524 ISSN Online 2094-2532

Vol. 1 No.1 (Maiden issue) December, 2009



THE JOURNAL OF PEDAGOGY, TECHNOLOGY & SYNERGY

Published by the

Pacific Island Institute for Pedagogy, Technology, Arts and Science, Incorporated
(Pacific Tech Institute),

No. 82-A Constantino Street, Virac 4800, Catanduanes, The Philippines

B8 L12 Soldiers Hills 2 Subdivision, Las Piñas City, The Philippines

Tel.No. (02) 212-71-98or952-85-40 (Mrs. B.Y. Dadole)

Cell Nos. 09395695723
Tel. No. 5360262 (Rico)

Emails: jmasagca@yahoo.com
manrico.masagca@dlsu.edu.ph
jtmasagca@dasma.dlsu.edu.ph

Weblog:
www.jtmasagca.blogspot.com
http://multiply/pacifictech09.com
www.philippinecompanies.com/pacifictech

CONTENTS

Vol.1 No.1, pages 1- 80

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1):1 – 6 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Research Article

Workable approaches in Social Studies teaching* and ICT integration in crowded classrooms

Jimmy T. Masagca[1] and Nenita Dionglay[2]

[1]*De La Salle University-Dasmariñas, Cavite 4116, Philippines*
[2]*Department of Social Sciences, Dasmariñas National High School-Main, Cavite, Philippines*
**Portion of a master's thesis submitted to the Graduate School of Education, Arts and Sciences (GSEAS), De La Salle University-Dasmariñas,Cavite 4116, Philippines*

Abstract Several teacher-mediated actions using workable teaching approaches and the use of some teaching devices in Social Studies are being practiced not to immunize the students from the overcrowding situation but to introduce creative ways to surmount this phenomenon in Philippine classrooms. This report discusses the various approaches in the teaching of social studies for the secondary schools in selected public schools of the Municipality of Dasmariñas in the province of Cavite in Luzon, Philippines. Moreover, reflections on the integration of technology in the classroom is also included as to how these public school teachers, head teachers and school principals/officials can maximize the use of materials in the World Wide Web (WWW) and the "open access" resources in trying to address such predicament of overcrowding while maintaining quality, equity, responsiveness and relevance of basic education in the Philippines and elsewhere in the world.
Key words ICT integration, secondary schools, teaching strategy

INTRODUCTION

While supervising the student teaching program during the first semester of school year 2008-2009 at De La Salle University-Dasmariñas in Cavite, Philippines, it has come to the attention of the first author (JTM) about the realities of crowded classrooms (with 80 to 90 high school students per room (with a size of 4.5 m x 6 m) in the public elementary and secondary schools. We cannot help but to ponder on the question, "Is it possible to raise standards in education with this scenario of big number of students with small room sizes"? In improving quality of education, according to Dr. Richard T. White, Faculty of Education of Monash University (Australia) in an interview article of Liberato Cardelinni of *Universita Politecnica delle Marche* (Ancona, Italy) published in the *Revista de Educacion en Ciencias* (Journal of Science Education) (2006) has placed focused on increasing the teachers' pay, introducing sabbatical leave for teachers, and underscored the essentiality of keeping class sizes small. The Philippine government has been trying to address the issue on quality by increasing the salaries of teachers and at present, the Department of Education (DepEd) of the country has embarked on several programs and projects to address the problem on class sizes. It is expected that better, bolder and decisive moves from the education department are in the offing so that raising standards in education will be achieved in the coming years.

In this paper, we do not intend to find out the causes or effects of having overcrowded classrooms in the Philippines, but to present workable teaching strategies and approaches and present our reflections of how secondary school teachers can respond to such condition of big class sizes through the integration ICT in teaching and learning. We intend to focus our discussion on the teaching of Social Studies in the public secondary schools of the municipality Dasmariñas in the province of Cavite, which is a rapidly growing municipality in southern Luzon, Philippines. It would certainly be worthwhile to assert that this locality will become a "university town" in the country.

The focus of our paper is on the teaching of Social Studies. This is a subject that includes the study of human relationship and focuses on human beings and their relationships. It consists of topics dealing with man as a member of society. The aim of teaching this subject is to accomplish the universal objective of developing an enlightened, patriotic, useful and upright citizenry in a democratic society. It is also designed to develop an understanding and competencies that create effective citizens of a democracy, and to gain a background of knowledge for appreciating the heritage and for acquiring a deeper understanding of the independence of people or brotherhood of man (Dionglay 2006).

This subject in high school had been offered in the Basic Education Curriculum (BEC) of the Republic of the Philippines. In this curriculum, students taking Social Studies are required to take Philippine History during the freshman year, Asian History during the sophomore year, World History during the junior level, and Economics during the senior year. With the significance of Social Studies to the total development of the students, secondary school teachers should be creative, resourceful and innovative at the time when they are now immersed in overcrowding classrooms. Teachers must be willing to introduce new ways of nurturing the minds and hearts of the secondary school students in the public schools of the country so that quality education will be ensured. Initially, these teachers must have the profound pedagogical content knowledge (PCK) of GOOGLthe subject they are teaching. Likewise, teachers have to

adopt teaching approaches and strategies that are appropriate and attuned to the needs of the students within the confines of overcrowded classrooms with the overall aim of maintaining education standards. This will make the teaching and learning of Social Studies in the country more lively, dynamic, more effective and can be in a leisurely way.

According to Acar (2008), the most important purpose of the social studies lesson is giving the individual the information and the general culture to enable students on getting acquainted with his surroundings and society, resolving the problems they encountered and becoming a good citizen. It was further stressed that the social studies contribute significantly to the education's achievement of its general targets. They accelerate the development of knowledge, skills and values of the students and the formation of the personality. A good Social Studies teaching improves the primary school children's critical and creative thinking skills. It helps them in taking future decisions.

We therefore, attempt to present the different approaches in teaching the subject and present some reflections about improving teaching and learning in Social Studies. The reflection centers on the lenses of ensuring quality, equity, relevance and responsiveness of education in the secondary schools. This is seen in the midst of the overcrowded classrooms or very large or epically-huge teaching and learning rooms.

METHODOLOGY

Research Design. In determining the different approaches in teaching Social Studies, the descriptive method was used by document

analysis, interviews, and observation. Questionnaires consisting of three (3) parts were utilized for further validation of data gathered. Documentary analysis was used for the performance rating of the teachers in Social Studies.

In the qualitative part of the paper, field observations were made during monitoring of classes of student teachers who were assigned in the public secondary schools under consideration. Certain property of story-telling or conversation ("*kwentuhan"* or "*pakikipagkwentuhan"*) was employed. This ethnographic technique is a naturally occurring phenomenon or process of sharing and telling stories among individuals to figure out or to make sense about their world and their experiences. According to Javier (2004) *kwentuhan* (literally, story–telling in the Filipino language) is an occasion for exchange of information, ideas, insights and individual experiences. This is basically a lively and always a happy group discussion in which the participants are actively involved (such as in the classroom, in the public market, over meals and while resting in their abode as well as the workplace.

Story-telling is an ancient method of conveying ideas and images. The educative aspect of this process allows individuals to share personal experiences with others and make ideas part of the collective knowledge of a community (McEwan & Egan 1995; Mello 2001). Moreover, stories are hailed by practitioners and theorists as important teaching tools that assist in psychosocial and imaginative growth (Bettelheim 1977; Bruner 1990). In research, story-telling can be situated at the heart of meaning-making (or constructivism) and the broader aspect of educative inquiry.

Data Gathering. In gathering data, a series of conversation and interviews using a semi-structured questionnaire as a general guide that involved the cooperating teachers, department heads of Social Studies, and school heads on how they respond to the huge class sizes in the teaching of Social Studies. The small number of participants allow for particularization or illustration of the uniqueness of the reflections of the teacher educators. There was a tendency to undergo contextualization and subsequent generalization during the investigation. During the course of the study, many *ad hoc* questions were asked during informal interviews. These were carried out during the field work whenever or wherever possible - over meals, during snacks after a student teaching demonstration, during flag ceremony, on the corridors of the school, during post conference of student teaching, in public vehicles, or even public markets where teachers are waiting for the ride. In certain cases, telephone or cellular phones were used in the interviews during working hours. There were reflections made, and the study attempted to keep the participant identities with confidentiality. In gathering data, quotations representing discovered constructs or concepts were placed together to form narratives. Some narratives are contained within the indented summaries.

RESULTS AND DISCUSSION

Workable strategies in Social Studies teaching

Academic qualifications of the respondents. The academic qualifications of the 21 teachers, indicate that 7 (33.3 %) were BSE major in History graduates; and 3 or 14.3% were BSE graduates who majored in other subjects such as Political Science, Sociology, Philosophy. There were 8 or 38% of the teachers with units in the master's program, while the other 3 teachers (or 14%) have completed their academic requirements towards a master's degree either on thesis writing or have just passed the comprehensive examination.

Number of years in teaching experience. As to the number of years teaching experience, 11 or 52% of the teachers have 1 to 5 years public service as

Social Studies teacher; 3 or 14% each for teachers with 6 to 10 years, 11 to 15 years and 16 to 20 years experience. Only 1 teacher had 21 years or more experience as a SS teacher.

Performance rating of the teachers. As to the performance rating, there were 4 teachers or 19% with outstanding (O) rating, 17 teachers with very satisfactory (VS) rating, and none with satisfactory (S), fair or unsatisfactory rating. It is expected that these teachers will not get ratings below S due to certain school policies, thus a teacher cannot be retained in the school with such unsatisfactory rating.

Teaching strategies employed by the Social Studies teachers. Due to the large number of classes, the most popular among the Social Studies teachers is the Reporting Method, and followed by the Discussion Method (group or whole class discussion). Responding to the large and overcrowding classrooms, the Question and Answer approach (or the Socratic Method) is a popular teaching strategy in the public secondary schools under study. Moreover, the Lecture Method, Concept-Mapping, Role Playing, Activity Method and the Inductive Method are also used by the Social Studies teachers in the overcrowding classrooms.

The reporting method has been the usual approach for most of these public school teachers teaching in large classes. The use of reporting allows the Social Studies teachers to have the most opportune time to rest from the usual "teacher talk" scenario in the classroom, usually if the workload is more than 5 or 6 classes daily. It appears that persuasiveness of the teacher can be seen in large classes if the student who was assigned to report in the class is considered the best in the class as to the ability to talk, to explain, and to convince the students if issues and concerns are being tackled. Likewise, the Social Studies teacher maximizes the use of Reporting Method considering that it will be extremely easy for the students to give or facilitate the reporting session, since the use of Filipino language as a medium of instruction appears to be an advantage. It will be easy for the teacher to look for volunteers from the class since, the materials to be used are found in their textbooks.

Enhancement can be carried out by referring to the newspapers, surfing the WWW and by viewing the TV screen during news broadcasting. This method tends to be a reactive mechanism of the Social Studies teachers. Restificar (1991) viewed the method of reporting and lecture methods as traditional methods but it has lasting and more enjoyment or excitement if the teaching and learning processes are injected with many exciting trends, controversial news and more recent issues that confront the students. If properly used, the lecture and reporting methods can immediately disseminate to the students vital information that are not readily available to the students if the Social Studies teacher has a "nose for news" through readings and WWW surfing.

The discussion method, allows the teacher to provide a more democratic presentation of the lesson. This means that students are given the greatest freedom or ensuring greater latitude in trying to dissect a social problem, a phenomenon and other social occurrences.

As to the extent of use of the different teaching strategies that are said to be workable in overcrowding classrooms of the public secondary schools indicate that the discussion, reporting, and inductive method are always used by the teachers. Concept mapping, role playing and activity method are sometimes used, while question and answer and lecture methods are most often used by the teachers.

Teaching devises used by the Social Studies teachers. Based on the work of Dionglay (2002), the teaching devises being used by SS teachers in the public secondary schools under inquiry includes: pictures/figures, maps, globe, textbook or the reference materials in the subject, the Current Events Digest, concrete objects, posters,

clippings, charts, films or video clips and the TV set found in the classroom.

As attested by Avendaño (1992) and Dionglay (2002) pictures (enlarged), maps and globes are the most commonly used devices or materials of Social Studies teachers. With the use of these materials important details and facts are given to the students while viewing. Discussion will follow after using the said devices and materials, whether whole class or group and cluster. The availability of these devices and materials is also another reason why Social Studies teachers commonly use in their teaching and learning. Students can even be assigned to bring to the class these materials that would certainly reduce the burden of the Social Studies teacher in overcrowding classes.

Reflections on the integration of technology in teaching and learning. Technology integration in teaching and learning has been a very significant innovation in the classroom. The advent of "open access" in various schools around world and its impact in the T & L of Social Studies necessitates the need for greater attention. Professor Phillip G. Albach, Director of the Center for International Higher Education of Boston College, USA emphatically noted that "the basic argument claims that knowledge should be free to everyone and that the internet permits easy worldwide access" (2008). Although there are several problems with the open access system, schools in the developing world can have great benefits by having unlimited source of knowledge. This offers great opportunity for the Social Studies Teacher in trying to catch up with the increasingly dependent face to face classrooms for the projection technology or web-based resources for the teaching of specific topics on geography with the use of Google Earth and other geographic resources and materials. This is in lieu of the usual utilization of maps and globes.

In a more controversial note, the study on educational technology by Dynarski et al. (2007), tackled on the research question: *Is education technology effective in improving academic achievement, and if so, under what condition and practices?* The research team assessed the achievement of more than 9,000 students, and discovered that there is no link between the use of technology and achievement after one year. The result of the study after two years as to the effect on student achievement is upcoming and has yet to be concrete in order to reject the continued use of educational technology in the teaching of subjects such as Social Studies. This assertion deserves further notice as to its focus in educational research.

Elsewhere in the paper, it is very evident that Social Studies teachers are using teaching materials such as pictures or figures, maps, globe, posters, clippings, charts, films and video clips. These are all available on the World Wide Web (WWW) and in would be prudent to let this Social Studies teachers realize the unlimited benefits of using materials on the web or the internet. For instance, Google Earth materials can be used in the teaching of Philippine Geography as well as World Geography.

The Philippine DepEd has been at the forefront of enhancing quality of basic education through ICT integration. Department Order No. 50, s. 2009 on DepEd Internet Connectivity Program (DICP) and earlier directives Strengthening the ICT Governance of the Department contained in DepEd Order No. 26, s 2009 (amending DepEd Order No. 1 s 2007) are in support of the ICT for Education Strategic Plan (ICT4E). This strategic plan has the vision of a "21st Century Education for All Filipinos, Anytime, Anywhere. This means an ICT-enabled education system that transforms students into dynamic life-long learners and values-centered and productive citizens.

Of recent, Masagca & Londerio (2008) observed that the teacher-participants investigated generated a limited number of themes (storing, encoding and preparing of materials/documents, retrieving, distributing and utilizing

data/information related to school counseling, and other uses for entertainment, leisure and recreational activities) on the uses and application of ICT in school counseling. However, as to the potential uses, the teacher respondents have generated acceptable and commendable uses as what they have probably learned from their graduate courses on technology in education and knowledge management in education. Moreover, the issues and problems presented are mostly related to the economic aspects, costs, administrators' attitudes towards the use of ICT, quality of information and on the issue of commercialism. Finally, the teacher-participants innovative programs are mostly focused on the individual needs of the pupils and on the career services, but not on the ways to improve the professional capabilities of the guidance counselor.

LITERATURE CITED

Acar FE.2008. An assessment of social studies competency of social studies competency of Turkish classroom teachers. *International Journal of Instruction*, Vol. 1 No. 2, pages 77-100.

Albach PG. 2008. The costs and benefits of "open access". *International Higher Education*, p. 2.

Avendaño HI. 1982. Instructional problems met by Social Studies teachers in Dasmarinas, District I, A Survey School, Cavite. *Master's Thesis*. Emilio Aguinaldo College.

Dr. JT Masagca *is a Full Professor 3 of De La Salle University in Dasmariñas (DLSUD) in Cavite, Philippines and was a former Professor and Director for Research and Linkages of the DLSUD Graduate School of Education, Arts and Sciences (GSEAS) and a National Director of the Biology Teachers Association of the Philippines (BIOTA).* ***Nenita A. Dionglay*** *is high school teacher of the Dasmariñas National High School Main in Cavite, Philippines. She obtained her Master of Arts degree from De La Salle University in Dasmariñas Cavite, Philippines.*

Bettelheim B.1977. *The uses of enchantment: the meaning and importance of fairy tales.* New York: Vintage Books.

Bruner JS.1990. *Acts of meaning.* Cambridge, MA: Harvard University Press.

Dionglay NA. 2002. The extent of the use of teaching strategies and devices of social studies teachers in selected public high schools in Dasmariñas, Cavite. *Unpublished Master's Thesis*. De La Salle University Dasmariñas.

Dynarski M, Agodini R, Heaviside S, Novak T, Carey N, Campuzano L et al. 2007. *Effectiveness of reading and mathematics software products: Findings from the first student cohort*. Washington, D.C., Department of Education, Institute of Education Sciences.

Dynarski M. 2009. Researchers and educators: allies in learning. *Educational Leadership*, Dec. 2008/Jan. 2009: 48-53.

Javier RE. 2004. *Kuwentuhan*: A study on the methodological properties of *pakikipagkwentuhan. The URCO Digest of De La Salle University Manila*, 5(3).

Masagca JT, Londerio N.2008. Teachers perspectives on ICT integration in school counseling. International Journal of Education and Development Using ICT, Vol. 4 No. 4. Available at http//www.ijedict.edu.com <.

McEwan H, K Egan. 1995. *Narrative in teaching, learning and research*. New York: Teachers College Press.

Mello R. 2001. The power of storytelling: How oral narratives influence children's relationships in classrooms. *International Journal of Education and the Arts*, 2 (1):1- 14.

Rectificar CM.1991. Instruction in Heograpiya, Kasaysayan at Sibika in upper and intermediate schools. *Master's Thesis*, University of Bohol.

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1):7 – 17 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Functional managerial competencies of women executives in Catanduanes, Luzon, Philippines

Lily P. Custodio

Graduate School
Catanduanes State Colleges, Virac 4800, Catanduanes, Philippines
E-mail Address: Dr.Lily_Custodio@yahoo.com.ph

Abstract Given the importance of utilizing the functional management areas in discharging the duties and functions of executives in organizations, the managerial competencies of women executives (=managers and entrepreneurs) in the province of Catanduanes (Luzon, Philippines) were investigated. The descriptive method was used with the questionnaire as the main tool in gathering the data by involving women managers and entrepreneurs and three of their subordinates. Said respondents were selected by convenience sampling and quota sampling. It was ascertained in the study that (1) the managerial competencies of women managers and entrepreneurs in Catanduanes as perceived by them and their subordinates are highly important in discharging managerial duties and functions; (2) the managerial competencies on (a) strategic thinking and scenario-building, (b) analysis, problem solving and decision making, (c) planning and organizing, and (d) change management were perceived differently by the executives and their subordinates; and (3) the executives had similar perceptions on their competencies on the 13 functional management areas investigated in the study. Recommendations were formulated in the light of the findings and conclusions drawn from this investigation.

Key words Women managers and entrepreneurs, managerial competencies, functional management areas, management functions

INTRODUCTION

More and more women are joining organizations as holders of key positions in national and local government, universities, business corporations and family business enterprises (Miralao 1980, Roffey 2001). Despite of this reality, there is a dearth of study that looked into the managerial competencies of women.

Managers and entrepreneurs execute a number of managerial functions inherent in their position. Executives are expected to possess these competencies because their managerial role is of critical importance to the success of the organization since they are the focal point of decision-making. The realization of the mission, goals and objectives is paramount to how they run the affairs of their respective organizations (David 2000, Mintzberg 1973).

Soriano and Nhert (1990) emphasized that the personality of the chief executive is a determinant factor in the success of any organization. Such personality includes inherent and acquired abilities which have been developed through formal education and training (Iñigo 2000, Martires 1995). These abilities are competencies which are demonstrated or mastered in a job (UNIDO, 2002) as how executives performed their functions along 13 functional areas in management. These include strategic thinking and scenario-building (cf. David 2000, Hitt Ireland & Hoskisson 1999); analysis, problem solving and decision making (cf. Bigelow 1991, Custodio 2000b, Narit 2005, Roffey 2001, Yau & Sculli 1990); planning and organizing (cf.

Boyatzis 1993, Kotter 1988, Mintzberg 1975, Quinn et al. 1988); change management (cf. Huffington et al. 1998); managing small organizational groups (Fraenkel & Brownell 1989; Tubbs & Moss 1987); team leadership (cf. Custodio 2007); information management (cf. Murphy 2008); innovation and creation (cf. Overman 1993); mediation and negotiation (cf. Turbolencia 2001); mentoring and coaching (cf. Bittel & Newstrom 1990); facilitation and group moderation (cf. Custodio 2007); presentation and public speaking (cf. Custodio & Tugano 2006, Mintzberg 1973); and interviewing.

Given these concerns, the managerial competencies as perceived by the women executives (these are managers and entrepreneurs) and their subordinates from Catanduanes, Luzon, Philippines were determined. Differences in perceptions of such competencies between the two groups of respondents were evaluated based on functional management areas enumerated in a UNIDO report (2002).

MATERIALS AND METHODS

Research design. In this study, from May to August 2008, the descriptive method of research with the questionnaire as the main instrument in gathering the data was employed using thirteen (13) functional management areas.

Women executives (=managers and entrepreneurs) involved in this study include women deans and directors of a local state college in Catanduanes; supervisors and principals in the Department of Education (DepEd) in the province of Catanduanes, Luzon, Philippines; and bank executives in the locality. In addition, responses of their subordinates were included to validate the judgment or answers by the main respondents.

Sampling method and instrument used. Convenience sampling was used in identifying the respondents (nineteen managers and 13 entrepreneurs) and quota sampling was used for the 96 subordinate-respondents.
A modified questionnaire based from a United Nations Industrial Development Organization (UNIDO) report on managerial competencies (UNIDO 2002) was used in the study. The women manager/entrepreneur-respondents and their subordinates were asked to indicate the extent of importance in executing the managerial duties and functions through the functional management areas using a five-point Likertian scale ranging from “Extremely Important” (5) to “Not Important” (1). Descriptive statistics was used in analyzing and interpreting the results of the study.

RESULTS AND DISCUSSION

In Table 1, shows the importance of managerial competencies in discharging duties and functions as perceived by the managers and entrepreneurs and their subordinates appear that competencies along the different functional management areas are *Highly Important* (HI) in discharging managerial duties and functions. The responses suggest that executives are expected to be competent on strategic thinking and scenario-building since they make and implement decisions about the organization’s future and allocate resources so as to implement the plans as well as competent in analyzing, problem solving and decision making in order to discharge their duties and functions effectively. These findings parallel the reports of Bigelow (1991), Custodio (2000b), Roffey (2001), and Narit (2005) and Yau & Sculli (1990).

The individuals holding managerial positions in organizations are expected to envision the organization’s future by developing procedures and operations necessary to achieve its goals and objectives through planning and organizing. Roffey (2001)

reported that Filipino women managers are good in planning and organizing which was also noted in this study. The same observation was also noted in extant literatures on western management theory and research conducted by Boyatzis (1982, 1993), Kotter (1988), Mintzberg (1975) and Quinn et al (1988).

The notion on change management was considered by the respondents in this study as *Highly Important* in discharging managerial duties and functions. This is similar to the finding of Huffington et al, (1998) that managerial competence includes developing and building an environment characterized by openness and healthy interaction.

As depicted by the respondents in the present study, competencies on managing small organizational groups were also considered HI in managerial leadership. This shows that executives must be able to create an atmosphere where the various units in the organization work together (Fraenkel & Brownell 1989, Tubbs & Moss 1987). Moreover, competencies on team leadership were also perceived as *Highly Important* in discharging managerial duties and functions. This functional management area depicts a scenario that managerial leadership is able to promote a healthy interaction that creates group dynamism and stimulates participative management (Custodio 2007).

The need to manage information effectively in an organization is associated with different indicators depicting the competencies of those in managerial position together with their subordinates. Knowledge - based undertaking is information-driven which allows people to communicate across intra-organizational and inter-organizational boundaries (Murphy 2008).

Furthermore, results show that the competencies involved on innovation and creation were are HI. According to Overman (1993), there are people in the organization who discover and find ways of doing things. They would want to improve on traditional ways with more effective action. These competencies are also in connection with what executives need in performing their function on mediation and negotiation. Heads of organizations are the most pivotal individual in building consensus among the parties involved in mediation and negotiation (Turbolencia 2001).

Managers' and entrepreneurs' competencies on mentoring and coaching would mean that they have tangibly and properly guided and supported their subordinates on their work assignments, career and succession trends as they provided a rating of *Highly Important*. Bittel & Newstrom (1990) emphasized that employees are more satisfied when formal distinctions such as awards are given and employees' recognition is made in the company's newsletter. Competencies on facilitation and group moderation as perceived by the women managers and entrepreneurs imply that they are practicing management by participation. This practice enhances people's willingness to work with other employees toward common goals (Bittel & Newstrom 1990, Custodio 2007). These executives considered the competencies on interviewing as *Highly Important* because they are expected to be effective in panel interviews since they lead discussions as key actors in conferences and seminars. Both respondents depicted a scenario that managers and entrepreneurs are good public speakers as expected of them. It is a must for chief executive officers to be effective spokespersons (Mintzberg 1973). This observation relates to the findings of Custodio & Tugano (2006) that the chief academic officers of state universities and colleges (SUCs) in the Bicol region (Luzon) perform the role of spokesperson to great extent.

Table 1. Managerial competencies of women managers and entrepreneurs in Catanduanes as perceived by them and their subordinates

Managerial Competencies Based on Functional Management Areas	Women Managers and Entrepreneurs			Subordinates			Women Managers/ Entrepreneurs and Subordinates		
	WM	QN	QL	WM	QN	QL	WM	QN	QL
A. Strategic Thinking and Scenario-Building									
1. Thinking macro	4.63	5	EI	4.18	4	HI	4.41	4	HI
2. Going beyond the present situation	4.63	5	EI	4.13	4	HI	4.38	4	HI
3. Being sensitive to wider political and organizational priorities.	4.26	4	HI	3.87	4	HI	4.06	4	HI
4. Exploring and understanding trends, opportunities, and risks that could affect services, programs, functional areas or jobs.	4.63	5	EI	3.95	4	HI	4.29	4	HI
5. Forecasting and integrating different views.	4.58	5	EI	4.01	4	HI	4.30	4	HI
6. Designing alternative scenarios and business Models.	4.53	4	HI	4.08	4	HI	4.31	4	HI
General Weighted Mean	4.54	4	HI	4.04	4	HI	4.29	4	HI
B. Analysis, Problem Solving and Decision Making									
1. Comprehending and distilling issues.	4.58	5	EI	4.24	4	HI	4.41	4	HI
2. Identifying problem factors.	4.63	5	EI	4.44	4	HI	4.54	4	HI
3. Determining appropriate information.	4.63	5	EI	4.31	4	HI	4.47	4	HI
4. Checking assumptions against facts.	4.68	5	EI	4.38	4	HI	4.52	4	HI
5. Generating creative solutions.	4.63	5	EI	4.28	4	HI	4.46	4	HI
6. Taking care of macro and long-term consequences of decisions.	4.68	5	EI	4.15	4	HI	4.42	4	HI
7. Having courage to take effective decisions.	4.68	5	EI	4.38	4	HI	4.48	4	HI
General Weighted Mean	4.64	5	EI	4.31	4	HI	4.48	4	HI
C. Planning and Organizing									
1. Designing comprehensive and realistic plans using strategic goals.	4.53	4	HI	4.39	4	HI	4.46	4	HI
2. Acting on future needs and taking advantage of opportunities.	4.58	5	EI	4.10	4	HI	4.34	4	HI
3. Being prepared for contingencies.	4.63	5	EI	4.47	4	HI	4.55	5	EI
4. Assessing adequate level of resources and organize them in a timely manner	4.53	4	HI	4.38	4	HI	4.46	4	HI
5. Balancing day to day demands with planning Efforts	4.68	5	EI	4.27	4	HI	4.48	4	HI
6. Monitoring plans and taking corrective action as required	4.53	4	HI	4.44	4	HI	4.48	4	HI
7. Organizing things to be done logically, Clearly and well	4.53	4	HI	4.54	4	HI	4.54	4	HI
8. Using time effectively.	4.79	5	EI	4.67	4	HI	4.51	4	HI
General Weighted Mean	4.60	5	EI	4.41	4	HI	4.51	4	HI
D. Change Management									
1. Encouraging and producing change in self and others.	4.58	5	EI	4.26	4	HI	4.42	4	HI
2. Creating conditions and processes to support Change.	4.36	4	HI	3.84	4	HI	4.10	4	HI
3. Sustaining change, balancing people, financial resources, technology and processes	4.32	4	HI	4.32	4	HI	4.32	4	HI
4. Bringing in practical improvements.	4.21	4	HI	4.31	4	HI	4.26	4	HI
5. Developing an environment in which others can express themselves and act without fear.	4.58	5	EI	4.31	4	HI	4.44	4	HI
6. Operating with transparency.	4.53	4	HI	4.45	4	HI	4.49	4	HI
7. Building trust.	4.68	5	EI	4.43	4	HI	4.56	5	HI
General Weighted Mean	4.47	4	HI	4.28	4	HI	4.37	4	HI

Legend: EI = Extremely Important HI = Highly Important WM = Weighted Mean
QN = Quantitative Response QL = Qualitative Response

Table 1. ***(Continued)***

Managerial Competencies Based on Functional Management Areas	Women Managers and Entrepreneurs			Subordinates			Women Managers/ Entrepreneurs and Subordinates		
	WM	QN	QL	WM	QN	QL	WM	QN	QL
E. Managing Small Organizational Groups									
1. Balancing distribution of tasks and Resources	4.16	4	HI	4.18	4	HI	4.17	4	HI
2. Establishing, in a particular process, group and individual objectives	4.32	4	HI	4.32	4	HI	4.32	4	HI
3. Taking ownership of all responsibilities and honoring commitments	3.63	4	HI	4.24	4	HI	3.94	4	HI
4. Fostering collaborative relationships.	4.32	4	HI	4.30	4	HI	4.31	4	HI
5. Involving staff in different steps of the management process	4.36	4	HI	4.20	4	HI	4.28	4	HI
6. Valuing others' initiatives and expertise	4.32	4	HI	4.33	4	HI	4.32	4	HI
7. Managing stress in self and others	4.26	4	HI	4.18	4	HI	4.22	4	HI
8. Evaluating performance and dealing with motivational issues	4.32	4	HI	4.32	4	HI	4.32	4	HI
General Weighted Mean	4.21	4	HI	4.26	4	HI	4.24	4	HI
F. Team Leadership									
1. Building effective teams by recognizing individual contributions, cultural factors and organizational context	4.36	4	HI	4.33	4	HI	4.34	4	HI
2. Conducting effectively different types of teams/task forces	4.36	4	HI	4.24	4	HI	4.30	4	HI
3. Motivating self and team members for Results	3.52	4	HI	4.37	4	HI	3.94	4	HI
4. Instilling team agenda before personal/individual interest	4.32	4	HI	4.22	4	HI	4.27	4	HI
5. Encouraging dialogue and acting in accordance with team inputs	4.36	4	HI	4.32	4	HI	4.34	4	HI
6. Anticipating and resolving conflicting differences by pursuing mutually agreeable solutions	4.36	4	HI	4.35	4	HI	4.36	4	HI
7. Giving proper credit to others	4.26	4	HI	4.36	4	HI	4.31	4	HI
8. Participating effectively in cross-organizational activities	4.32	4	HI	4.27	4	HI	4.30	4	HI
General Weighted Mean	4.23	4	HI	4.31	4	HI	4.34	4	HI
G. Information Management									
1. Defining indicators and organizing cost-effective information schemes	4.37	4	HI	4.17	4	HI	4.27	4	HI
2. Identifying reliable sources of pertinent Information	4.42	4	HI	4.35	4	HI	4.38	4	HI
3. Using quantitative and qualitative Information	4.26	4	HI	4.42	4	HI	4.34	4	HI
4. Providing appropriate and timely information to clients (internal/external)	4.26	4	HI	4.35	4	HI	4.31	4	HI
5. Keeping abreast of emerging changes of information technology in functional area	4.52	4	HI	4.38	4	HI	4.45	4	HI
6. Actively seeking to apply information technology to appropriate tasks	4.58	5	EI	4.38	4	HI	4.48	4	HI
General Weighted Mean	4.40	4	HI	4.43	4	HI	4.37	4	HI

Legend: EI = Extremely Important HI = Highly Important WM = Weighted Mean
QN = Quantitative Response QL = Qualitative Response

Table 1. ***(Continued)***

Managerial Competencies Based on Functional Management Areas	Women Managers and Entrepreneurs			Subordinates			Women Managers/ Entrepreneurs and Subordinates		
	WM	QN	QL	WM	QN	QL	WM	QN	QL
H. Innovation and Creation									
1. Discovering and finding new ways of doing Things	4.63	5	EI	4.30	4	HI	4.46	4	HI
2. Staying abreast on new theories, trends or Developments	4.37	4	HI	4.39	4	HI	4.38	4	HI
3. Challenging prevailing assumptions	4.37	4	HI	3.94	4	HI	4.16	4	HI
4. Actively seeking to improve programs and Services	4.47	4	HI	4.44	4	HI	4.46	4	HI
5. Obtaining results with different means.	4.42	4	HI	4.13	4	HI	4.28	4	HI
6. Encouraging others to look for new ideas or approaches	4.32	4	HI	4.33	4	HI	4.32	4	HI
7. Improving on traditional ways with more effective action	4.42	4	HI	4.36	4	HI	4.39	4	HI
General Weighted Mean	4.43	4	HI	4.27	4	HI	4.35	4	HI
I. Mediation and Negotiation									
1. Assessing divergent views	4.17	4	HI	4.13	4	HI	4.15	4	HI
2. Identifying key arguments	3.94	4	HI	3.85	4	HI	3.90	4	HI
3. Formulating positions	4.10	4	HI	4.01	4	HI	4.06	4	HI
4. Presenting or proposing alternative ways to Others	4.22	4	HI	4.20	4	HI	4.21	4	HI
5. Building consensus among parties	4.27	4	HI	4.21	4	HI	4.24	4	HI
6. Reaching solutions to satisfy fundamental objectives	4.31	4	HI	4.28	4	HI	4.30	4	HI
7. Arriving at constructive solutions while maintaining positive working relationships	4.24	4	HI	4.18	4	HI	4.21	4	HI
General Weighted Mean	4.18	4	HI	4.12	4	HI	4.15	4	HI
J. Mentoring and Coaching									
1. Sharing wisdom and professional expertise with others	4.89	5	EI	4.42	4	HI	4.66	5	EI
2. Being engaged regularly in professional Exchanges	4.42	4	HI	4.36	4	HI	4.39	4	HI
3. Assessing accurately individual strengths and development needs	4.78	5	EI	4.26	4	HI	4.52	4	HI
4. Facilitating individual learning	4.42	4	HI	4.33	4	HI	4.38	4	HI
5. Giving specific and timely recognition	4.37	4	HI	4.35	4	HI	4.36	4	HI
6. Providing feedback on actual behavior	4.47	4	HI	4.28	4	HI	4.36	4	HI
7. Guiding and supporting on performance, career or succession trends	4.37	4	HI	4.36	4	HI	4.36	4	HI
General Weighted Mean	4.54	4	HI	4.34	4	HI	4.44	4	HI
K. Facilitation and Group Moderation									
1. Setting up or organizing meeting facilities	4.21	4	HI	4.35	4	HI	4.28	4	HI
2. Conducting/Chairing effective meetings	4.52	4	HI	4.11	4	HI	4.32	4	HI
3. Facilitating group discussions	4.47	4	HI	4.33	4	HI	4.40	4	HI
4. Integrating different positions	3.71	4	HI	4.10	4	HI	3.91	4	HI
5. Obtaining the best from the group	4.14	4	HI	4.28	4	HI	4.21	4	HI
6. Keeping balanced views	4.14	4	HI	4.31	4	HI	4.23	4	HI
7. Encouraging wide participation	4.55	5	EI	4.31	4	HI	4.43	4	HI
8. Guiding the group in obtaining concrete results	4.46	4	HI	4.30	4	HI	4.38	4	HI
General Weighted Mean	4.32	4	HI	4.26	4	HI	4.27	4	HI

Legend: EI = Extremely Important HI = Highly Important WM = Weighted Mean
QN = Quantitative Response QL = Qualitative Response

Table 1. ***(Continued)***

Managerial Competencies Based on Functional Management Areas	Women Managers and Entrepreneurs			Subordinates			Women Managers/ Entrepreneurs and Subordinates		
	WM	QN	QL	WM	QN	QL	WM	QN	QL
L. Presentation and Public Speaking									
1. Preparing high impact presentations	4.23	4	HI	4.29	4	HI	4.26	4	HI
2. Carrying audience analysis	4.23	4	HI	4.37	4	HI	4.30	4	HI
3. Delivering concrete messages	4.46	4	HI	4.27	4	HI	4.36	4	HI
4. Speaking clearly and concisely in public	4.57	5	EI	4.45	4	HI	4.51	4	HI
5. Using appropriate audio visual technology	4.42	4	HI	4.29	4	HI	4.36	4	HI
6. Carrying self well in front of a large audience	4.36	4	HI	4.10	4	HI	4.23	4	HI
7. Answering spontaneously pertinent questions	4.42	4	HI	3.87	4	HI	4.14	4	HI
8. Making a self-assessment after performance for future improvements	4.52	4	HI	4.32	4	HI	4.42	4	HI
General Weighted Mean	4.41	4	HI	4.24	4	HI	4.32	4	HI
M. Interviewing									
1. Defining interview purpose and preparing plan	4.36	4	HI	4.23	4	HI	4.30	4	HI
2. Elaborating pertinent questions	4.47	4	HI	4.32	4	HI	4.40	4	HI
3. Finding relevant factual information and identifying personality traits	4.47	4	HI	4.14	4	HI	4.31	4	HI
4. Participating effectively in panel interviews	4.58	5	EI	4.35	4	HI	4.46	4	HI
5. Recording facts and conclusions.	4.32	4	HI	4.22	4	HI	4.27	4	HI
6. Applying effective competency-based recruitment and selection procedures	4.42	4	HI	4.24	4	HI	4.33	4	HI
7. Conducting performance assessments.	4.36	4	HI	4.40	4	HI	4.38	4	HI
8. Using constructive approaches during investigation process	4.36	4	HI	4.35	4	HI	4.36	4	HI
General Weighted Mean	4.43	4	HI	4.28	4	HI	4.35	4	HI
Overall Weighted Mean	4.42	4	HI	4.27	4	HI	4.35	4	HI

Legend: EI = Extremely Important HI = Highly Important WM = Weighted Mean
QN = Quantitative Response QL = Qualitative Response

The perceptions of the women executives separate from their subordinates was ascertained that they perceived their managerial competencies on analysis, problem solving and decision making; and planning and organizing as *Extremely Important* (EI) in discharging their duties and functions. It parallels with the advocacy of management experts that executives must be analytically competent to be able to identify, analyze and solve problems under conditions of incomplete information and uncertainty. Previous study of this author (Custodio 2000a) on the careers of academic executives in Catanduanes reported that analytical competence is a crucial requirement in discharging their managerial duties and functions in both public and private organizations. Likewise, Narit (2005) reported that analysis, problem solving and decision making are very important managerial functions of executives manufacturing businesses in Region V.

The subordinates perceived that women managers and entrepreneurs consider the 13 functional management areas as *Highly Important* in discharging their managerial duties and functions. This means that as far as the subordinates are concerned, there is still a need for these executives to exert more effort to enhance their managerial competencies and thereby consider the functional areas of management as extremely important in their jobs.

Table 2 illustrates that the actual responses of women managers and entrepreneurs differ from the perceptions of their subordinates along (a) strategic thinking and scenario-

building, (b) analysis, problem solving and decision making, (c) planning and organizing, and (d) change management. This provides a picture that the managers and entrepreneurs rated themselves higher than their subordinates. It shows that while these executives feel that they are competent in these management areas, their subordinates would want them to perform better if not best than how they perform currently.

Table 3 shows that the t-test performed on these data did not reveal any significant difference on the perceived managerial competencies between women managers and entrepreneurs. This result suggests that as executives, they are expected to be exceptionally knowledgeable and skillful in their work given their responsibilities in their respective organizations. Being such, they give directions to their organizations as executives. In this case, therefore, it is a must that they should consider the different functional management areas as extremely important in discharging their duties and functions. They are the individuals in the organization who provide the vision and goals with the required periodic review by asking themselves the following questions for the benefit of their organizations, as follows: (1) Where are we now? and (2) Where are we going? These guide executives in managing their organizations to achieve efficiency and effectiveness.

Table 2. Summary of test results of the difference on the managerial competencies of women executives in Catanduanes as perceived by them and their subordinates

Managerial Competencies Based on Functional Management Areas	Test Statistic	Computed Value	Tabular Value	Decision	Interpretation
A. Strategic thinking and scenario-building	t-test	3.175	2.015	Reject Ho	Difference is significant
B. Analysis, problem solving and decision making	t-test	4.554	1.943	Reject Ho	Difference is significant
C. Planning and organizing	t-test	5.554	1.895	Reject Ho	Difference is significant
D. Change Management	t-test	2.124	1.943	Reject Ho	Difference is significant
E. Managing small organizational groups	t-test	1.000	1.895	Accept Ho	No significant difference
F. Team leadership	t-test	1.000	1.895	Accept Ho	No significant difference
G. Information management	t-test	1.554	1.943	Accept Ho	No significant difference
H. Innovation and creation	t-test	1.554	1.943	Accept Ho	No significant difference
I. Mediation and negotiation	t-test	1.000	1.943	Accept Ho	No significant difference
J. Mentoring and coaching	t-test	1.192	1.943	Accept Ho	No significant difference
K. Facilitation and group Moderation	t-test	1.000	1.895	Accept Ho	No significant difference
L. Presentation and public speaking	t-test	1.000	1.895	Accept Ho	No significant difference
M. Interviewing	t-test	1.000	1.895	Accept Ho	No significant difference

Table 3. Summary of test results of the difference in perceptions of managerial competencies between women executives and their subordinates in Catanduanes, Luzon, Philippines

Managerial Competencies Based on Functional Management Areas	Test Statistic	Computed Value	Tabular Value	Decision	Interpretation
A. Strategic thinking and scenario-building	t-test	0.953	2.015	Accept Ho	No significant difference
B. Analysis, problem solving and decision making	t-test	0.934	1.943	Accept Ho	No significant difference
C. Planning and organizing	t-test	0.933	1.895	Accept Ho	No significant difference
D. Change Management	t-test	0.408	1.943	Accept Ho	No significant difference
E. Managing small organizational groups	t-test	1.524	1.895	Accept Ho	No significant difference
F. Team leadership	t-test	1.000	1.895	Accept Ho	No significant difference
G. Information management	t-test	0.862	1.943	Accept Ho	No significant difference
H. Innovation and creation	t-test	1.000	1.943	Accept Ho	No significant difference
I. Mediation and negotiation	t-test	1.000	1.943	Accept Ho	No significant difference
J. Mentoring and coaching	t-test	1.000	1.943	Accept Ho	No significant difference
K. Facilitation and group moderation	t-test	1.000	1.895	Accept Ho	No significant difference
L. Presentation and public speaking	t-test	1.000	1.895	Accept Ho	No significant difference
M. Interviewing	t-test	0.661	1.895	Accept Ho	No significant difference

CONCLUSION AND RECOMMENDATION

Given these findings, it is concluded that the managerial competencies of women managers and entrepreneurs (used here as women executives) in Catanduanes as perceived by them and their subordinates are *Highly Important* in discharging managerial duties and functions. The management functional areas along strategic thinking and scenario-building; analysis, problem solving and decision making; planning and organizing; and change management were perceived differently by the executives and their subordinates. Women managers and entrepreneurs in Catanduanes have similar managerial competencies.

The present inquiry recommends that women managers/entrepreneurs in Catanduanes must strive to extremely consider these management functional areas important in executing their jobs. It is a must for them to acquire training and expertise to possess the skills and attributes necessary in performing tasks and activities for the welfare of the members of the organization, and to achieve its goals and objectives. Efficient and effective management does not happen by chance; it happens when the person tasked to do it is prepared and equipped with the knowledge, skills and attributes necessary for one to be highly competent. Moreover, these executives must attend trainings and seminars related to these management aspects; enroll in graduate studies related to management to broaden their ideas in managing and leading; conduct peer observation as to what others are doing especially those whom they believed are experts in organizational management; read books, articles and other published materials on leadership and management; and exert effort to master the art of managing and leading.

MANAGERIAL IMPLICATIONS

While knowledge can be acquired, nurtured and polished through the passage of time, skills are acquired and mastered, attributes are totally within the individual. Managerial competencies are crucial requirements for executives to be able to perform their tasks for the benefit of their respective organizations. Along this line of thinking, managerial competencies of executives are vital ingredients in any human organizations. Management at whatever level of the organization needs considerable review and

monitoring to see to it that the organizational system functions in harmony with the different sub-systems.

It is implied therefore that even managers need training and re-orientation as need arises. This is in response to the management and organizational concept that organizational control is a must for any human organization. Thus, organizational control is simply the regulation to facilitate goal attainment.

LITERATURE CITED

Bigelow JD (ed). 1991. *Managerial Skills: Exploration in Practical Knowledge*, Newbury Park, CA: Sage Publications.

Bittel LR, Newstrom JW. 1990. *What Every Supervisor Should Know*, 6th edition, Sydney: McGraw-Hill Publishing Company.

Boyatzis R. 1982. *The Competent Manager*, New York: Wiley.

Boyatzis R. 1993. Beyond competence: the choice to be a leader, *Human Resources Management Review*, *3*(1), 1-14.

Custodio LP. 2000a. Career Anchors of Filipino Academic Executives, *School of Commerce Research Paper Series: 00-7* @ http://www.flinders.edu.au.

Custodio LP. 2000b. Work-Related Perceptions of Executives in Catanduanes, *Research Digest, Volume XII*, January.

Custodio LP. 2007. *Strategic Planning and Decision Making in Educational Administration*, Revised Edition, Virac: Catanduanes State Colleges.

Custodio LP, Tugano MS.2006. Managerial Roles of Chief Academic Officers in SUCs Region V and Their Perceptions on the Importance of Accreditation in Higher Education, *Business Research Journal, 2*(1), 35-49.

David FR. 2000. *Strategic Management: Concepts and Cases*, 7th edition, Singapore: Pearson Education, Asia Pte. Ltd.

Hitt MA, Ireland RD, Hoskisson RE. 1999. Strategic Management: Competitiveness and Contradictions, *Journal of the American Institute of Planners, 45*(4), 387-398.

Huffington C, Cole C, Brunning H.1998. *A Manual of Organizational Development: The Psychology of Change*, Boston, MA: Psychological Press.

Iñigo CE. 2000. *Management for Filipinos: Principles and Applications*, Quezon City: Design Plus.

Kotter JP. 1988. *The Leadership Factor*, NY: Free Press.

Kotter JP. 1990. *A Force for Change: How leadership Differs from Management*, New York: Free Press.

Martirez CR. 1991. *Human Resources and Management: Principles and Practices*, Metro Manila: National Book Store, Inc.

Mintzberg H.1973. *The Nature of Managerial Work*, NY: Harper and Row.

Mintzberg H. 1975. The manager's job: folklore and fact, *Harvard Business Review*, July-August, 49-61.

Miralao, V (1980) *Women and Men in Development: Findings from a Pilot Study*, Quezon City: Ateneo de Manila University Institute for Philippine Culture.

Murphy JJ. 2008. Virtual Management: Changing the Management Paradigm @ http://www.negotiationeurope.com.

Narit NT. 2005. Managerial Skills and Performance of Executives in Manufacturing Businesses in Region V, *Master's Thesis*, Catanduanes State Colleges.

Overman S. 1993. Weighing career anchors, *HR Magazine, 38*(3), 57-58.

Quinn JB, Mintzberg H, James R. 1988. *The Strategy Process: Concepts, Contexts and Cases*, Englewood Cliffs, NJ: Prentice Hall International.

Roffey BH. 2001 Women Managers and Entrepreneurs in the Philippines: A Comparison with "Western" Theories, *School of Commerce Research Paper Series: 00-7* @ http://www.flinders.edu.au.

Soriano EV, Nhert LC. 1990. *Business Policy in an Asian Context*, Metro Manila: Sinag-Tala Publishers, Inc.

Tubbs SL, Moss S. 1987 *Human Communication*, 5th edition, New York: Random House.

Turbolencia L. 2001. Conflict Management Strategies of Principals in Relation to Teacher Behavior and School Climate in Elementary Schools in Catanduanes, *Master's Thesis*, Catanduanes State Colleges.

United Nations Industrial Development Organization (UNIDO).2002. *Strengthening Organizational Core Values and Managerial Capabilities*, Vienna, Austria: Human Resource Management Branch @ http://www.unido.org

Yau WSL, Sculli D. 1990. Managerial trait and skills, *Journal of Management Development*, *9*(6), 32-40.

Dr. Lily P. Custodio *is a Certified Public Accountant and holds the rank as Full Professor 6. She obtained her Master's and Doctorate degrees from Flinders University in Australia on an Equity Merit Scholarship Program. Dr. Custodio is the Dean of the Graduate School, Catanduanes State Colleges in Virac, Catanduanes, Philippines.*

*The Journal of Pedagogy, Technology and Synergy (*2009) **1**(1): 17– 25 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

ICT use and application in *Barangay* governance: Reflections of academics from Luzon

Jimmy T. Masagca[1], Liu Chun[2] & Manrico T. Masagca[1,3]

[1]Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Incorporated (SEC Reg. No. 200916487)
Constantino St. Virac 4008, Catanduanes, Philippines
[2]San Jose Christian Colleges, San Jose City, Philippines
[3]De La Salle University-Manila & San Beda College Alabang, Muntinglupa City, Philippines

Abstract The uses and application of ICT (the Internet/World Wide Web, e-governance, and the issue of digital divide) in local governance are mostly applicable to the legislative and financial functions of the *Barangay*, the basic administrative or political unit (BPU) of the Philippines. In this study the purposively-selected participants (academics) believe that the issue of digital divide is nevertheless related to effectiveness or efficiency in the delivery of basic services since accessibility (as to IT infrastructure and ICT availability) is a great factor to be considered. The officials of the local government unit are expected to develop mechanisms on how the constituents could have access to the internet or use the ICT facilities that can be carried establishing functional and enabling linkages with the industry, the academe and the government communication network.

Key words ICT, academics, Philippines, perceptions, *Barangay*, governance

INTRODUCTION

With the dramatic acceleration in the development and use of Information and Communication Technology (ICT), various countries all over the world have been undergoing a period of transition particularly in the process of transforming into telematic governance or e–governance. Like the Philippines, the centers of this transformation are technology advances that posed greater challenges to governance of the basic political unit (BPU) known as the *Barangay.* Whether one likes it or not, officials of this basic administrative unit in the country have to be better equipped in response to the changing scenarios of ICT revolution. Aside from the fact that these local officials should know the Philippine Local Governance Code of 1991 (Republic Act No. 7160), they should also be proficient about recent advances in *i-governance* particularly on the guidelines of the preparation, review, approval, and implementation of ICT projects (Philippine Republic Act or R.A. No. 6957 as amended by R.A. No. 7718).

It is known that there are several BPU officials who are not knowledgeable about aspects on the judiciary, legislative and financial functions of this administrative unit. It is also observed that even constituents do not know anything about various devolved functions of the administrative. Moreover, allocation of resources due to the conflicting and complicated demands of the constituents becomes a common problem that BPU officials must face. There is legitimacy in the observation that most officials are unprepared, untrained and ill-equipped with the necessary skills needed to handle such problems and the

mantle of responsibilities given to them. With the changing scenarios in local governance, the need to look into the gains or "miracles" of using and applying ICT will be a matter of urgency.

Amidst the knowledge-based society, with and against the positive and negative circumstances, local governance in the Philippines is faced with enormous challenges and opportunities. The era of globalization and the new and emerging technologies available for use in the day to day activities of these BPUs, define quite a complex modality in the delivery of services to its constituents. First and foremost is to let these BPU officials understand the utmost importance of the fundamental changes and paradigm shifts brought about by the use and application of ICT which require a different tool of analysis. It is asserted that that ICT use in local governance will create different mentalities, attitudes and approaches that will surely lead to major changes in enhancing local governance in the country particularly in the work-life and workplace of the local officials and the constituents or the people in the community itself. The belief how these BPU officials relate with the constituents, think and exchange ideas with others in this modern world that we have now, demand a different way of reaching out and interrelating ICT to the recipients of the various functions or services being provided. It appears now that a different "ecology of governance" of the BPU in the Philippines does exist.

Our modest inquiry gives its contribution to the growing area of interest in creating a new "ecology of governance" in the Philippines particularly in the technology-driven local governance of the country. The ecology of governance consists of structural and functional components based on the bio-ecological approach or systems ecology (proponent: Howard Owen 1994; for discussions related to education, see Masagca and Medina 2002; Masagca et al 2004). The living and non-living components of good governance (guided by the themes of transparency, accountability participation and conflict management) are the structures while functions refer to how the structures operate, interact and interrelate in the attainment or pursuit for governance. It is being asserted that the interdependence of the basic and complex components of the process of learning (Masagca 2002) and in the present study on BPU governance demand for new practices in the delivery of various services being provided for the assumed change in the constituency. Hence, ecology defines the interrelationships of the varied components of local government organizations (e.g. BPU) and the need for re-structuring governance to a more systematic and dynamic processes of delivering services via innovative and attuned modalities in the midst of advances in ICT. With such a responsibility, the task of BPU officials to use and apply ICT in delivering services is clearly noted. To ensure successes in this endeavor, the human factor (Levine 2001) has to be integrated in this initiative, and that of Carlopio's (1998) central messages that alongside a centrally planned and top-down strategy for change, significant attention needs to be paid to improving channels of communication between those undertaking project planning and those implementing the new IT system at the local level. The BPU officials are therefore given the formidable tasks to design creative delivery modes using new IT system most fitting to the nature of the clientele they serve.

This paper on the use and application of ICT in local governance of BPU was carried out in order to outline possible ways of creating a new "ecology of governance" in the Philippines. Preparatory field work activities were carried out in a BPU in order to set the tone and comply with the tenets or stages of innovative change. The purpose of this inquiry is to gain insights of the different perspectives

of selected academic executives from higher institutions of learning as to the use and application of ICT in BPU governance. This paper addresses the following questions:

1. What are the profiles of the academics who were involved in this study as to how BPU officials use and apply ICT in governance?
2. What are the views of the academics about the internet, e-mails and the issue of digital divide?
3. How do these academics perceive about the use of and application of ICT in the delivery of various services that center on judiciary, legal and financial functions of LGUs in the Philippines?

This study covered the determination of the academic executive perspectives on how can the officials use and apply ICT in the delivery of various services to their constituency. The study is delimited to judiciary, legal and financial functions of the BPU as related to the themes in governance, i.e. transparency, accountability, participation and conflict management. The study is further limited to the participants/informants who are academic executives working in a college and a university as full-time and part-time status and as members of the board of trustees during the academic year 2007-2008.

***Barangay*: The Basic Political Unit (BPU) of Governance in the Philippines.** The *Barangay* is a basic administrative unit and key arena for democratic engagement in the Philippines. As of the most recent national elections in 2007, there are more than 42,000 BPUs or *barangay* all over the country (Abros 2003). Under the Local Government Code of the Philippines in 1991 (Republic Act No. 7160), the unit is empowered to: a) conduct project planning, development and monitoring; b) exercise fiscal autonomy through its power of taxation; c) enter into contracts; d) develop mechanisms for conflict resolution; and e) exercise eminent domain. In the governance of this unit, civil society participation is mandated in the following bodies: a.) Development council; b.) Pre-qualification, Bids and Award committee; c.) Local Peace and Order Council; d.) Local School Board; and e.) Local Health Board (Villarin et al 2002).

Information and Communication Technology (ICT)

Curley (2002) discusses how ICT impacts the processes for advancing S & T, and the importance of improving digital literacy. The emerging peer-to-peer computing model is briefly reviewed and examples of its opportunity for use in advancing S&T are provided. In the field of engineering, Ablaza (2002) notes the challenges in the field of telecommunications that include: 1) the growing complexity of the network of telecommunications with requirements for engineering resources in radio, transmission and switching and more importantly in IT and systems integration field; 2) high content of proprietary technology or software; 3) privacy of information and communication, and security of systems. Moreover, the paper notes that government and in order together to improve the quality of education and the quality of teachers at the primary and secondary levels.

Vea (2002) punctuates that in the field of ICT itself, Philippine schools hold great promise by responding to the immediate challenge to bring standards up to international levels – in order to make the graduates certified to appropriate standards. Another challenge is to make the global connections with industry in order to produce the ICT professionals they need and demand. ICT opens up avenues to places where Philippine technological schools have never been to. The World Wide Web (WWW) has enabled schools to share their libraries and other educational materials and

even their faculty with other schools around the world.

Roldan (2003) explores on how e-governance and the domestic digital divide affects the evolution of Philippine communities into online, electronically linked communities. The paper looks at two NGO led ICT projects and compared them in terms of approach, the nature of the pilot villages, and the issues encountered. It also explores on the use of cell phones as an alternative instead of desktops. The work of Alampay and Umali (2007) focuses on the various applications and best practices models of e-governance through the Community e-Centers in the Philippines. A methodology or guide was proposed for evaluating killer applications and practice models were presented and how communities benefit from their use. It is concluded in the study that ICT fosters good governance- or the exercise of political, economic and administrative authority in the management of the country's affairs-by promoting public participation, transparency, efficiency and government accountability.

The use of ICT to enhance or provide for the efficient, effective and transparent delivery of government services is now broadly taken to mean digital governance or e-governance. A related study of Dumaquit (2004) illustrates how the empowerment of LGUs or local government units (LGU) can accelerate the development process and improve government performance in the delivery of basic services through a decentralized system of governance. This study investigated how this could be achieved through a strategy of assisted self-reliance and provision of technical assistance from the devolved national government agencies and oversight support agencies on a demand driven basis.

METHODOLOGY

This study used the qualitative research approach associated with the naturalistic approach, and to a certain extent that of case studies (Stake 2005; Yin 2005). Certain property of sharing, conversation or story telling (*kwentuhan* or *pakikipagkwentuhan* in the Filipino language) was employed. In case studies, the small number of participants allow for particularization or illustration of the uniqueness of the individual cases. Contextualization and subsequent generalization could be done. Informal interviews were conducted over snacks in the canteen, on the corridors and at the offices of the academic executives. Telephone or cellular phones were used in the interviews carried out by the research assistants. Certain reflections were also considered and the study attempted to maintain the participants' identities, as such, quotations representing discovered constructs or concepts were placed together to form narratives. Some narratives are contained within the indented summaries in the succeeding sections.

Participants and location of the study. The participants (termed as academics) of the investigation are college administrators, academic teaching faculty and member of the board of trustees. The dynamic nature of the study that dealt on changing the "ecology of governance" through the use and application of ICT necessitates a naturalistic approach. Noting on the paucity of this type of study in the Philippines, this inquiry was carried out to fill-in such gaps. The participants were purposively selected academic executives from Luzon, Philippines.

Participant 1: A-Male. This participant is a 49 year-old academic executive with a total teaching experience of 25 years. He holds a BS, MS and Doctorate degrees. He works with a private university on full-time and as part-time professor in other graduate studies programs.

This participant was a member of the *Lupon ng Barangay* (Barangay Council) for 5 years.

Participant 2: B-Female. She is involved in managing a school in Quezon City aside from her tasks as administrator and trustee of a private non sectarian school. She holds a masters degree in educational management and had been involved in community leadership.

Participant 3: C-Male. He is newly married and just recently finished his MA degree. He has a bachelor's degree in Political Science and took courses in Education to qualify for the Licensure Examination for Teachers (LET),

Table 1. Summary of the profile of the participants involved in the study

Participant	*Gender*	*Age*	*Educational Attainment*	*Involvement in the BPU*
1	Male	47	Doctorate Degree	Member of Lupon and Consultant
2	Female	65	Doctorate Degree	Consultant
3	Male	29	Master's degree	Adviser of Youth Program
4	Female	27	Master's degree	Member of Working Committees

which he passed. He had several stints in his own BPU aside from his teaching and administrative work with the college.

Participant 4: D-Female. She is unmarried and currently enrolled in a doctoral program.

Research Instruments and Data Gathering Techniques

The unstructured interview instrument was prepared by the researchers. The instrument contained several questions or topics for discussion with the informants. The questions dealt with 1) Years of involvement with community or BPU activities, 2.) Current uses of ICT in governance and education 3.) Knowledge on ICT, internet, the Web, e-mails, intranets, websites, files transfer, URLs and news groups, 4.) Potential uses of ICT in governance and 5.) Innovative programs of the BPU as to the use and application of ICT.

RESULTS AND DISCUSSION

Profiles of the informants. The profile of each of the participants involved in this study is presented in Table 1. Their age ranged from 27 to 65 years old with a mean age 42 years old. Two (or 50%) of the participants have already obtained their doctorate degrees, while the remaining two have received their master's degrees. All of the participants of the study have adequate involvement in the programs and projects of the BPU either as member of the BPU Advisory Group, consultant and adviser of the youth programs.

Views on the Internet, e-mails and the issue of digital divide. All the participants view that the Internet or WWW is an important source of information for the daily activities of the local officials. As a rich source of information, the participants believe that internet connectivity of the BPU in their locality must be maintained continuously to be at pace with the rapid developments in business, technology and industry.

The Internet and e-mails. According to *Participant 1-Male,* the internet is an excellent resource for the judiciary function of the BPU since cases and decisions made by the courts are available as reference materials. The BPU officials need these documents during meetings or hearings of certain complaints and cases. Materials downloaded from the Internet such as websites are being used as evidentiary support in the officials report writing. Through the Web, BPU officials can be informed that several cases related to child abuse, acts of lasciviousness and serious physical injuries are not within the jurisdiction of the BPU. The Web

stores several genres created by companies, interest groups, and even individuals, e.g. webpages and weblogs which represent a new source of information largely unavailable a decade ago (Radia & Stapleton 2008).For the very resourceful BPU officials, these genres represent a rich storage of readily available materials to be used in the different activities or functions of the local government unit. Information about the judiciary function can be found in government websites of the Department of Justice and the Department of Interior and Local Government. Other materials such as government statistics are also found on the Web in the electronic form which can be converted into other forms. In this way the work on data banking and information system management appears to be easy in the advent of these various genres that would be easy for the BPU officials to get or use as reference materials in dealing with the queries received during extreme situations.

Participant 3-Female believes that the internet has the unlimited resources about possible programs and projects related to tourism, environmental protection and e-governance. Electronic mails are widely used as an effective supplement in education (Masagca 2008). More recent, is the use of weblogs in governance as well as in "citizen journalism". Electronic mails are used as means of posting answers to questions of clients located in far places that an official cannot personally visit. E-mails and Weblogs at the present time are used in a variety of ways in the context of governance, from evaluation of a project, communication patterns among the constituencies and the integration of e-mail in the conversation approach during meetings wherein officials cannot come personally.

According to *Participant 3-Male*,

> "… The use of e-mails in local governance increases the efficiency, particularly of the use of time. When responses are received by the officials, clients can quickly receive more feedback and other information.

According to *Participant 4-Female*, e-mails can spell-out factor convenience in developing the local official's self-organized leadership capabilities. She said that:

> "The local official can evaluate himself based on the e-mail responses posted by the consultant (e.g. legal adviser, financial analyst)… local officials can read messages at their convenience… and messages can be easily retrieved for future references…"

Participant 2-Female points out that e-mails can keep officials abreast with the recent information or to know the recent advances in knowledge. Constant posting of e-mail messages can fully develop the computer skills of the BPU officials. On the other hand, *Participant 1-Male* expresses the view that the use of e-mails in local governance means to store more information reliably and be up-to-date with the information on various concerns dealing with pre-qualification, bids and awards. Likewise, the peace and order council of the BPU can receive recent data about criminality; while the school or health board councils will be informed about trends on diseases and disasters in other areas of the country and the world.

The digital divide. The participants commented that the lack of skills or hands-on orientation for the local officials affects the use and application of ICT in governance. Only one of the participants (*Participant 4-Female*) admitted that she lack the technical know-how in order maximize the use of the internet during her study days. The problem of the unavailability of connectivity to the internet was expressed by only two participants. She points out that

> "To solve such gaps, officials must avail the services from other private internet shops. If the local/community office or community hall lacks interconnectivity then improving

> governance by using and applying ICT will be problematic."

The issue of digital divide stems from the fact that not all local government units in the Philippines will have the access of the internet and could enjoy the benefits given by the advances in ICT. Although the government has launched the project on empowering local communities in ICT through community e-centers (CECs), there are numerous local political units in the Philippines that would be impossible to receive the services provided through the internet. Roldan (2003) had explored on using cellular phones in the BPU.

Samuel et al. (2005) argue that bridging the digital divide in disadvantaged communities requires adequate knowledge of the underlying causes of the divide, a favorable government policy, a focus on the benefits of providing ICT, the provision of suitable infrastructure, and a committed management that is prepared to get round the various barriers or risks found in disadvantaged communities. Thus this study addressed this argument by looking into the other lenses of the issue.

Perspectives on the use and application of ICT in the delivery of various services that center on judiciary, legal and financial functions of BPU

Participant 1-Male expresses the view that the use and application of ICT in local governance will be most helpful particularly in the legislative function. He claims that:

> "…It is perfectly true that there are local officials in the country who do not know the difference between a resolution and an ordinance, a petition, an opinion, a motion, and a ruling or provision. In order to avoid falsification, cheating and fabricate or invent the minutes of meetings of the local units, there is a need to have websites containing rich sources of specimen resolution, ordinance or minutes of meeting for the use of the officials."

The local government websites will contain uploads about these documents which are readily available for these local officials.

Participant 2-Female stresses that the financial function of the local government can be improved if officials can find in various websites that will allow them to know more about the mechanics of income and expenditure or accounting and auditing. It is pertinent to note that local officials have undergone trainings about the New Government Accounting System (NGAS). However, it is not enough that they know the mechanics of the accounting system, these officials should be provided with the needed information through the various websites and weblogs to be created by the local government agencies to assist them in improving accounting, auditing and budgeting functions. It appears now that the need for innovative model programs and projects can be proposed in the different local government units as to the use and application of ICT consistent with the provisions of Republic Act (RA) No. 6957, as amended by RA 7718.

The Philippine Commission on Information and Communication Technology (CICT) presented the government's policy aimed at developing an e-enabled society. This indicates that the country is now trying to focus on the practices of e-governance and e-government. As of this date it appears that provision for the affordable access to internet has yet to be achieved as per target. This is in anyway related to the issue of digital divide which somehow affects the full implementation of the provisions of the legislative acts dealing with the use and application of ICT up to the BPUs.

The academics involved in the present study challenges the BPUs of the country to come up with several ways deemed innovative similar with the programs and projects of Naga City on *i-governance* and other programs presented in

the paper of Alampay and Umali (2007) on best practice models on e-governance. Citizen's attitudes toward e-governance as to their interest must be positive or high to ensure success aside from the fact that the infrastructural considerations are met. A recent study in UK by Kolsaker & Lee-Kelley (2008) shows that citizens' interest in e-government and e-governance is low and tend to appreciate more personalized and user-friendly practices.

In any change involving ICT use and application, it is but proper to consider prescriptive model of IT implementation with a perspective that takes in the people-centered dimensions of organizational behavior. Carlopio's (1998) work on the implementation of technology-based change involves a process that links the actions of work-groups with a centrally-devised menu for change. Because

computer systems are inevitably developed and applied from the "top down" (although those who will use the system will be involved to varying degrees in design and testing), implementation requires a disciplined capacity to carry out pre-planned change, as well as constant communication between those in the field and those doing the planning (Stewart & O'donnel 2007).

Based on the results presented in can be generalized that Internet or WWW is an important source of information for the day to day activities of the BPU. It is known that the Internet has the unlimited resources about possible programs and projects related to tourism, environmental protection and e-governance. On the electronic mails (e-mails), the local officials' belief that it can keep them abreast of the recent advances in knowledge was confirmed by the academics. Likewise, e-mailing can also fully enhance the computer literacy (i.e. tool literacy, ICT resource literacy) and can assist BPU officials to store more information reliably and be up-to-date with the information on various concerns dealing with pre-qualification, bids and awards and others. The issue of digital divide stems from the fact that not all BPUs in the Philippines will have the access to the internet and could enjoy the benefits given by the advances in ICT. The use and application of ICT in BPU governance will be most helpful particularly in the legislative function, thus various websites will allow them to know about the mechanics of income and expenditure, accounting and auditing.

The benefits that can be derived from the internet are unlimited and the use of electronic mails in the implementation of different programs and projects of the BPU can be helpful in ensuring the efficiency and effectiveness of the delivery of services at the BPU level. The issue of digital divide is nevertheless related to effectiveness or efficiency in the delivery of services since access to ICT is a great factor in this aspect. The use and application of ICT in BPU governance are mostly applicable to the legislative and financial functions.

In order to maximize the use and application of ICT in BPU governance, local officials should prioritize its internet connectivity. As such allocation of funds and budgeting in the BPU should include internet connection provisions to ensure effectivity and efficiency in the delivery of BPU services to the clientele. In addressing the issue of digital divide, BPU officials are expected to develop mechanisms on how the constituents could have access to the internet or use the ICT facilities of the BPU. Local officials are expected to develop mechanisms on how the constituents could have access to the internet or use the ICT facilities that can be carried out establishing collaboration and linkages (both functional and enabling) with the industry, the academe and the government communication network. Dynarski (2008) stressed that "by collaborating, we can learn more about the

effectiveness of programs, practices, and policies". Several programs and projects related to the legislative and financial functions can be proposed and undertaken. These programs and projects should not only deal with the internal workforce of the BPU but should also deal on the clientele or constituents that they serve.

LITERATURE CITED

Ablaza GC. 2002. Confronting global challenges in engineering. *Trans. Nat. Acad. Sci. Tech. Philippines* 24:7-10.

Abros A. 2003. *Civil Society Engagements in Local Governance: The Case of the Philippines.* Available at the URL (retrieved last March 1, 2008) http://www.ipd.ph/logolinksea/resources/SEA%20Regional%20Paper5.pdf.

Alampay G, Umali J. 2007. High impact, pro-poor e-governance applications: identifying "killer applications" and best practice models of e-governance through community e-centers in the Philippines. Available at http://662186911/search/cache?ei=UTF

Carlopio J. 1998. *Implementation: making workplace innovation and technical change happen.* McGraw-Hill, Sydney.

Curley M. 2002. Enhancing Philippine science and technology through ICT: an overview. *Trans. Nat. Acad. Sci. Tech. Philippines,* 24:1-6.

Dynarski M. 2007. Researchers and educators: allies in learning. *Educational Leadership.*

Gueco CW, Villorente DF, Larin LR, Mendoza RC, Olesco RO. 2002. Next generation internet in the Philippines: the Philippine research, education, and government information network. *Trans. Nat. Acad. Sci. Tech. Philippines* 24:15-28.

Forrester JW. 1992. *Systems dynamics and learner-centered learning in kindergarten through 12th grade education.* Paper D-4337. Cambridge, Mass.: MIT Press.

Kolsaker A, Lee-Kelley L. 2008. Citizens' attitudes towards e-government and e-governance: a UK study. *International Journal of Public Sector Management*, 21(7):723-738.

Masagca JT, Londerio N.2008. Teachers' perspectives on the integration ICT in school counseling. *International Journal of Education and Development Using ICT*, Vol. 4 No., 4. Available at > http://www.pkp.ubc.ca/ojs/ <.

Masagca JT, Medina N.2002. Creating a New "Ecology of Teaching" at DLSU-Damarinas: The Partial Mode Distance Education (PMDE) Program of the Graduate School of Education, Arts and Sciences (GSEAS). 1st National Conference on eLearning, Aug. 1-2, 2002 held at Manila Hotel, Philippines.

Masagca JT. 2002. Ecology of teaching in an era of globalization. Paper presented during the 5th National Research Forum of REDTI, Inc. Feb. 1, 2002 held at JICA Hall, Department of Agriculture, Diliman, Quezon City.

Radia P, Stapleton P.2008. Unconventional internet genres and their impact on second language undergraduate students' writing process. *Internet and Higher Education*, 11:9-17.

Roldan MDZ.2003. ICT and *barangays*: Two case studies in the Philippines. *Journal of Philippine Studies*, 40:34-43.

Samuel O, Akinsola M, Herselman ME, Jacobs SJ. 2005. ICT provision to disadvantaged urban communities: a study in South Africa and Nigeria. International Journal of Education and Development using ICT, Vol. 1, No. 3. Available at http://www.pkp.ubc.ca/ojs/

Shedletsky, LJ, Aitken JE. 2001. The paradoxes of online academic work. *Communication Education*, 50 (3):206-217.

Stake R.2005. Qualitative case studies. In N.K. Denzin & Y.S. Lincoln (Eds.), *Qualitative research* (3rd ed., pp.433-436), Thousand Oaks, CA: Sage Publications.

Stewart J, Michael O'Donnell S. 2007. Implementing change in a public agency Leadership, learning and organisational resilience. *International Journal of Public Sector Management*, 20 (3): 239-251

Vea RB. 2002. ICT road map in engineering: the academe. *Trans. Nat. Acad. Sci. Tech. Philippines*, 24:11-14.

Villarin T, Castillo C, Perpetua M, Chavez E. 2002. *Balangay*: *A Resource for Barangay Governance* (3rd edition). Institute of Politics and Governance (IPG): Quezon City.

Watzlawick P, Beaven J, Jackson D. 1967. *Pragmatics of human communication: a study of international patterns, pathologies, and paradoxes*. New York: Norton Co.

Yacci M. 2000. Interactivity demystified: a structural definition for distance education and intelligent computer-based instruction. *Educational Technology*, July-August, pp. 5-16.

Yin R. 2005. *Introducing the world of education: a case study reader*. Thousand Oaks, CA: Sage Publications.

Dr. JT Masagca *designed and implemented the Partial Mode Distance Education (PMDE) program of DLSUD GSEAS and PTECHS (Pedagogy, Technology and Synergism Seminar-Workshop at DLSUD.* ***Liu Chun*** *is a graduate student of the Master in Public Administration program at San Jose Christian College (SJCC).* ***Manrico T. Masagca*** *was the Dean of the SJCC Institute of Business & Technology and presently an Assistant Professorial Lecturer at the College of Business Economics (CBE), De La Salle University in Manila (DLSU-M), Philippines.*

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 27–29 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

TEACHING AND LEARNING

Chemistry teaching techniques employed in secondary schools of Catanduanes, Philippines

Ma. Luz A. Floralde

Catanduanes State Colleges Panganiban Campus
Panganiban 4600, Catanduanes, Philippines

Abstract This paper presents the techniques used in teaching Chemistry in selected high schools of Catanduanes in Luzon, Philippines which will serve as inputs in preparing achievement tests for the future and suggest ways to improve teaching and learning in Science. Data were gathered through questionnaire by involving a total of 230 teachers handling Chemistry. Results show that majority of the teacher-respondents used several techniques in teaching, and out of the 14 identified techniques, "cooperative learning" and "problem solving method" are the most commonly used by giving the response of "always" as to frequency. Field studies technique is seldom used by the teachers under consideration. These results indicate that school administrators should encourage Chemistry teachers in the province to use progressive and meaningful teaching techniques in order to enhance quality of teaching and learning in science.

Key words Chemistry teaching, teaching techniques, science teaching, Catanduanes

INTRODUCTION

Techniques of teaching are the actual manner that a teacher performs his work. These are the methods of teaching, the tools of teaching, the audio-visual aids being manipulated, the tests given to the students and manner of scoring or marking, the medium of instruction being utilized and all other devices used in teaching and learning. The teacher uses a definite combination of devices consciously or unconsciously and a definite pattern of teaching is formed. These definite patterns of teaching of a teacher become his techniques of teaching (Calderon 1998). There are several teaching techniques adopted by teachers in teaching Chemistry. One of them is cooperative learning method, which is a form of teaching in which the pupils or students are given maximum participation in the development of the lesson. It utilizes either the inductive or deductive development of a lesson, employs the question and answer as a means of communication between the teacher and the students. There are different techniques aside from the said method that includes traditional, progressive and meaningful learning techniques like brainstorming, concept-mapping, mind mapping and the research-based techniques of inquiry, problem-based and experimental and discovery techniques.

This paper intends to present the different teaching techniques used in Chemistry for secondary schools of an island province that will serve as inputs in preparing achievement tests in the future as well as determining the relation of teacher performance as to the use of specific techniques. Likewise, it is the keen intent of this report to serve as the basis in

`

designing in-service trainings to upgrade and update the competencies of teachers of Chemistry and other science teachers.

METHODOLOGY

There were 46 Chemistry teachers and 230 third year students enrolled in the secondary schools of Catanduanes in Luzon, Philippines during the school year 2003 to 2004 that were involved in this inquiry. The student samples were identified through stratified quota sampling of the different classes.

The questionnaire used in this descriptive study dealt on the teaching techniques of Chemistry teachers in public high schools in Catanduanes. Several teaching techniques were identified by the teacher- respondents and they were allowed to make their judgments by rating the frequency of use of the techniques following a four - point Likertian scale (4=Always, 3=Often, 2=seldom, 1=not at all). The respondents were guided that a response of *Always* indicate that they use the technique 5 to 6 times, *Often* is 3 to 4 times the technique is used in a grading system, *Seldom* means 1 to 2 times the technique is being used in a grading period and *Not at All* means that the said technique is not used during the grading period.

RESULTS AND DISCUSSION

There were 14 teaching techniques used by the Chemistry teachers under study in the public secondary schools of Catanduanes. All the teacher respondents are using all techniques identified such as cooperative learning, concept mapping, practical work, individual/small group method, project-based learning, problem solving, role playing, games/simulation, student research, classroom demonstration and field studies.

Of all the teaching techniques, cooperative learning and problem solving were always used by chemistry teachers (means of 3.7 and 3.5, respectively). Cooperative learning is a form of teaching in which the pupils or students are given maximum participation in the development of the lesson. It employs the question and answer as a means of communication between the teacher and the students. The strength of this method is the fact that students or pupils learn by doing or they themselves develop the lessons under the direction of the teacher. The students learn faster and better and remember longer the things they have learned. It is the teacher who acts as facilitator leading and directing the students in performing the learning activities. When nobody in the class can give the information, the teacher will be the one to provide the answers (Calderon 1998). Vygotsky (1978) stated that the use of cooperative learning could clearly aid in the use of technology in the classroom. This method develops teamwork approaches in teaching and develops critical thinking through discussions, evaluation and clarification of each other's ideas that are vital in the present technological society.

Problem solving is an activity or a group of activities designed to attack, eliminate, minimize or solve a problem. When used in teaching, this technique is done by students themselves under the guidance of the teacher (Calderon 1998). As a purposeful activity, this method will remove difficulty or perplexity through the reasoning process. It utilizes reflective thinking in the actual teaching and learning process.

Table 1 shows the different teaching techniques used by Chemistry teachers in public secondary schools of Catanduanes. From among the teaching techniques rated as "often" by the Chemistry teachers of the public secondary schools in the province, the technique "predict-observe-explain" and individual/small group method had the highest weighted mean of 3.4.

`

The only technique which is seldom used is "field studies". One reason why this is seldom adopted is the cost as well as long preparation to coordinate with different agencies or the potential burden of seeking permits or waivers from the administration or parents for students to go out or be exposed to the hazards of the environment. Field studies are very effective means of enhancing student understanding about the natural processes, hydrological systems and chemical processes in the natural setting which can be learnt through field exposure.

Table 1. Chemistry teaching techniques employed in secondary schools of Catanduanes, Luzon

Teaching Technique in Teaching Chemistry	Brief Description
word association	Students are asked to write down the words that first come to mind or the words the usually associate with the scientific term/concept presented in a lesson.
predict-observe-explain (POE)	Learners have three tasks to do to enable a teacher to probe this understanding. First they predict the outcome, then they watch the event happen and finally reconcile any conflict between observation and prediction.
concept mapping	Requires students to organize a set of related concepts that make up the content of a lesson.The purpose is to determine whether students are able to distinguish the hierarchy of concepts or ideas.
practical work	Involves the manipulation of concrete objects and/or performance of activities to arrive at a conceptual understanding of different phenomena and situations.
individual/small group method	Promotes the development of self teaching skills and worthwhile habits of work and study. It also minimizes the tendency to depend or rely upon others for assistance at all times.
project-based learning	Students undertake time-bound activity such as business plan, wherein students are given the change to manage and evaluate at the end of the activity.
role playing	Allows students to demonstrate their understanding of abstract ideas into actions/words and by providing a way of sharing students understanding to others
games/simulation	Teacher presents the topic to be explored and the concepts embedded in the actual simulation. Teacher introduces the rules, roles, procedures, scoring and decisions to be made.
student research	Groups or individuals set up situations commonly in the laboratory, in order to gather information, organize and analyze said information and draw conclusions.
classroom demonstration	Students are allowed to passively observe what happens in an activity carried out by the teacher in front of the class.

The findings of this inquiry relates to the science teaching and learning in the context of the 2002 Basic Education Curriculum (BEC). It should be clearly noted that the choice of the teaching technique for every teacher depends on the learning objectives, the concepts to be learned and the depth of understanding that is required for the said subject or topic. The teacher respondents of the present study appear to subscribe to the view that learning by doing is a technique

CONCLUSION AND RECOMMENDATIONS

Based on the results presented teachers in Chemistry use various teaching techniques with cooperative learning and problem – solving as the technique always used. Since

`

many concepts in this science subject are learned through direct observation of classroom experiments and other meaningful learning experiences, school administrators encourage teachers of Chemistry to adopt the technique "predict-observe –explain (POE) (Mocorro et al. 1992) and student led research. These techniques are expected to provide relevant lessons on real life situations in order to encourage them to become analytical, thus develop their higher order thinking skills. Moreover, the student research technique as used in science high schools of the country can have greater effects on the effectiveness of developing the overall capabilities of secondary school students by the use of scientific method.

LITERATURE CITED

Calderon JF.1998. *Principles and practices of teaching*. Manila: Great Book Stores Trading, Inc.

Mocorro ZM, Aban EG, Garcia SC.1992. *Professional development for Chemistry teachers: resource materials for in-service workshop (PASMEP).* The Center for Studies in the Curriculum. Philippines.

Vygotsky LS.2008.Social *development theory*. Retrieved on December 2008 at http://www.gww.edu/tip/vygotsky.html

Ma. Luz A. Floralde *is an Assistant Professor of the Catanduanes State Colleges Panganiban Campus in Panganiban Catanduanes. She holds the degrees in Bachelor of Science in Chemical Engineering and Master of Arts in Teaching Chemistry from the Catanduanes State Colleges and currently enrolled in the doctoral program of the same institution. Prior to her teaching position at CSC, she was a Product and Plant Chemist of Lubrifax Resources, Inc. Oiltech Resources in Laguna, Philippines, respectively.*

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 30–33 ISSN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Micro skills in language learning of senior high school students in Panganiban, Catanduanes (Philippines)

Jennifer Aguilar Berces

Catanduanes State Colleges Panganiban Campus
Panganiban 4006, Catanduanes, Philippines

Abstract Eleven (11) micro skills which determine the communication competence of senior high school students in an agricultural industrial college were identified after trialling a proposed Achievement Test in Communication Arts IV (ATCA IV) for English. These are (1) distinguishing between sounds, (2) word stress, (3) sorting details,(4) identifying errors, (5) making inferences, (6) giving the main ideas, (7) correct usage, vocabulary using (8) context clues, (9) word analysis, (10) verbal analogy, and (11) letter writing skills. Results indicate that the students are deficient in six of the micro skills (vocabulary using structural analysis, identifying errors, vocabulary using verbal analogy, correct usage, noting details, and vocabulary using context clues). The need to find out the ways to measure communication skills of the said students are needed in order to propose the most appropriate ATCA IV for English for senior high school students.

Key words Micro skills, communication, competence, language teaching, English, secondary schools

INTRODUCTION

The teaching of the English language has been used in the Philippine educational system since the American regime. It has been an instrument in the development process of the country's educational system. The English language is also taught as a communication arts subject and in recent times, many changes are taking place in the curriculum. For the language teacher before making and administering a test, must be aware of the uses of language tests in the educational program. These tests are made in order to determine readiness for instructional programs, to classify or place individual's specific strengths and weaknesses, to measure the extent of student achievement of the instructional goals and to evaluate the effectiveness of instruction (Calmorin 1994). Students as learners possess different skills which are macro and micro skills. The former refers to the content areas of the language learning (i.e. listening, grammar, reading and writing skills), while the latter are the sub skills (i.e. word stress, making inferences) of the macro skills. Using these kinds of skills, one can determine communicative competence, which refers to the relationship and interaction between grammatical competence that includes knowledge of grammar rules on usage, and socio-linguistic competence, which also includes knowledge of the rules of language use (Robles 1988).

This paper presents the different micro skills of senior secondary school students in Panganiban, Catanduanes which are needed in the preparation of an achievement test in

`

Communication Skills IV. Current inquiry on preparing, revising and validating achievement tests is being carried out in order to improvement the administration of these tests with the end view of enhancing the language skills of secondary students in the island province of Catanduanes in Luzon, Philippines.

METHODOLOGY

The highly technical task of preparing achievement tests requires preliminary work on understanding the nature of the clients' or students' for which such test will be administered. The curriculum or the set of educational objectives being pursued are also clearly recognized in order to achieve the ultimate purpose of achievement tests. In test construction, planning the test is an important component which a teacher of communication arts must first carry out before actual construction, editing, trialling, analyzing and finally administering the given test.

The method used in gathering data for this inquiry followed the steps in test construction: Planning, Constructing and Editing, Administering the Tryout or Trial and Analyzing the Test Results. The first step of planning was carried out by determining the objectives of the test in order to measure students progress, specific strengths and weaknesses in communication or language, and information on the essential content and skills being taught and finally, what students are already able or not able to do in communication arts, which is termed as the communication competence as seen in the micro skills being possessed by the students under consideration. The actual preparation of the achievement test is not included in this report, since another serial report will discuss the completed proposed Achievement Test in Communication Arts for English (ATCA for English) prepared by this author.

This inquiry, determined the different micro skills used in the analysis of achievement tests in Communication Arts IV (for senior high school students) known as ATCA for English. The said skills were known after trialling or testing the proposed achievement test prepared by this proponent.

RESULTS AND DISCUSSION

The distribution of test items in the proposed ATCA IV for English consists of the four learning or content areas, namely: listening, grammar, reading and writing skills. A total of 123 test items were validated based on the original test items of 150 (27 test items were deleted). There were 11 micro skills in four (4) learning or content areas that were noted as presented in Table 1.

It can be seen from the table that listening skills has six micro skills, while grammar and reading skills have two micro skills each, while the last learning content on writing has a single micro skill on letter writing. It should be noted that some micro skills are taught both in the listening and reading skills, such as

Table 1. Micro skills in each English learning or content area of senior high school students in Catanduanes

Learning/ Content Areas	*Micro Skills*
Listening Skills	Distinguishing between sounds Word stress Noting details Context Clues Making inferences Giving the main idea
Grammar Skills	Correct usage Identifying errors
Reading Skills	Vocabulary (word analysis, content clues, verbal analogy) Reading comprehension (noting details and vocabulary)
Writing Skills	Letter writing skills

`

noting the details and vocabulary. In fact, all these micro skills are interrelated with each other and should be mastered by students if only to make them more competent in the communication aspect. This explains the reasons why some micro skills are found in the listening skills and also in the reading skills.

Current findings in the trials show that if the criteria of being competent are 75% as it is required in the minimum learning competencies, then it could be inferred that the high school students enrolled in the agricultural and industrial college appear to have not excelled in the micro skills noted earlier. If 50% is considered to measure competence, then these senior high school students are competent. Whether these students are competent or lack competence will be more plausible after further trialling and re-preparation, re-administration, re-testing and re-validation of the proposed ATCA IV for English intended for students in community colleges that include agricultural or industrial schools.

Pertinent to note is the observation that students are said to be deficient in vocabulary using word analysis, identifying errors, vocabulary using verbal analogy, correct usage, noting details, and vocabulary using context clues. It can be surmised that the micro skills which determine the communication competence of senior high school students in an agricultural and industrial college are (1) letter writing skill, (2) word stress, (3) making inference, (4) distinguishing between sounds, and (5) giving the main ideas of what is read and heard. These findings would mean that revised ATCA IV for English must focus on test items that deal on the aforecited micro skills of senior high schools students.

The emphasis on micro skills in communication particularly in various professions such as in business (Adler & Elmhorst 2002) and among spokespersons, legal mediators and dispute workers (Dubrin & Geerinck 2002, Association of Dispute Resolvers 2009) are becoming extremely important. The need therefore to train students earlier on improving micro skills in communication arts would be helpful when high school students start to pursue their career in the field of communication and mediation after finishing their secondary diploma.

CONCLUSION

There were six micro skills on listening, two for grammar and reading, and one on writing, which is on letter writing that were identified to describe the competence of high school students in an agro-industrial college. The students under study were deficient in six of the micro skills (vocabulary using structural analysis, identifying errors, vocabulary using verbal analogy, correct usage, noting details, and vocabulary using context clues). It is recommended that communication arts teachers should exert efforts to enhance the micro skills in the communication aspect by putting emphasis on vocabulary using word analysis, verbal analogy and context clues and many others as shown in the deficiency of the students.

LITERATURE CITED

Association of Dispute Resolvers (ADR).2009. Flyer on micro skills workshops for mediators. Available at www.leadr.com.au Retrieved, November 2009.

Calmorin LP. 1994.*Educational research and evaluation*. Manila: National Bookstore.

Robles FC.1988. *Developing English proficiency*, Book 1. Sta. Cruz, Manila: Goodwill Trading Co. Inc.

Adler R, Elmhorst J. 2002. *Communicating at work: Principles and practices for business and the professions* (7th ed.). New York: McGraw-Hill College.

`

Dubrin AJ, Geerinck T. 2002. *Human relations: Interpersonal job-oriented skills* (7th ed.). Toronto: Pearson Education Canada.

Jennifer Aguilar Berces *holds a Bachelor of Science in Education, major in English and Master of Arts in Teaching Language Testing from the Catanduanes State Colleges (CSC) in Virac, Catanduanes. She is currently enrolled in the doctoral rogram on educational management from the CSC Graduate School.*

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 35–36 ISSN 2094-2524 (PRINT) ISSN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Promoting the Cabugao School of Handicrafts and Cottage Industries: Vision, mission and programs

Elpidio R. Tuboro[1], Gloria Tabuzo Sorrera[2] & Elvie G. Competente[3]

[1]Vocational School Administrator, [2]Vocational Education Supervisor and [3]Registrar, Cabugao School of Handicrafts & Cottage Industries (CSHCI), Cabugao, Bato, Catanduanes, Philippines

Historical Background

Like all growing schools, the Cabugao School of Handicrafts and Cottage Industries (CSHCI) started from humble beginnings. Late in the 1970s, Mr. Andres T. Torres saw the need for a school that will serve the people of Cabugao and other neighboring villages (or barangay) with quality education that can favorably compare with other schools in the province of Catanduanes.

Subsequently, the late ex-Board Member of the province, Mr. A. Torres, started planning to open up such a school with a vision of helping the youth by instilling in the students the virtues of hard work, self-reliance and a dynamic faith in God and in themselves. In August of 1970, the Cabugao National High School was converted to Cabugao School of Handicrafts and Cottage Industries by virtue of the Appropriation Act of 6130 of the Constitution of the Philippines.

After its creation, the initial enrollment confirmed the belief of its founder that the new school has answered a great need in the community since most of those who were enlisted were not only from Cabugao but from the neighboring places and villages.

After more than three decades of existence, the Technical Education and Skills Development Authority (TESDA) integrated

CSHCI in July 1997. The TESDA Director, Mr. Orlando M. Naag and other officials after having a consultative meeting at CHSCI were instrumental in laying a cornerstone of the new buildings including the provisions for new equipment and other facilities. Shortly thereafter, it was noted that the enrollment had prolifically conceived from 49 students to more than 500 students both secondary and post secondary combined although operating only under the budget for secondary program and a workforce of 33 teachers and non-teaching staff. Additional number of students registered every school year. Owing to the desires of the administration to provide the youth of the entire province the opportunities to develop their skills and prepare for a lifelong gainful occupations, CHSCI offered technically-based courses and hopes to further strengthen it by establishing linkages with industries when they are sent for Dual Training System (DTS) and On the Job Training (OJT).

`

During the academic year 2009-2010, new curricula were introduced after having applied and duly approved by UTPRAS the Competency-Based Curricula and other LEP were implemented the latter being entered into Memorandum of Agreement with the Catanduanes State Colleges giving the students a chance to enroll in the said institution should they opt to pursue their collegiate studies.

The years ahead will see more changes and improvements in terms of it facilities, institutional services and most of all faculty development programs.

As the institution grows, normally expects to expand its services to the community and other towns in the island province of Catanduanes. This means not only will the professional students will benefit but also those out of school youths as there would be a string of livelihood programs offered. Such efforts are intended to provide an avenue for global competitiveness and people empowerment.

Vision. The CHSCI envisions itself as a center of excellence in the development of technically competitive workers imbued with positive values and entrepreneurship spirit, attainment of quality life, economic security, social well-being and personal dignity towards industrialized Catanduanes.

Mission. Develop skilled, creative, productive, and service oriented human resources through relevant technical education and trainings as well as the organization of progressive, empowered and transformed leadership.

Core Business. CSHCI is a training institution whose primary concerns are for the delivery of quality tech-voc education gearing towards economic development through TVET programs such as Competency-Based Curriculum, UTPRAS registered courses and LEP and extension related trainings-CBTED Community Training Enterprise Development. The institution will strive to carry-out the following programs, projects and activities:

1. Registration of other priority courses through UTPRAS (CBC);
2. Strengthen partnership with private sectors/industry and other stakeholders for effective program implementation;
3. Enhance Employee Welfare and Career Development programs and projects; and
4. Establish resources and income generating projects to generate revenues for the institution.

PROGRAM OFFERINGS OF CSHCI

Regular Programs- COMPETENCY-BASED CURRICULUM

Baking/Pastry Production NC II, Food and Beverage Services NC II, Commercial Cooking NC II, Dressmaking NC II, Tailoring NC II, Building Wiring Installation NC II and Welding NC II. Other courses: (1) Year Handicraft Technology, Two (2) Year Drafting Technology, PGMA-TWSP, SMAW NC II (304 Hours).

Short-Term Programs/Community-Based Training. Baking/Pastry Production, Commercial Cooking, Food & Beverage Services, Dressmaking, Tailoring, Welding NC I, Card and Calendar Making, Picture Frame Making, Macrame, Novelty Item Making and Flower Making.

REFERENCE:

CSHCI Institutional Information. Cabugao School of Handicrafts and Cottage Industries. Cabugao, Bato, Catanduanes. (Handout, No date of Printing).

`

Constantino St., Virac 4800, Catanduanes, Philippines

Pacific Island Institute of Catanduanes, Philippines: pioneering on quality research-based education and training

Jimmy T. Masagca[1], Manrico T. Masagca[2], Tersy M. Flores, Lucio M. Flores III and Mark Joe M. Flores

[1]President & In-Charge of Research, Development & Innovations (RDIs), jtmasagca@dasma.dlsu.edu.ph
[2]Chief Executive Officer (CEO) & Finance Officer manrico.masagca@dlsu.edu.ph, Pacific Island Institute for Pedagogy, Technology, Arts and Sciences Incorporated, Constantino Street, Virac 4800, Catanduanes, Philippines

Brief History

Amidst the knowledge-based society, with and against the positive and negative circumstances, academic governance in the Philippines is faced with enormous challenges and opportunities. The era of globalization and the new and emerging technologies available for use in the day to day activities of small Higher Education Institutions (HEIs) and the Local Government Units (LGUs), define quite a complex modality in the delivery of services to its clients and constituents. First and foremost is to let these academic and government officials understand the utmost importance of the fundamental changes and paradigm shifts brought about by the use and application of ICT which require a different tool of analysis. It is asserted that ICT use in academic and LGUs will create different mentalities, attitudes and approaches that will surely lead to major changes in the various developmental programs of the country particularly in the work-life and workplace of the different stakeholders. The notion of how these LGU officials and HEIs relate with the constituents, think and exchange ideas with others in this modern world that we have now, demand a different way of reaching out and interrelating ICT to the recipients of the various functions or services being provided. It appears now that a different scenario or "ecology of governance" in academic institutions and political units in the Philippines does exist.

Vision

To become a nationally and internationally recognized private higher education institution (HEI) with the Bicolano charactersistics, distinguished by outstanding teaching, guiding students or the youth of the province of Catanduanes to the frontiers of knowledge, skills development and the highest standards of academics, research and scholarship.

Mission

PACIFIC TECH seeks to provide students and other clientele with quality, effective, relevant and equitable education distinguished by the best traditions of pedagogy, technology, arts and sciences from the ancient, classical, medieval, modern and post-modern times. It follows a holistic or whole-person approach to teaching and learning which enable its students to think critically, judge intelligibly, care emphatically, and ultimately act responsibly in the changing scenarios of the Bicol Region, the country and the world.

`

PACIFIC TECH Institute or simply PACIFIC TECH (a contracted name of *Pacific Island Institute for Pedagogy, Technology, Arts and Sciences, Incorporated*) thrives as an integral part of the economic, agricultural, industrial, scientific and cultural life of the province of Catanduanes, the Bicol region and the country as well. As a newly-established private higher institution of learning (HIL) it places high premium on the trinity of *Education*, *Culture* and *Language*. Pacific Tech is the first research-based and innovations institution in the province of Catanduanes. With the recent developments in Information and Communication Technology (ICT) and globalization, the need to introduce new and innovative ways in teaching and learning (T &L) becomes clearer when the *"ecology of teaching"* is altered. The Institute believes that these changes in technology have greater and lasting implications in the pedagogical, educative and ethical considerations of educational institutions. Thus, the Institute will help in the attainment of these developmental objectives through its unique curricular programs that are strongly anchored on research & development, innovations (RDIs) and community service.

This Institute was conceived out of the perceived need of a group of educators in a family to respond to the task of providing training and education to the new generations of creative, innovative and God-fearing youth to become highly skilled workers, licensed professionals and knowledge producers and distributors in the select field of *P*edagogy, *Tech*nology, the Arts and *S*ciences (PTECHS). In other words, PACIFIC TECH INSTITUTE is geared towards the training of future Educators, Technologists, Artists and Scientists of the country. Simultaneously, the presence of an active core group of Business leaders, Researchers, Entrepreneurs, Engineers and Dynamic innovators in the roll of faculty (BREED Faculty) with mixed preparations, talents and interests ensures the continuous stimulation and challenge of creating a new "*Ecology of Teaching and Learning @ PACIFIC TECH*". Initially, the Institute will have different development sites in the country, namely: I - Catanduanes; II - Las Pinas City; and III – Quezon City. Each one will have unique features and areas to be pursued as to the felt need of the locality. The school site in Constantino Street in Virac is the microcosm of a small private HIL which will be equipped with adequate facilities to offer the blended approach in T&L, which is a successful approach to integrating technology into pedagogy that combines face to face (f2f) with web-based or internet-based learning in support of the *Transformative Learning General Education Program @ PACIFIC TECH*. This approach will capitalize on developing the research capabilities of students and trainees by allowing students to enroll in Research Methodologies, Research Publications, Critical Thought and Global Citizenship, European and Asian Languages. The varied uses of Technology and synergy with Pedagogy and Science will be the centerpiece of the innovative Approach in Learning-Leisure Ecology, Learning-Research Ecology and Learning-Teaching Ecology called *ALERT PROGRAM @ PACIFIC TECH INSTITUTE.*

The research, teaching, extension and business operation activities of the Institute will be supervised by the President through its Chief Executive Officer & Finance Officer and the RDI Director and Academic-Industry Linkages Director. Two faculty divisions are in operation during the Second Trimester of AY 2009-2010: 1) Faculty Business, Arts, Technology and Health/Human Sciences (BATHS) and Pedagogy, Agriculture, Theology and Holistic Sciences (PATHS).

The presence of a very small core of research workers within the Institute will initiate the development of specialist groups/centers/study centers which will be organized in the next five to ten years. These study centers will create stimulating research facilities or infrastructures for the province that will tackle very specific research commodities, like the:

1. *George Tevar Water Resources Management Study Center for the Local Communities* in Bato, Catanduanes;
2. *Jose Valeza Masagca Initiative for the*

`

Integration of ICT in T & L;
3. *Marcelo N. Mapa & Francisca Valeza Study Center for Science and Technology Education, Early Childhood Education and Children with Disabilities*;
4. *Sylvina Valeza Masagca Study Center for Biodiversity, Island Ecology and Climate Studies* (SVM-BIOCLIMES) in Virac;
5. *Tomas & Sylvina Masagca (TSM) Center for Entrepreneurship, Cooperativism and Indigenous Management Practices Operations* (TSM-CENTIMOS); and
6. *Visitacion Tevar Flora & Fauna Reference Collections & Reading Center for the Local Communities of Catanduanes*.

The educational programs of PACIFIC TECH INSTITUTE are guided by the charisms of St. Vincent Ferrer *(1350-1419)*, who was the leading fourteenth century logician being the proponent of the *Theory of Natural Supposition*. St. Vincent Ferrer deserves more attention proportionate to what other medieval logicians received such as Ockham, Buridan and Burley et al. Serial research papers are now being written by philosophy students to rectify *De suppositionibus* (critical edition was published by John Trentman) by paving a way to make a middle-way between the nominalist and realist logicians in the country and elsewhere in the world.

The organizers of the new Institute have finalized the innovative curricula and the implementation of trimester and quarter terms in the programming of flexible courses with nominal duration. The Trimester Program will run from May 25 to September 5 (Term 1), September 15 to December 21 (Term 2) and January 5 to April 5 (Term 3). The Regional Directors of TESDA (Engr. Conrado Bares, CESO IV), DepED (Dr. Layon Jr.), and CHED (Dr. Francisco Peralta Jr.) have favorably endorsed Institute as a new educational institution which will offer basic education, technical vocational education, undergraduate and graduate courses. For its maiden courses, PACIFIC TECH INSTITUTE will offer the one-year Diploma in e-Business Studies (Bookkeeping NCIII and Programming NCIV), Diploma in e-Entrepreneurship and Small Business Management (Hardware Maintenance NCII), and Associate Degrees in Science, Technology, Pedagogy, Business, Arts and Technology Management. These pre-baccalaureate programs will be proposed during the AY 2010-2011. Classes are expected to begin this coming November 2009 for the short-term and medium term courses. Degree courses recognized by CHED will be offered during the academic year of 2012-2013.

Some institutions are about to provide support to the new Institute, such as Hechanova & Co./Hechanova, Bugay & Vilchez Law Office and the Institute of Studies for Intellectual Property (ISIP). The Galilee Theological College in Quezon City will be supporting the *Bachelor of Arts (BA) in Divinity & Religious Studies*. Several educational institutions and companies are now being tapped for Academic-Industry Linkages Program *(AIL Program @ Pacific Tech)*, such as the University of Perpetual Help, the Galilee Theological College, De La Salle University, AMA Computer University, Pacific Tech Construction, Pacific Tech Electronics, Pacific Tech Solutions, ASM Pacific Tech, and Pacific Tech Fabrics for the Academic-Industry Linkages Programs @ Pacific Tech Institute Incorporated.

In order to achieve something on the notion that research is an integral component of the academic life at PACIFIC TECH, the maiden issue of the refereed journal, *The Pacific Island Journal of Pedagogy, Technology and Synergy* (JPTS) will be launched during the Catandungan Festival this October 2009. Both print and online versions will be available for researchers, faculty and students. They can obtain the full-text materials through the OPEN JOURNAL System of the Public Knowledge Project (PKP) even before its launching date. "Scholars need the means to launch a new generation of journals committed to open access and to help existing journals that elect to make the transition to open access..." (Budapest Open Access Initiative 2002). A

`

seminar-workshop on *Getting Research Papers Published in Refereed Journals* is a regular short course for faculty members of TVIs and HEIs. The objectives of the one-day Seminar for the faculty development program of PACIFIC TECH are as follows:

1. To consider the range of work of faculty attendees that can be published in refereed or peer-reviewed journals.
2. To explain how to get started as a faculty researcher-author.
3. To explain how to avoid the factors that will contribute to failure to publish or better known as immunity to PoP Syndrome.
4. To demonstrate how to plan a publishable paper (participants are required to bring with them a sample unpublished manuscript of a recent research work).
5. To explain how to write the proposed paper for publication in a newly-established refereed journal of Pacific Tech Institute known as *The Journal of Pedagogy, Technology and Synergy* better known as JPTS.
6. To elaborate on how to deal with a refereed or academic journal.
7. To discuss further work on the research topics presented by the participants.

Several researchers, professors, scholars and other specialists are being approached by PACIFIC TECH to support this research publication journal as members of the Editorial Board and referees.

Technology integration in the teaching and learning has been a very significant innovation in the classroom. The advent of "open access" in various schools in the world (such as PACIFIC TECH) and its impact in the T & L necessitates the need for greater attention. Professor Phillip G. Albach, Director of the Center for International Higher Education of Boston College, USA emphatically noted that "the basic argument claims that knowledge should be free to everyone and that the internet permits easy worldwide access" (2008). Although there are several problems with the open access system, schools in the developing world can have great benefits by having unlimited source of knowledge. This offers great opportunity for the newly established school in Catanduanes in trying to catch up with the increasingly dependent face to face classrooms for the projection technology or web-based resources for the teaching of specific subjects at PACIFIC TECH.

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 40–46 ISSN 2094-2524 (PRINT) ISSN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

AGRICULTURE & AQUACULTURE

Status and problems of swine production in northeastern Catanduanes (Philippines)

Manuel I. Torio and Sonia A. Torio

Catanduanes State Colleges Panganiban Campus
Panganiban 4006, Catanduanes, Philippines

Abstract The paper presents the status and problems of swine (hog) production in the northeastern towns of Catanduanes island, Philippines as to size of capital investment, nearness of the project to the public market, number of hogs raised, and the purpose of producing hogs. With the use of a pretested questionnaire, ninety (90) swine producers in the towns of Viga, Bagamanoc and Panganiban were interviewed on the different aspects of swine production and the problems they experience. Results indicate that majority of the swine producers are involved in farm business using 1 to 10 hogs being raised, with capital investment ranging from ten to 15 thousand pesos and with hog raising farms located 31 to 40 meters away from the residence. These findings indicate that swine business is small utilizing few number of hogs, low capitalization and swine farms associated with the dwelling units of the farmers nearer to the public market.

Key words **S**wine, swine production, swine business, Catanduanes, hog production

INTRODUCTION

The industry of swine production provides benefits to the different income level producers. In making this industry a profitable enterprise, a swine producer should know the status and problems of the industry, its advantages and disadvantages and the technical skills required of`11 the swine producer to efficiently and effectively turn meat into profit (Llagas 1989). Good management, proper feeding and sanitation programs are essential for swine (or hogs) from weaning to market weight. It is important for a swine raiser to identify the right market outlet and more importantly, the producer must be acquainted with up-to-date market trends and information on prevailing prices (Escandor et al. 1999).

In the evaluation as to what extent a particular swine project should accomplish, it is indispensable that the project proponent must develop the managerial and operative abilities, acquire fundamental information pertaining to agriculture mechanics and development of abilities in planning and problem solving (Barile et al. 1973). Considering all these premises, it is important that the status of operation in swine production may influence its productivity level. Hence, this study was undertaken in selected northeastern towns of the island province of Catanduanes.

`

METHODOLOGY

The descriptive method was employed using questionnaire as the main data-gathering device. This instrument was supplemented by conducting observations and using secondary data from reports on the economics of swine production in the province. The questionnaire was used to elicit information on financing (capital investment), competence of the project operators, number of years of experience in the business, location, purpose and type of project.

Responses from the questionnaires were summarized, analyzed, interpreted and computed using descriptive statistics. The questionnaire was pre – tested among the swine operators in the northernmost town of Pandan, which was chosen by the researcher as it is the nearest town to the locale of the study. A letter approved by the mayor of the three towns under study was sought prior to the dry run. Two weeks after the pre-test, the post-test was given to same respondents.

RESULTS AND DISCUSSION

Table 1.0 presents the status of the swine production in the north eastern towns of Panganiban, Viga, and Bagamanoc in the province under consideration. The status describes financing, location of the pig farms, type as to the number of hogs and purpose of undertaking the swine business.

Financing. Ten or 33.34% of the swine farmers in Panganiban has a capital ranging from P10,001 – P15,000; 8 or 26.67%, P15,001 – P20,000; 6 or 20%, P5,001 – P10,000; 2 or 6.67%, P5,000 or less and 1 each with P20,001 – 25,000; P25,001 – P30,000; P30,001 – P35,000, and P35,001 and above.

For swine farmers of Viga, 8 or 26.67% has a capital ranging from P10,000- P15,000; 6 or 20%, P5,001- P10,000; 5 each or 16.67% with P15,001- P20,000; and P35,000 up; and 1 each (3.33% with a capital of P5,000 or below and P30,001- P35,000. Of the thirty respondents in Bagamanoc, 8 or 26.67% finance the swine project in the amount ranging from P10,001- P15,000; 7 or 23.34% with P20,001- P25,000; 4 each (13.33%) with P5,000 or less and P15,001- P20,000; 3 or 10%, P25,001- P30,000; 2 or 6.67%, P30,001- P35,000; and I each (3.33%) with P5,001- P10,000; and P35,000 and above.

Project Location. Considering the distance of the project to the market, 10 each (33.33%) of the swine growers in Panganiban have swine project about 21- 30 meters and 31- 40 meters respectively; 3 each (10%) with pig house adjacent and fifty meters from the market; and 2 each (16.67%) with project location 10- 20 meters and 100 meters distance from the market.

For Viga, 11 (36.67%) have hog projects which are 31- 40 meters from the house; 8 (26.67%), 10- 20 meters; 4 (13.33%), 50 meters; 3 (40%), 21- 30 meters; and 2 each (6.67%, adjacent and 100 meters from the house.

Thirteen (43.33%) of the respondents from Bagamanoc have hog project 31- 40 meters from the house; 6 (20%), adjacent the house and 10- 20 meters from the house respectively; 3 (10%), more than 100 meters; and 1 (3.33%), 50 meters away from the house.

Type and Purpose of Undertaking the Project. As to the type of the swine business, 25 or 83.34% of the respondents in Panganiban owned a small farm with 1- 10 hogs raised. Four or 13.33% are involved in medium farm business (11-20), while only 1 or 3.33% owns a large farm with 21 or more hogs. In terms of the purpose of the project, 20 or 66.67% combined fattening and breeding. This means that majority of the

`

respondents raise both fatteners and breeders (sow/boar) simultaneously. Seven or 23.33% prefer to raise either boar or sow for breeding/weanling production; and 3 or 10% are involved in fattening.

For the hog growers in Viga, 19 or 63.33% own a small farm; 8 or 26.67%, medium farm; and 3 or 10%, large farm. Fourteen or 46.67% are involved both in fattening and breeding; 11 or 36.66%, breeding/weanling production; and 5 or 16.67% in fattening or meat production.

Twenty three (23) or 76.66% of the respondents in Bagamanoc own a small farm; 5 or 16.67%, medium farm; and 2 or 6.67%, large farm. Twelve or 40% of the respondents raised fattening hogs; 10 or 33.33% combined fattening and breeding and 8 or 26.67% venture in breeding/weanling production.

Table 1.0 Status of swine production in the northeastern towns of Catanduanes, Luzon

Aspects of the Status of Swine Production	Panganiban		Viga		Bagamanoc	
	F	%	F	%	F	%
1.0 Financing						
5,000 – or less	2	6.67	1	3.33	4	13.33
5,001 – 10,000	6	20.00	6	20.00	1	3.33
10,001 – 15,000	10	33.34	8	26.67	8	26.67
15,001 – 20,000	8	26.67	5	16.67	4	13.33
20,001 – 25,000	1	3.33	2	6.67	7	23.34
25,001 – 30,000	1	3.33	5	16.67	3	10.00
30,001 – 35,000	1	3.33	1	3.33	2	6.67
35,001 – up	1	3.33	2	6.67	1	3.33
	30	100.00	30	100.00	30	100.00
2.0 Project Location (Distance from the Market)						
Adjacent the market						
10 – 20 meters from the market	3	10.00	2	6.67	6	20.00
21 – 30 meters from the market	2	6.67	8	26.67	6	20.00
31 – 40 meters from the market	10	33.33	3	10.00	0	
50 meters from the market	10	33.33	11	36.66	13	43.33
100 meters from the market	3	10.00	4	13.33	2	6.67
	2	6.67	2	6.67	3	10.00
	30	100.00	30	100.00	30	100.00
3.0 Type of Swine Business						
Small farm (1-10 hogs)	25	83.34	19	63.33	23	76.66
Medium farm (11-20 hogs)	4	13.33	8	26.67	5	16.67
Large farm (21-or more hogs)	1	3.33	3	10.00	2	6.67
	30	100.00	30	100.00	30	100.00
4.0 Purpose of Undertaking the Swine Business						
Pork/Meat Production						
Breeding/Weanling Production	3	10.00	5	16.67	12	40.00
Combination of breeding & fattening	7	23.33	11	36.66	8	26.67
	20	66.67	14	46.67	10	33.33
	30	100.00	30	100.00	30	100.00

`

Problems Encountered in Swine Business

The problems being met by the swine producers in the selected towns include the high cost of stocks, commercial feeds and biologics (very moderate problems). Majority of the swine farmers encountered mild problems like shortages of feeds, high mortality rate, inadequate number of extension workers, lack of credit facilities, poor market system, poor nutrition, pests/diseases, unstable peace and order condition, poor location, lack of transportation facilities, poor access to electric power, inadequate water facilities, lack of support from LGU, lack of manpower resources, and poor waste disposal.

Swine production offers several entrepreneurial opportunities. It can be integrated into different farming systems. As prolific animals, hogs or swine have relatively short gestation period that poses greater advantage for farming or meat production. However, as noted in the study, high cost of commercial feeds and biologics will certainly influence the overall swine production if these areas are not controlled. Aside from improving human nutrition, swine production can be diversified and ultimately augment income as it is a good sideline (Dagom 1990) among Filipinos. As revealed in the small capital investment of the swine producers of the said towns under study, increasing capitalization will directly increase incomes of swine producers, that is why support initiatives on increasing capital through bank support systems and provisions including microfinancing schemes for the swine producers are urgently needed.

The present study discovered almost similar problems as reported by Llagas (1989). The said study revealed several problems such as shortage of feeds, high mortality rate, lack of qualified veterinarians and animal technologist, lack of credit facilities, poor farming system, high cost of breeding and reproduction, and unstable peace and order situation. Dimaculangan & Montealto (1999) assert that the data to be collected in swine production largely depends on the pre-set target and the purpose of the enterprise. It is obvious that only those data which are relevant to the production system should be collected. As considered in the present inquiry, some aspects of financing and proximity of the swine project to the market where the produced meat will be sold are highlighted.

In order to produce profitably, the swine producers are expected to consider the details related to the management practices find immediate solutions to technical and operational problems and be able to project a good strategy for marketing scheme and product outlets. The technical parameters and the financial gains in raising the animals must be attended to. It is on this premise that the present investigation would describe the status of swine industry in the island province of Catanduanes located in the typhoon highway of Luzon, Philippines. The overall intent is to contribute in the improvement of swine industry in the province in order to increase income.

Knowing the economics or the status of swine industry of Catanduanes offers a challenge and suggests potential avenues for expanding the swine business. The paper provides information for policy and economic planners in their formulation of development strategies and production programs for the industry. Further, this study may serve as the basis for future investigations, the evaluation and realization of the objectives of the swine industry and discovering flaws/threats as gauge for future improvement.

Basic research studies are constantly seeking adjustment between production efficiency

`

and economic values in swine production. These discoveries contribute to an improved understanding of the general economic agreement that is sought in useful type by the producer and the consumer (Hunsley et al., 1978).

There were four major problems noted in the study, namely: high prices of poultry feeds, shortage of breeding stocks and feeds, outbreak of parasites and diseases and lack of government support.

On the implications of this inquiry of swine production in the province as to project management to the input-output analysis of agricultural projects in a state college, the need to consider the cost and return ratios of swine projects is recognized. These ratios as discovered in previous studies could be influenced by the quality and kinds of inputs that are injected into the projects. Contradicting to a report on the viability of agricultural projects, the limited pasture area should not be a deterrent to any future venture but to device ways on how pasture areas can be maximized for animal production. The lack of market potentials in the service area as noted in the said study of De Leon (1988) should not also hinder the development of swine production in the northeastern towns under study. Such predicament nevertheless appears to be nonexistent at the present time noting the greater demand for swine products in the province and elsewhere in the country.

What remains to be done now are the unsolved problems encountered by projects manages indicate that swine producers in the towns studied are to be completely attended so as to improve production. Problems on supply of inputs and the biologics have to be solved. Unlike in agricultural projects of state colleges, privately owned swine projects can easily solve problems about lack of supplies and materials by looking into the appropriate timing or time line in procuring swine farming inputs for the short gestation period of hogs or swine.

CONCLUSION

Based on the results presented, swine farmers have low capitalization in financing their swine production business involving a small number of hogs per pen. These swine business projects are found near the maket and possibly their dwelling units as known from the proximity of the animal farm lots. Problems of the swine farmers are not serious focusing only on the high costs of swine farm inputs like animal seeds, feeds and veterinary medicines to eradicate diseases.

LITERATURE CITED

Alcachupas RC. 1986. An Economic Analysis of Poultry Production in the Philippines. *Terminal Report. Bureau of Agric. Econ.* – PCARR Project, 1986.

Dagom JD.1990. *Poultry, swine and goat production.* Rex Bookstore: Manila, Philippines.

Dorado RB. 1985. The economics of poultry industry in Laguna. *B.S. Thesis*. University of the Philippines, College of Agriculture (UPCA) Los Baños, Laguna.

De Leon LP. 1985. The input – output analysis of agricultural projects in the Catanduanes State Colleges: its implication to project Management. *Unpublished Master's Thesis*, CSC Graduate School, Virac. Catanduanes.

Dimaculangan M, Montealto B.1999. Basic pigkeeping manual, Book 5. Department of Agricultural Training Institute (ATI).

Escander MC, TB Buizon.1999. Basic pig keeping manual, Book 3 Rearing periods and fattening period. Dept. of Agriculture Agricultural Training Institute (ATI).

Hunsley R, Beeson WM, Novdby JE.1978. *Livestock judging, selection and evaluation*. The Interstate Rinters and Publishers, Inc. Danville, Illinois, Second edition.

Llagas AT.1989. Agriculture and fishery technology. Animal Production Instructive Materials Corporation, Brookman, Inc. Philippines.

Milaflor L, Lewellie K. 1999. Building your farm. Department of Agriculture. Agriculture Training Institute (ATI).

`

Montealto BJ. 1999. *Deduction planning, farm recording and economics.* Science Industry. Department of Agriculture. Agriculture Training Institute.

Rojo LV, Villanueva C. 1998. *Business Management III*. Adriana Printing Co., Inc. Philippines.

Sison M, Equia A, Inciong L.1999. Pig keeping manual, Book I: replacement stock. Department of Agriculture, Agricultural Training Institute (ATI).

Swine Directory Manual. 1995. International Training Center on Pig Husbandry Foundation, Inc. Philippines.

Madrona RL.1996. The income sources of Bicol University: Status and Prospects. *Unpublished Doctoral Dissertation* Bicol University Legaspi City.

Dr. Sonia A. Torio *holds a doctoral degree in Education (Educational Management), a master's degree Agricultural Education and a bachelor's degree in Agriculture (Major in Agricultural Education, minor in Agronomy). She is currently an Associate Professor 5 and the former Agriculture Department Chairman Designate and the Local Research Coordinator of Catanduanes State Colleges (CSC) Panganiban Campus, Panganiban, Catanduanes. Her research studies include: "THE EFFECTS OF VARYING LEVELS OF DECOMPOSED RICE HULL ON THE GROWTH AND YIELD OF MUSKMELON UNDER LOCAL CONDITION" (2001), "EFFECTS OF THE RATE OF SEEDING ON THE YIELD AND AGRONOMIC CHARACTERS OF CUCUMBER" (2002), "YIELD RESPONSE OF F1 CABBAGE CULTIVAR TO VARYING AMOUNT OF MIXED UREA AND COMPLETE FERTILIZER" (2004), "CULTURAL MANAGEMENT AND PRODUCTION PERFORMANCE IN RICE FARMING OF GRADUATES OF CSC PANGANIBAN CAMPUS (2003) , "EFFECTS OF DIFFERENT MULCHING MATRIALS ON THE GROWTH AND YIELD OF WATERMELON UNDER LOCAL CLIMATE CONDITION" (2004). Dr. Torio advised 12 undergraduate theses on different topics and sat as Chairperson of Theses Defense Panel at CSC Panganiban Campus, Panganiban, Catanduanes.* ***Manuel I. Torio*** *is a holder of a degree of Master of Arts in Education (MAEd) major in Mathematics and a Bachelor of Science in Education, major in Physics, minor in Mathematics. He is currently an Assistant Professor 2 at CSC Panganiban Campus, Panganiban, Catanduanes. His research works are on the "EFFECTS OF VARYING LEVELS OF DECOMPOSED RICE HULL ON THE GROWTH AND YIELD OF MUSKMELON UNDER LOCAL CONDITION" (2001) and "EFFECTS OF THE RATE OF SEEDING ON THE YIELD AND AGRONOMIC CHARACTERS OF CUCUMBER" (2002). Asst. Prof. Torio is the Statistics consultant and provides data analyses and computational needs of undergraduate theses students and research staff of CSC Panganiban Campus.*

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 47– 50 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

RESEARCH NOTE

Preference of the Philippine green mussel ("Tahong"), *Perna viridis* L. on Abaca or Manila hemp (*Musa textilis*) as substrate for larval settlement in outdoor experiments

Jimmy T. Masagca[1] and Nora I. Alarcon[2]

[1]*De La Salle University-Dasmarinas (DLSU-D), Cavite 4116, Philippines and Pacific Island Institute for Pedagogy, Technology, Arts and Sciences, Incorporated (Pacific Tech), Virac 4800, Catanduanes, Philippines*
E-mail: jmasagca@yahoo.com
[2]*Science Department, Imus Institute, Cavite 4116, Philippines*
**Portion of a Master's thesis submitted to the Graduate Studies program at DLSU-Dasmarinas, Cavite 4116, Philippines*

Abstract This outdoor tank experiment was carried out in the green mussel ("tahong"), *Perna viridis* L. to determine the effects substrates and hydrodynamics (i.e. turbulence) on its larval settlement using abaca or Manila hemp (*Musa textilis* Nee), nylon and bamboo poles. The substrate with abaca fibers was preferred by the larvae of *P. viridis* L. stocked in cemented circular tanks provided with aeration, recirculating and non-recirculating systems to simulate two sets of hydrodynamics. Whether the improvised substrates (made of nylon, abaca fiber and bamboo) were placed from the upper level or to the bottom level of the tanks, larval settlement was not influenced or affected so far.

Key words Larval settlement, green mussel (Tahong), *Perna viridis*, abaca (*Musa textilis*), substrate, reproductive strategy.

The concept of reproductive strategy refers to a complex system of adaptation related to reproduction (Kasyanov 2001). This is a set of behaviors which have evolved to maximize reproductive success. This study which focuses on reproductive strategy investigated one of the most important food mollusks in the Philippines, the green mussel, *Perna viridis* L. locally known as "tahong". This popular food mollusk is extensively cultured in the Philippines (Yap 1997) and it would be prudent to carry out researches on its reproductive strategy from the view of reproduction and developmental energy propounded by several workers like Christiansen & Frenchel (1979) and Todd & Doyle (1981).

As emphasized by Kasyanov (2001), the aforementioned authors have demonstrated that the ecological condition of larval settlement is a factor in reproductive strategy.

Numerous decades of handpicking bivalves and years of dredging the coasts produced signs of depletion in the early 1960's. Walz (1992) had observed that the beginning of the mussel industry in 1955 in the Philippines was followed by a stock depletion in the 1960's due to pollution. It appears now that the green mussel, *P. viridis* L. might be

`

commercially threatened, and thus further studies are needed about the reproductive biology anchored on the evolutionary ecological approach. This could be supplemented with the morphological aspects of reproductive strategy and the ecological characters in the context of larval energetic, cohorts, settlement and recruitment.

Recruitment is one of the main processes governing the temporal fluctuations and the spatial structure of adult populations (Ellen 2004). Hence, the need to understand more about larval settlement and post-settlement would be significant in describing saturation of habitat population among the bivalves. While numerous studies are available about larval supply, fewer studies on larval settlement and post-settlement processes are available. Olafsson et al. (1994) noted that the relative importance of these processes in soft sediments is unclear. The notion that reproductive output is site related requires further study and thus more inquiry is needed to fully understand the settlement process (Seed & Suchanek 1992). Then appropriate materials to be used in larval settling during larval and juvenile rearing of bivalves clearly suggest further studies that will generate empirical date supportive to the concept of reproductive strategy. This concept is analogized to the old concept of Game Theory (Marchi & Hansell 1973).

It is well known that the duration of the pelagic stage of bivalves depends on the temperature, availability of food to larvae; and in the late period of pelagic life, which is the availability of a suitable substrate for settling (Kasyanov 2001). Among the bivalve mollusks, such as *P. viridis* L. the search for a place to settle involves a set of behaviors loosely referred to as the reproductive behavior. This behavior may also be termed as the reproductive strategy of larvae of bivalves found in the marine environment. In the period of settling, the larva tests the substrate for its physical properties such as texture, color, exposure to light and spatial disposition. Studies indicate that settling process is related to the nature of substrate and the hydrological conditions. It is still unclear whether settling proceeds better in water bodies with low or flowing rates. Compared to the settling of larvae on hard substrates, settling on soft substrates has been little studied so far, thus this study was undertaken.

The study adopted the design used in agricultural investigations. Although aquatic based experiments differ in many instances with that of the terrestrial-based studies, it was very necessary to adopt a research design popularly used in plot experiments of plant growth and development, particularly on the effects of fertilizers and hormones.

The search for the most appropriate research design was done during the standardization phase or pre-trial or pre-experimental runs. Several runs were undertaken, such as the use of adults spawning and juvenile samples of *P. viridis* L., but mortalities were extremely high. Owing to the high cost of outdoor marine research, the experiment used *P. viridis* L. larvae obtained from the mussel farms in Cavite instead of the spawners as sources of the larvae in two outdoor rectangular tanks.

The Split -Split Plot design was used in the present study. This design allows subjects to be assigned at random to a set of treatments or factors. Then those are also subdivided into subunits to which another set of treatments are applied. Those in turn are subdivided again and a third set of treatments are applied (Rao 1998). This type of design includes three or more factors being experimented on, wherein different levels of provision for the factors are evaluated.

`

The experiment was designed to investigate possible effects of the two types of experimental tanks with re-circulating and non-recirculating water systems. The split-split plot design was used in the study consisting of 3 replicates (3 experimental runs or trials). The main plot adopted two types of hydrodynamics, with a) circulating and b) non-recirculating water systems. These two types of water systems are synonymous with the flowing and still water systems for fish weight gain experiments (Rao 1998). The subplot adopted three types of materials used in the improvised substrates for spat settlement: a) nylon, b) abaca, and c) bamboo. Moreover, the subplots were again given three types of placement, namely: a) upper, middle, and c) bottom.

Two hundred (200) *P. viridis* L. larvae were stocked in each tank containing the different substrates placed on different levels. The number of larvae that settled in the different substrates over the next 72 hours was determined. This was carried out by counting the number of *P. viridis* L. larvae m in the improvised substrates on an hourly basis until the 16th hour (Time 16). It was observed during the standardization runs and even during the actual experimental runs that on the 12th hour or Time 12, settlement started to occur and on the 16th hour or T16, settlement was observed to have stopped. However, observation on the number of larvae that settled was extended until the 72nd hour Time 72.

P. viridis L. larvae (shell length = 1.2 cm to 1.5 cm) were manually collected by bivalve workers from the mussel farms (owned by Mr. Rafael Gasconia in Bacoor Cavite, Philippines (14˚28 min N, 120˚ 54 min E). To reduce handling stress, the experimental animals were not weighed for this experiment. The animals were acclimatized in seawater placed in styrophore box (volume= 30 gallons or 113.50 liters) box for 3 to 5 hours. The 200 *P. viridis* L. larvae were randomly selected from the handpicked representative animals and used for this experiment.

Improvised substrates made of nylon (*Ny*), abaca (*Ab*) fibers, *Musa textilis* and bamboo, *Bambusa affinis* were prepared. Each improvised substrate made of different materials had a total length of 15 cm and approximate diameter of 3 cm. Figure 2 shows an illustration of the improvised substrate containing the 3 different materials. The materials were attached to a solid bamboo pole. Distance from one material to another is 15 cm. The individual substrates were tied on the bamboo pole placed horizontally using nylon and abaca ropes. A combination of abaca and nylon ropes was used for hanging and scaffolding. Figure 3 illustrates the set up of the experiment. Both nylon and abaca ropes tied on the bamboo poles at the top of the rectangular tanks were used to hold or scaffold the 3 sets of improvised substrates. A small bamboo was used to hold the 3 types of substrates placed or hanged at different levels or height. The upper level set up was positioned at 60.5 cm above the tank floors and the bottom setup was 2 cm above the tank floor (not touching). The middle level placement was situated just in between the two set ups.

The placement as to the different levels of the substrates was included in the study to find out possible preference of the *P. viridis* L. larvae in the depths to compare settlement success. During each experimental run (replicate), the improvised substrates were hung two days prior to the start of the observation period which lasted for 72 h. After which, the tanks were cleaned and the substrates were brushed and dried under the sun for the next runs.

This study was carried out in the green mussel ("*tahong*"), *P. viridis* L. to determine the

`

effects of hydrodynamics (i.e. turbulence) and nature of substrate on its settlement using improvised substrates. Improvised substrates made of nylon, abaca and bamboo were hung in three different placements/levels (upper, middle, bottom) in two outdoor rectangular cemented tanks (one was equipped with a submersible pump to stimulate a recirculating/flowing system while the other was only aerated to stimulate a non-recirculating or still water system). The split-split plot design replicated three times (experimental runs or trials) was used as an experimental design in the study. A total of 200 *P. viridis* larvae were stocked in the tanks during the experimental runs over a 72-hour observation period.

Results show that the type of substrate most preferred was abaca ($p>0.05$). The mean value of the larvae that settled in the nylon material was almost the same as the bamboo substrate (6.56), while the abaca material (9.22) was much greater. This result implies that the abaca is the most preferred material for larval settlement compared to nylon and bamboo. There exists an interaction between the hydrodynamics and re-circulating system. In general, water turbulence process could have influenced the larval settlement process in *P. viridis* and can proceed better in flowing water rather than still water bodies under outdoor conditions. The nature of material of the substrates alone had the main effect during the experiment. The larvae significantly preferred abaca substrate compared to the others. Whether the improvised substrates were placed from the upper level or to the bottom level of the tanks, larval settlement was not influenced or affected so far.

The study concluded that *P. viridis* L. larvae preferred the abaca substrate during its settlement under outdoor tank experiments both in recirculating and non-recirculating system.

On the side of technology development and transfer, the results can guide mussel farmers to shift to the use of abaca as substrate and in turn engage crop farmers to plant more abaca in support of the needs of mussel farmers in the country particularly in the province of Cavite. The need to carry-out further studies on larval settlement in glass aquaria and in field experiments located in mussel farms is clearly recognized. Ω

Figure 1. *Perna viridis* settling on the 3 types of substrates (nylon, abaca rope and bamboo) for an outdoor tank experiment on larval reproductive strategy.

LITERATURE CITED

Christiansen FB, Frenchel T.1979. Evolution of marine invertebrate reproductive patterns. *Theoretical Population Biology*, 16: 267-282.

Ellien C, Thiebaut E, Dumas F, Solomon J, Nival P.2004. A modeling study of the respective role of hyrdrodynamic processes and larval mortality on dispersal and recruitment of benthic invertebrates: example of *Pectinaria koreni* (Annelida: Polychaeta) in the Bay of Seine (English Channel). Journal of Plankton Research, 26(2):117-132.

Kasyanov VL.2001. *Reproductive strategy of marine bivalves and echinoderms*. Science Publishers, Inc. Enfield, NH, USA.

Marchi E, Hansell R.1973.Framework for systematic zoological studies with game theory. *Mathematical Bioscience*, 16:31-58.

`

Olafsson EB, Petersen CH, Ambrose WG.1994. Does recruitment limitation structure populations and communities of macro-invertebrates in marine sot sediments: the relative significance of pre- and post-settlement processes. *Oceanography and Marine Biology Annual Review*, 32:65-109.

Rao RR, Abruzzese E, Buss D.1996. Fish weight gain. *Journal of Marine Biology*, 28:53-55.

Seed R, Suchanek Th. 1992. Reproductive biology of *Mytilus edulis*. *Journal of the Marine Biological Association of the United Kingdom*, 8:1-10.

Todd ChD, Doyle DW. 1981. Reproductive strategy of marine invertebrates: a settlement timing hypothesis. Marine Ecology Program Serials, 4:75-83.

Walz N. 1992. Ecological equilibrium of bivalve populations. Journal of Shellfisheries Research, 11:241.

Yap WG. 1978. Settlement preference of the brown mussel, *Modiolus metcalfei* Hanley and its implication on the aquaculture potential of the species. *Fisheries Research Journal of the Philippines*, 3(1):65-70.

Dr. JT Masagca *was a recipient of various scholarships and fellowships (PASUC Scholarship at DLSU Manila, SEAMEO SEARCA Training at UP in Los Banos & Kasetsart University, Thailand, SEAMEO BIOTROP Long Term Research Fellowship in Bogor, Indonesia and the most recent scholarship online training course on school leadership in SE Asia). He received the International Research Award Publication from 2006 to 2009 from DLSUD Annual Faculty Recognition Program.* ***Nora Alarcon*** *is a faculty of the Imus Institute in Cavite, Philippines and currently the head of the Science Department. She received her Diploma in Teaching (Biology) from the University of the Philippines OPEN University and a Master of Science in Biology from De La Salle University in Cavite, Philippines.*

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 52–60 ISSN 2094-2524 (PRINT) ISSN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Enhancing home farming through optimized use of commercial fertilizers for pole snap beans, *Phaseolus vulgaris*

Sonia A. Torio

Catanduanes State Colleges Panganiban Campus
Panganiban 4006, Catanduanes, Philippines

Abstract Home farm lots are being used to produce food for many Filipinos. Among the legumes, pole snap beans (*Phaseolus vulgaris* L.) are popularly prepared for soup, stew or baked beans. The need to optimize the use of commercial fertilizers to enhance home agricultural production, trials of fertilizing the soil in simulated home farm lots to produce the said beans was carried out in a 160 m² experimental lot in Panganiban, Catanduanes. A total of 50 gms of *P. vulgaris* and 9.6 kgs of complete fertilizers (14-14-14) were applied in the experimental lot following Randomized Complete Block Design (RCBD) with 4 treatments and replicated 4 times. Different treatments were used (TA-no fertilizer, TB- 0.4 kg/plot, TC- 0.8 kg/plot and TD- 1.2 kg/plot) and pole snap beans were sowed directly on the plots prepared following standard agronomic or agricultural methods. Treatments were applied twice and after 75 days the pods were harvested. The number and length of pods were determined after the experiments and results were compared as to treatments. Results show that TC (0.8 kgs/plot or 400 kg/ha) obtained the highest mean pod harvest of 4.46 kgs/plot or estimated to be 4.46 tons/ha. TC also showed the longest pods reaching to 12.27 cm compared to TB (0.4 kgs/plot or 200 kg/ha) with only 11.32 cm. The treatments used in the study have exerted influential effects in all the parameters. It is recommended that in optimizing the use of commercial fertilizers to use any of the three levels of complete fertilizer (14-14-14) as it proved influential on yield and its components using only at least 0.8 kg/plot.

Key words *Phaseolus vulgaris*, snap beans, fertilizers, home farm lots

INTRODUCTION

Pole snap beans (black seeded) (*Phaseolus vulgaris*) are basic food market which are found in many parts of the world. In the Philippines, home farming of this variety of bean is increasingly becoming popular among households in home farm lots to produce food for the family. In many parts of the world, this bean is prepared as soup bean, stewed bean, baked bean, coconut milked bean, etc. In temperate regions the green immature pods are cooked and eaten as a vegetable. Immature pods are marketed fresh, frozen or canned, whole, cut or French-cut. Mature ripe beans, variously called navy beans, white beans, northern beans, or pea beans, are widely consumed. In lower latitudes, dry beans furnish a large portion of the protein needs of low and middle class families. In some parts of the tropics leaves are used as a pot-herb, and to a lesser extent the green-shelled beans are eaten. In Java, young leaves are eaten as a salad. After beans are harvested, straw is used for fodder.

`

On the medical value of beans, many are said to be used for acne, bladder, burns, cardiac, carminative, depurative, diabetes, diarrhea, diuretic, dropsy, dysentery, eczema, emolient, hiccups, itch, kidney, resolvent, rheumatism, sciatica, and tenesmus. A recent study of Celleno et al (2007), examines a dietary supplement containing 445 mg of *Phaseolus vulgaris* extract derived from the white kidney bean, previously shown to inhibit the activity of the digestive enzyme alpha amylase, on body composition of overweight human subjects. In other varieties, the green snap beans contain 6.2% protein, 0.2% fat, and 63% carbohydrate. Analysis shows that the vitamin contents of the dried beans are: thiamine, 0.6; riboflavin, 0.2; nicotinic acid, 2.5; and ascorbic acid, 2.0 mg/100 (Celleno et al. 2007, Stephens 2009).

Raw immature pods of green, and yellow or wax snap beans are reported to contain per 100 g, 32 and 27 calories, 90.1 and 91.4 g moisture, 1.9 and 1.7 g protein, 0.2 g fat, 7.1 and 6.0 g total carbohydrate, 1.0 g fiber, and 0.7 g ash, respectively. Raw pods of kidney beans contain (per 100 g edible portion): 150 calories, 60.4% moisture, 9.8 g protein, 0.3 g fat, 27.8 g total carbohydrate, 2.3 g fiber, 1.7 g ash, 59 mg Ca, 213 mg P, 3.6 mg Fe, 10 □g vitamin A, 0.38 mg thiamine, 0.12 mg riboflavin, 1.5 mg niacin, 7 mg ascorbic acid (http://edis.ifas.ufl.edu).

Cultivation of *P. vulgaris*. In temperate areas, seeds are planted about the same time as corn, when soil has become warm. Germination is rapid at soil temperatures above 18°C. In pure stands, bush cvs give good yields at 30 by 30 cm spacing, but wider spacing facilitates weeding. Pole beans are usually planted 4–6 seeds in hills spaced about 1 m apart at a seeding rate of nearly 80 kg/ha. Seed rates are 20–115 kg/ha depending on the cv, seed size, and width of row; 'Red Kidney', 'Marrow', and 'Yellow Eye' at 75–100 kg/ha; 'Pea Beans', 'Black Turtle Soup', at 30–40 kg/ha; row widths 70–75 or 80 cm. Some pole beans are sown at rates as low as 25 kg/ha. Seed of good quality is essential for production of dry beans. Susceptibility to diseases, mechanical injury, frost damage, and wet weather damage at harvest time, and cracked seed coats should be considered. With a corn, bean or beat drill with removable plates, beans are usually planted 5–8 cm deep, deep enough to give good coverage and sufficient moisture to promote fast germination and growth. Plants should be cultivated to control weeds; care should be taken late in the season to avoid injuring roots extending out between the rows just beneath soil surface. Inoculation of seed with nitrogen-fixing bacteria is unnecessary for dry beans. Beans should be rotated with other crops to maintain high yields and quality and to reduce the hazard of diseases which may survive in the soil or on plant refuse in the soil. In the tropics beans are often inter-planted with such crops as coffee, corn, cotton, sweet potatoes, and little or no fertilization is employed, although the plant does respond to nitrogen. Still, as much as 25 MT/ha barnyard manure is recommended. In the US applications of nitrogen and phosphate are applied. Irrigation is beneficial in semiarid regions, with overhead preferred to flood irrigation. Mixtures of cvs are often sown. In Latin America, ca 70% of the beans are inter-planted with corn. Grown alone, they are planted at 200,000–250,000 plants per hectare in 50 cm rows with 5–10 cm between seed. Bush beans are planted 30 x 30 or 50–60 x 5–10 cm, the latter permitting easier cultivation. Latin American bean production is mainly on marginal soil, nearly always with P deficiency, commonly with N problems as well.

The use of organic and inorganic fertilizers in farming. An important feature of enhancing home agricultural production (i.e. vegetable

`

production) is the application of organic and in organic fertilizers. It is known that home gardeners must be knowledgeable on the kind, amount and correct use of these fertilizers to avoid wastage. Generally, the aim of any fertilizer application is to provide the crops with enough of the essential nutrients to facilitate crop growth. In order to provide proper balance of the nutrients, other kinds of fertilizers containing the essential and trace elements should be made available for optimum plant growth and development (Llagas 1989).

Inorganic or commercial fertilizers are necessary to furnish limiting elements in the most economical manner and to maintain proper ratios of the nutrients for the particular crop being grown. Mc Collum (1975) contended that commercial fertilizers can be added to the soil with a particular purpose of directly increasing the amounts of available nutrients for immediate use of the plants.

The snap or kidney beans, *Phaseolus vulgaris* may be grown on soils that range from sandy to clay and peat. Most growers prefer to use soils which are well-drained, fairly fertile loam containing humus. Because it is least responsive to the application, a moderate amount of complete fertilizer may be applied (Villanueva 1997). Considering the effect of complete fertilizer to crops, the researcher posed to find out whether the varying levels of complete fertilizer (14-14-14) would influence the yield and agronomic characters of pole snap beans.

The production of snap beans can be considerably increased if the cultural requirements and approved practices are satisfied and satisfactorily met. One common cause of low crop yield is poor and depleted soil. However, this problem could be remedied through soil amendments or the incorporation of organic and inorganic materials into the soil. It is a common fact that fertilizer has an evident effect on the quality of the crop, makes the plant grow well and become resistant to pests and diseases. Likewise, Mc Collum (1975) reported that no soil without additive or the use of commercial fertilizer can provide that right fertility for all types of vegetables. Nutrients not found in organic matters may be supplied by commercial fertilizers for immediate use by the plants.

Snap beans can be classified as vegetable which is least responsive to the application of fertilizers. An optimum amount of complete fertilizer high in phosphorus may be applied for better plant growth and higher in crop yield. Based on this premise, this study was conceived.

Like any other short season crops, legumes need various nutrients for their growth and development. Their positive response to fertilizer application is influenced by time and season of planting and fertility of the soil (Mendiola 1970). McCollum (1975) stated that excessive nitrogen should be avoided for legume crops since this element may increase vine growth at the expense of pod production and may interfere with mechanical harvesting. Moderate amount of complete fertilizer high in phosphorus is best for beans mature in a shorter time on sandy soils than on heavier soils. High moisture content and high nitrogen delay maturity. It was claimed further that on poor soil cowpeas require 200-300 pounds of 5 – 10 – 5 or some similar complete fertilizers as these will materially increase production.

Villanueva (1991) cited that the fertilizer requirement of pole snap beans using 12-24-12 fertilizer is 300 – 500 kg/hectare which can be applied in liquid form from a minimum of 2.7 – 4 tsp/plant to a maximum of 4-6 tsp/plant. Later, Villanueva (1997) reported that for good crop yield, fertilizers which are

`

applied to the soil must be of two kinds: the organic and inorganic. Inorganic (commercial fertilizers) must be applied to the plants with great care to avoid plasmolysis which is the result of too close application to the base of plants or over use of fertilizers. Slyke (1982) pointed out that it is safer to make 2 or 3 light top application of fertilizer for continuous growth of plants and for safeguarding the possible destructive effect of heavy grains. Bunoan (1982) recommended the use of organic fertilizer because of its beneficial effects on the soil. However, it could be more effective if combined with inorganic fertilizer because of its low nitrogen, phosphorus, and potassium content to meet the satisfactory nutrient requirements of most crops. He suggested further that organic fertilizer must be incorporated into the soil, hence basal application for most crops is required to attain better results.

In other plants, Castillo (1982) stated that cucumber requires 20 lbs. of nitrogen per acre for dark colored soils and 45 lbs. per acre of nitrogen for light colored soils. Day (1990) reported that the nutrient requirements of cucumber maybe applied twice the first application to be done by hand placement where 2/3 of the nitrogen is applied 3-4 inches to the side of the row two inches deeper that the seed before sowing. Complete fertilizer (14-14-14) at 5 bags/ha and solophos (0-20-0) at 3 bags/ha may supply the needed nutrients. Top dressing is done using the remaining nitrogen fertilizer when the first are to be half formed. Urea fertilizer (45-0-0) at 1 ½ bags/ha maybe applied for this purpose.

Gualberto (1987) revealed that the application of complete fertilizer (14-14-14) to *lasa* plant (recommended at the rate of 30, 50 and 70 grams per plant depending upon the financial capability of the grower. However, for the production of more tillers and panicles, the application of 70 grams per plant is preferable since it gives a higher yield and a higher net income as compared to 30 – 50 grams application. While Rola's work (1989) reported that IR-66 rice variety treated with complete fertilizer had the highest average plant height, average leaf area and average grain yield. Plants treated with manure had the highest average number of productive tillers. In corn (BPI Corn Variety No. 1.), Cabrera (1981) found that the 11 grams of application of urea per plant has obtained the highest yield.

Snap beans are extensively grown both commercially and in home gardens. It is one of the most important vegetable crops for fresh market and for processing. The findings of this study may be beneficial to farmers, students, future researchers and the community as they will be given the information on the best level of complete fertilizer (14-14-14) that will give the highest yield of pole snap beans, the greatest number of pods and the longest pods.

METHODOLOGY

The study used a 160 square - meter experimental lot to simulate a home farm lot garden. Pole snap bean seeds (50 gms), Complete fertilizer (14-14-14) (9.6 kgs), 352 salmon cans air-dried compost, rice straw as mulch, carabao, plow, harrow, sprayer, kriss EC insecticide, weighing scale, sprinkler, shovel, pick mattock, bolo, string, label, and markers, calculator and record book and pen. In order to be assured of a high percentage of seed germinability, the black-seeded pole snap bean seeds were purchased from a reliable Kaneko Seed dealer in the province.

Land preparation. The experimental lot was plowed and harrowed twice with a week interval between operations using the tamaraw or carabao as the work animal. This interval was followed to make the soil loose, destroy weed growth and to allow the organic

`

matter to decompose. Leveling was done during the last harrowing before the laying out was made.

Experimental design and layout. A Randomized Complete Block Design (RCBD) with 4 treatments replicated 4 times. The experimental lot was subdivided into 4 equal blocks, 40 square meters each. Each block was further divided into 4 plots of uniform sizes with 10 square meters each and a distance of 30 cm apart to represent each treatment. All treatments were represented with letters A, B, C and D and randomly distributed in the experimental lot. Treatment A, Control (No fertilizer); TB, 0.4 kg/plot of 14-14-14 fertilizer or 200 kg/ha.; TC, 0.8 kg/plot or 400 kg/ha; and TD, 1.2 kg/plot or 600 kg/ha. The treatments were randomly distributed in the design.

Preparation of plots and planting. Two days before planting, sixteen plots each measuring 1 x 10 m were prepared and raised to a height of 6 inches. A 30 cm distance between plots was maintained but this was not included in the measurement of the experimental area. Shallow but broader holes measuring 10 cm depth and 12 cm diameter were made at a distance of 45 cm x 45 cm between rows and hills respectively. Equal amount of air-dried compost were placed in each hole (one empty salmon can each) and mixed thoroughly with garden soil. The prepared holes were planted directly to the individual plot at four seeds per hill. Thinning was done a week after planting maintaining a uniform rate of two seeds/hill.

Plant care and management. Watering of the newly sown seeds was done once a day with a uniform volume of two gallons water/plot. This volume of water was maintained until the second week. Later, the amount of water was increased to 4 gallons/plot until the onset of the flowering stage. Hilling up was done two weeks after seeding using shovel and bolo. Rice straws with 2 cm thickness were spread on the spaces between plants about 6 inches away from the plant base to suppress weed growth and conserve soil moisture. Wooden poles as trellis were provided per hill ten days from seeding. A uniform height of 1.5 m of the poles used was maintained. Subsequent weeds growing were pulled by hand and / or using bolo throughout the period of the experiment. Kriss EC insecticide was sprayed twice during the period of the experiment to prevent any possible attack of aphids and other predators.

Application of treatments to optimize use of commercial fertilizers. The application of complete fertilizer (14-14-14) to the test crop was done using the spray method. The first half of the prescribed levels of (14-14-14) fertilizer was dissolved in water using the 2 gallon capacity of sprinkler. The first application was done one month after as seeding while the second application was sprayed a month thereafter. Just after the application of the treatments, each plot was sprinkled with two galloons of plain water to ensure that no fertilizer particles/granules were left on the foliage and other plant parts.

Harvesting. The tender pods of snap beans were harvested by priming starting on the 50^{th} day from seeding with five days interval for five consecutive harvests. Harvested pods were separated by plot and by block for easy collection and recording of data.

Field observations, data gathering and statistical procedures. Data were taken from the total plant population per treatment. Harvested pods were separated by treatment for accurate recording of the average pod yield 1expressed in kilogram/plot and in tons/hectare. Data was entered in Table 1.0

The agronomic characters include the average number of pods and average length of pods of

`

snap beans. For the number of pods, data were taken from the actual count of the pods/bean pods/treatment (Table 2.0)

The measurement of the length of pods was done using the centimeter scale of the tape measure. Data was entered in Table 3.0.

All data gathered were organized, tabulated and analyzed statistically. Analysis of variance of the weights of bean pods as well as its components as the number and length of pods were computed to determine the significant differences among treatment means. Likewise, the F-test was used in this study to evaluate and locate subsequently the specific treatment differences and to test whether those differences were significant. The RCBD was chosen to further check and reduce soil heterogeneity which is the major contributor of error in field experiment.

The Complete fertilizer (14-14-14) was applied to the pole snap beans following the levels as follows: Treatment A (Control); TB, 0.4 kg/plot or 200 kg/ha; TC, 0.8 kg/plot or 400 kg/ha and TD, 1.2 kg/plot or 600 kg/ha. Application of the fertilizer was split so that the first half was applied a month after seeding while the other half was done thirty days thereafter using the sprinkler method.

Five (5) successive harvesting were done starting on the 50th day from seeding with five days interval until the 75th day. Pods were harvested by priming. The analysis of variance and the Latin Square Design (LSD) were used to further test the level of significance of the data obtained in the study.

RESULTS AND DISCUSSION

Effects of Complete Fertilizer (14-14-14) on the Weight on *P. vulgaris* L.

Tables 1, 2 and 3 show the average pod yield in *P. vulgaris*.

Kilogram/plot and in tons per hectare of pole snap beans. It revealed that the application of varying levels of complete fertilizer (14-14-14) affected significantly the weight and yield of snap beans. Treatment C applied at 0.8 kg/plot or 200 kg/ha. Obtained the highest mean yield of 4.46 kg/plot or 4.46 tons/ha. Others followed such as TD (1.2 kg/plot or 600 kg/ha) with an average of 3.99 kg/plot or 3.988 tons/ha and TA (Control) as the lowest with 3.0 kg per plot or 3.0 tons/ha.

Table 1.0 Average weight of *P. vulgaris* in kilogram per plot

Treatments	Number of Blocks				Total	Treatment	
	I	II	III	IV		Mean	Tons/ha.
TA – Control	2.80	3.25	2.75	3.20	12.0	3.0	3.000
TB - 0.4 kg/plot	3.50	3.75	3.40	3.60	14.25	3.56	3.356
TC - 0.8kg/plot	4.25	4.35	4.50	4.75	17.85	4.46	4.463
TD – 1.2 kg/plot	3.85	4.20	3.90	4.00	15.95	3.99	3.988
Block Total	14.4	15.55	14.55	15.55			
Grand Total					60.05		
Grand Mean						3.75	

`

Table 2. Analysis of variance on the weights of *P. vulgaris*

Sources of Variation	Degree of Freedom	Sum of Squares	Mean Squares	Computed	Tabular – F	
				F - Value	5%	1%
Treatment	3	4.64	1.55	17.22**	3.86	6.99
Block	3	0.29	.097	1.08	3.86	6.99
Error	9	0.81	.09			
Total	15	5.11				
C.V. = 8 %						

Table 3. Comparison of treatment means using LSD

Treatment	Treatment Means	Difference from Control
A	3.0	-
B	3.56	0.56*
C	4.46	1.46**
D	3.99	0.99**

Analysis of variance for Table 1.0 shows a highly significant effect of the treatments used. This is shown by the computed F-value which is much higher than the tabular F-value both at 5% and 1% levels of significance. Based on the comparison of treatment means using the Least Significant Difference (Table 3), results showed that the mean difference between TB, TC and TD and the control (TA) exceeds both computed LSD values as indicated by the asterisks. This means that the varying levels of 14-14-14 fertilizer has significantly influenced the weights of snap beans. The Coefficient of variation is 8%.

Effects on the number of pods/plot in farming *P. vulgaris* L.

The average number of bean pods per plot is shown in Tables 4, 5, and 6 data revealed that the highest number of bean pods was obtained from TC with a mean of 589.75 pods/plot followed by TD, 477 pods/plot followed by TD, 477 pods/plot; TB, 439.5 pods and the lowest was TA (Control) with a mean of 390 pods/plot.

Analysis of variance in Table 4 and the comparison between treatments means using LSD (Table 5), results showed that the treatments employed has significantly influenced the number of pods. This means further that the complete fertilizer applied to the test crop showed an influential result although there was an insignificant effect on the blocks or replication employed. This variation among blocks indicates a more reduced error and an increased precision of the experiment. The Coefficient of variation is 3.64%.

Table 4. Number of *P. vulgaris* L. pods per plot

Treatment	Block Number				Treatment	
	I	II	III	IV	Total	Mean
TA – Control	384	420	348	408	1,560	390.00
TB - .4 kg/plot	432	462	414	450	1,758	439.50
TC - .8kg/plot	588	594	.601	576	2,359	589.75
TD – 1.2 kg/plot	474	480	468	486	1,908	477.00
Block Total	1878	1956	1831	1920		
Grand Total					7585	
Grand Mean						474.06

`

Table 5. Analysis of Variance of *P. vulgaris* pods per plot

Sources of Variation	Degree of Freedom	Sum of Squares	Mean Squares	Computed	Tabular – F	
				F - Value	5%	1%
Treatment	3	86613.19	2887.06	9.69**	3.86	6.99
Block	3	2181.19	727.06	2.44	3.86	6.99
Error	9	2682.56	298.06			
Total	15	91476.94				
C.V. = 3.64%						

Table 6. Comparison of treatment means using LSD

Treatment	Treatment Means	Difference from Control
A	390.00	-
B	439.50	49.50**
C	589.75	199.75**
D	447.00	57.00**

Effects on the Length of Bean Pods/Plot

Table 7 depicts the average length of pods in centimeter per plot. Treatment C (0.8 kg/plot) obtained the longest pod with a mean of 12.27 cm, this was followed by TD (1.2 kg/plot) with 11.84 cm; TB (0.4 kg/plot) with 11.325 cm and the last is TA (control) with 10.61 centimeters.

Analysis of variance in Table 8 shows that the Computed F-value for treatment is much higher than the Tabular F-value both at 5% and 1% levels. This indicates that the treatments used were highly influential on the length of pods. The low coefficient of variation (CV of 1.94%) showed that the reliability of the study is high.

On the comparison among treatment means as shown in Table 9 and using the LSD, results revealed that the mean differences between treatments B, C, and D and the control (TA) exceed both computed LSD data as indicated by the double asterisks. This means further that the complete fertilizer applied to snap beans has greatly influenced the length of pods. The coefficient of variation is 1.94%.

Table 7. Average length of *P. vulgaris* pods in cm/plot

Treatment	Block Number				Treatment	
	I	II	III	IV	Total	Mean
TA–Control	10.80	10.45	10.25	10.95	42.45	10.610
TB-0.4 kg/plot	11.15	11.63	11.00	11.52	45.30	11.325
TC-0.8 kg/plot	12.16	12.30	12.42	12.20	49.08	12.270
TD–1.2 kg/plot	11.70	11.90	11.66	12.10	47.36	11.840
Block Total	45.81	46.28	45.33	46.77		
Grand Total					184.19	
Grand Mean						11.51

`

Table 8. Analysis of variance of data in Table 3.0

Sources of Variation	Degree of Freedom	Sum of Squares	Mean Squares	Computed	Tabular – F	
				F - Value	5%	1%
Treatment	3	6.11	2.040	40.8**	3.86	6.99
Block	3	0.289	0.096	1.92	3.86	6.99
Error	9	0.451	0.050			
Total	15	6.85				
C.V. = 1.94 %						

Table 9. Comparison of treatment means using LSD

Treatment	Treatment Means	Difference from Control
A	10.610	-
B	11.325	0.715**
C	12.270	1.660**
D	11.840	1.23**

CONCLUSION

Based on the foregoing findings, the use 0.8 kg of 14-14-14 fertilizer per plot or 400 kg/ha can result to the highest weight of bean pods reaching to 4.46 kg/plot or 4.463 tons/ha and the highest in the number and length of pods with 589.75 and 12.27 cm., respectively. In order to enhance vegetable production, optimizing the use of commercial fertilizers should be observed following any of the three levels of the complete fertilizer to have significant yield, as to the number and length of bean pods. For further research, it is recommended that other test crops be used to determine the effectiveness of complete fertilizer.

LITERATURE CITED

Bunoan JC. 1982. *A study on Organic Fertilizer in the Philippines.* Farm – Agro Industrial Guide.

Castillo MR. 1982. *Animal Husbandry Magazine*. Ministry of Agriculture Personnel

Cabrera FC. 1981. Yield response of yellow corn (BPI Corn Variety No. 1) to different levels of urea Fertilizer under CAIC condition. *Master's Thesis*, Catanduanes State Colleges.

Celleno L, Tolaini MV, D'Amore A, Perricone NV, Preuss NG. 2007. A dietary supplement containing standardized *Phaseolus vulgaris* extract influences on body composition of overweight men and women. *International Journal of Medical Science,* 4(1): 45–52.

Day A. 1990. The right way to grow cucumber. *Green Fields*, 20 (9).

Gualberto P. 1981. Yellow variety of lasa tested for its vegetative and number of panicles at various levels of application of complete fertilizer (14-14-14). *Master's Thesis*, Catanduanes State Colleges, Catanduanes, Philippines.

Gomez KA, Gomez AA. 1976. *Statistical procedures for agricultural research with emphasis on rice*. International Rice Research Institute (IRRI). Los Banos, Philippines.

Llagas C. 1989. Plant and crop production. Instructional Materials Corporation, College of Agriculture at the University of the Philippines (UP), Los Banos.

Mc Collum, JP. 1975. *Producing vegetable Crops*. 2nd edition.

Rola S. 1989. The effects of hog manure, ammonium sulfate and complete fertilizer on the growth and yield of IR – 66. *Master's Thesis* submitted at De La Salle University-Manila.

Sandsted R. 1980. Energy inputs in snap bean production, pp. 127–128. *In*: Pimentel, D. (ed.), *Handbook of Energy Utilization in Agriculture.* CRC Press, Inc., Boca Raton, Florida, USA.

Stephens JM. 2009. Handout in the Agricultural Sciences Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611. University of Florida. Original publication date April 1994. Reviewed March 2009 Retrieved on October 2009 available at http://edis.ifas.ufl.edu.

Villanueva C. 1997. *Effective THE*. Adriana Publishing Co. Inc. Metro Manila Philippines.

Villanueva C. 1991. *Agriculture and Fishery Technology*. Instructional Materials Inc.: Manila.

`

Work P. 1970. Vegetable production and marketing. New York State, College of Agriculture, Cornell University, USA.

Dr. Sonia A. Torio *is an Associate Professor V at the Catanduanes State Colleges Panganiban Campus in Panganiban, Catanduanes. She was in-charge of the research program of the said college and head of the Agriculture Department.*

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 62–68 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Online patent search on various machine inventions for abaca fiber processing

Jimmy T. Masagca & Jonald M. de Belen

Pacific Island Institute for Pedagogy, Technology, Arts and Sciences Incorporated (Pacifictech), Constanitno St., Virac 4800, Catanduanes, Philippines

Abstract With the use of online patent search, the different machines or apparatuses recorded and published in the US and Philippine Patents Offices are reported here. A total of at least 1,000 entries were generated in the web search using abaca machines, abaca fiber extracting or abaca stripping methods. Of these entries, there were 11 patented machines/apparatuses and utility models described that could be used in prior art analyses on new inventions for abaca processing in the province.

Key words Abaca fiber, abaca stripping machines, online patent search, web search, patent claims

INTRODUCTION

Abaca, *Musa textilis* Nee, an endemic plant in the Philippines belongs to the banana family (Musaceae). The plant is harvested for its fiber (called Manila hemp), which is extracted or stripped from the sheaths (i.e., the bottom part of the leaves forming the pseudo-stem). The sheaths contain the versatile fiber, composed primarily of cellulose, lignin and pectin. The abaca fiber is extracted from the leaf sheath either by hand-stripping or using a machine. The strips are then scraped to remove the pulp, washed, and then sun-dried.

This exercise on patent search explores the extent to which abaca, abaca fiber, abaca extraction or stripping is contained in patent databases worldwide.

The phrase patent search is the process by which prior inventions or ideas are examined, with the goal being to find information that bears close similarity to a given patent or proposed invention. There are many different kinds of patent searches. The documents searched during a patent search may include Philippine Patents, U.S. and foreign patents and published patent applications. The need for non-patent literature is also important that can be derived from the Web, product literature, and primary or scientific journals and databases.

We intend to explore and review the different machines or apparatus recorded or published in the US Patent Office and the Philippine Patent Office (or elsewhere in the world). We used two web search facilities during data collection from August 15-30 and September 1 - 25, 2009. We tried to focus our inquiry on the titles, abstracts and claims presented in the patent documents surveyed using the patent search systems of the Intellectual Property Office (IPO) of the Philippines, the European Patent Office,

`

Japan Patent Office and the US Patent Office found on the Web.

IPO Philippines e-services patent search and *freepatentonline*

During our patent search activity on the Web (August 1-15, 2009), we were able to generate at least 1,352 patent entries worldwide using the term *abaca*; there were 1,289 patent entries using *abaca fiber*; a total of 994 patent entries using the phrase *abaca fiber machine*; 628 patent entries using *abaca plant*; 626 patent entries using *abaca extraction*; and 294 patent entries using *abaca fiber tool*. When we used the patent search facility of IPO Philippines, patents related to *abaca fiber extracting machine* or *abaca fiber stripping machine/apparatus* generated at least 29 patent documents or entries. These machines or apparatuses intended for abaca extraction, defibering, stripping are presented in the succeeding paragraphs. After having at least 10 to 15 repeats in patent searching, it seems to us that there are no entries for patent search using the phrases *abaca planting methodology*, *abaca suckers planting methodology, abaca planting methods* and *abaca tissue culture methods* in the abstracts of the patent documents. This observation should be considered significant for the academics of the Catanduanes State Colleges (CSC) and other inventors who would like to embark on patenting of inventions, utility model designs, processes or methods appertaining to abaca fiber development and abaca processing mechanization program supportive of the provincial government's program known as Catanduanes Unlad Abakamasa (CUA).
Moreover, a considerable number of patent entries or documents can be generated after using the terms and phrases *decorticating plant* and *plant fiber*, *method for decorticating fiber*, *apparatus for de-fibering sheaths* of fibrous material; and *stripping machines for abaca* and other allied fiber bearing plants. For instance, the invention of an Australian on the method and apparatus for removing sheets of fibers from banana plants for the production of paper products (*United States Patent 20090120597*) can be a starting point for prior art preparation of a method and apparatus intended for abaca.

Table 1 presents the output generated last September 23-25, 2009 using the e-Services quick search of IPO Philippines and the *freepatentponline* for the US, Japan and European Patents, and Patent documents of the World Intellectual Property Organization (WIPO).

Patented extracting machines or apparatus for Abaca fiber production

According to the Final Technical Report CFC/FIGHF/09 on Improvement of Fiber Extraction and Identification of Higher Yielding Varieties (Activities in the Philippines) of the Fiber Industry Development Authority (FIDA) of the Philippines, 1998-2004, there are two types of decorticating machines available in the Philippines. The two machines differ only in the size of output. A 40 kg/day decorticating machine is in operation in a number of abaca producing provinces (including Catanduanes). It was produced by a private entrepreneur and patterned after the multifiber decorticating machine, which is an improvement of the *raspador*, a decorticator for ramie. The multifiber decorticating machine has a capacity of 80 kgs/8hrs and was developed by the FIDA *(presented in the succeeding paragraphs)*.

According to FIDA (2004), the major parts of the multifiber decorticating machine are the extracting cylinder, the breastplate and

`

feeding chute. The machine is mounted on a chassis with pneumatic tires and is powered by a 5hp diesel engine. To operate the machine, about half of the leaf sheaths are fed to the extracting chamber where beating and partial scraping takes place. Complete scraping of non-fibrous materials takes place as the leaf sheaths are being pulled out. The other half of the leaf sheaths are fed and undergo the same process.

It is our intention in this paper to explore on the prior art of certain inventions so that we can recommend in the near future which of the modifications we would like to have in the utility models that are existing or currently having protection. It is our desire to have a complete listing of the patented abaca machines, but due to limitations that stem from a very conservative funding (Pacific Tech Institute Research Funding for AY 2009-2010), we started with this far from complete data on inventions that relate to abaca stripping or defibering. The following are the different fiber extracting machines either existing, pending or have expired as per records generated during Web search using various.

1. **Automatic Stripping Machine for Abaca and Allied Fiber Bearing Plants** *(United States Patent 3670366; Application Number: 04/830449)*

This machine was invented by Juan and Jesus T, Villanueva of Quezon City This patent consists of a method and apparatus for defibering sheaths of fibrous material, particularly Manila hemp, by conveying the sheaths past several stationary blades arranged in the path of travel of the sheaths whereby the edges of the blades separate the fibrous parts of the sheaths from the pulpy parts. Publication date of this invention was June 20, 1972 and was filed June 4, 1969. References include that of Humphrys (March 1918), fibrous-plant-decorticating machine by O'Neill, Jr. (September 1921); and apparatus for extracting fibers from fiber-bearing plants by Simons (August 1956).

This invention consisted of nine (9) claims that focused on the apparatus for defibering sheaths of fibrous material (i.e. sheaths of abaca), the conveyors, stripping blades, the leading and, trailing portions, and the pressing means that comprise a block. These claims are protected by Letters of Patent of the US Patent Office.

2. **Apparatus for defibering sheaths of fibrous material, particularly sheaths of abaca** *(United States Patent 3992753; Date Filed: 01/23/ 1975; Date Published: 11/23/1976).*

The US Patent Office records indicate that this application is a continuation-in-part of allowed co-pending application Ser. No. 258,875, filed June 1, 1972, now U.S. Pat. No. 3,887,063. Application Ser. No. 258,875, in turn, was a continuation-in-part of application Ser. No. 830,449 filed Jan. 4, 1969 and now U.S. Pat. No. 3,670,366. This machine was invented by Juan and Jesus Villanueva of 105 Apo St., Quezon City, Philippines.

This apparatus for defibering sheaths of fibrous material, particularly sheaths of abaca, in which the sheaths are transported sideways along a predetermined path by being gripped at opposite ends between the lower run and the upper run of an upper and a lower endless conveyor of a plurality of conveyor means which are so arranged with respect to each other that the sheaths

`

Table 1. Patents and patent documents on abaca

Keywords: Term/s or Phrase/s	*No. of Entries or Patent Entries (whether granted, pending and expired)*		
	IPO Philippines Search Facility	***Freepatentonline*** Search facility*	*Remarks*
Abaca	48	2,239	Includes the Abaca technology on anti-spam computer technology
Abaca fiber	4	2,073	Includes other allied plants like banana, cotton,
Abaca extraction	181	1,010	Includes methods and means of extracting other natural fibers
Abaca stripping	5	915	Filipino inventions are included
Abaca fiber machine	0	1,596	Modifications are needed for utility models. The academics of the Catanduanes State Colleges are encouraged to embark on patentable machine inventions
Abaca fiber apparatus	0	1,351	Some designs have expired patents
Abaca extraction method	0	1,001	Inventions dealing with abaca processing is practically nil (?)
Abaca apparatus	0	1,413	Some apparatus are pending
Abaca machine	15	1,689	Includes the pending application of an invention from Leyte State University in cooperation with the German academics
Abaca tissue culture method	0	27*	*Includes tissue culture of other related plants; While transgenic cotton, banana and allied plants are already patented in terms of resistant to certain diseases, the abaca counterpart appears to be lacking. The scientists from the University of the Philippines Institute of Molecular Biology and Biotechnology are now presently engaged in molecular biology of abaca.

**Includes database entries from the US Patents, US Patent Applications, EP Documents, Patent Documents of Japan, Patent Abstracts of Japan and WIPO (PCT)*

`

while passing over portions of stripping blades extending transverse to the path are gripped at least at one end thereof, and conveyor means for use in such apparatus which comprise a plurality of adjacent pulleys along the lower run of the upper conveyor, a plurality of adjacent pulleys along the upper run of the lower conveyor, turnable about parallel axes offset in direction of the path with respect to the axes of the pulleys of the upper conveyor, in which each of the pulleys is formed with a plurality of circumferential grooves in which endless flexible means are located which engage and grip the sheaths for transporting the same.

3. **Apparatus for defibering sheaths of fibrous materials particularly sheaths of abaca** *(United States Patent 4170286, filed last August 18, 1975 and finally published on October 9, 1979).*

This invention is a continuation in part of the machine (in no. 2, US Patent 3992753). The invention notes that the first and second endless conveyor arrangements respectively comprise a first and a second endless conveyor having a first and a second run. The second run adjoins the first run, and they together define an elongated path for fibrous material which is to be transported gripped between the runs. The first elongated endless conveyor comprises a plurality of parallel endless first elongated conveyor sections arranged side-by-side to define a plurality of elongated parallel first intermediate spaces extending along substantially the entire length of the first run. The second conveyor is similarly constructed so as to define similar second intermediate spaces. Along substantially the entire lengths of the first and second runs, the aforementioned sections of the conveyors project in direction from the respective run towards the other run into respective ones of the intermediate spaces of the other conveyor. The first and second conveyors are respectively comprised of a first and a second plurality of parallel spaced discrete endless conveyor members each constituting one of the first or second sections, respectively. [Source: US Patent Office].

4. **Abaca Chipper Machine** (*United States Patent 3708830; Application Number: 05/143962; Publication Date: 01/09/1973; Filing Date: 05/17/1971).*

The field of inventions indicates that solid material commnution or disintegration, rotary surface or surfaces-cooperating non-smooth surface characteristic. This machine accepts cut lengths of fibrous plant stem, and slices and cuts them into chips, and then crushes and squeezes them to partially defibered and de-watered condition. In the crushing and squeezing, the chips are fed by a pair of conveying endless chains to a squeeze-pass between circumferentially and chevron grooved rollers.

The patent application consisted of only two (2) claims, namely: (1.) A machine for cutting, chipping, crushing, de-watering and defibering fibrous vegetable material, such as abaca stalks, And (2.) The combination claimed in claim 1, said compression idler means having circumferential and axial grooves therein, one of said compression idler means having, in addition to said circumferential and axial grooves, grooves which run at acute angles to said axial grooves and form a chevron pattern therewith.

The prior art notes that the Gomez Philippine Patent Abaca Chipper Machine No. 2812 of Feb. 9, 1967, for a machine utilizing grooveless rollers for crushing abaca chips, and wherein the chips are propelled to the roller by a rotary cutter; and Klugh U.S. Pat. No. 1,993,102 disclosing

`

a pair of rollers, one with circumferential grooves and the other with axial grooves.

5. **Abaca Fiber Twisting Machine** *(Philippine Patent No. 2200100155; Date Filed: 05/22/2001; Date Issued: 09/19/2002).*

This machine was invented by Albert Martinez, Jr. and Feliciano G. Sinon (from Leyte State the Philippines). The invention pertains to the construction of an abaca-fiber twisting machine comprising a frame, a solid hollow shafts being rotatably supported on said frame by pillow block bearings, a twisting and spooling assembly rotatably mounted on flat frame, with said flat frame is welded.

6. **Portable Abaca Stripping Machine** *(Philippine Patent No. 267; Application No.: 529; Filing Date: 10/10/1963; Date Issued: 4/23/1964).*

This utility model was invented by Hector B. Ascano of Malabon, Rizal. Philippines, with the official assignee Roca Industries, Inc. located in San Juan Metro Manila. The constructed model is portable power-driven duplex abaca stripping machine. Invention is now expired.

7. **Abaca Stripping Machine** *(Philippine Application No.: 22002000336; Filing Date: 08/16/2002; First Publication: 08/23/2006; Second Publication: 12/11/2006)*

The inventor of this machine is Arthuro O. Marte from Naosin City, Southern Leyte. An abaca stripping machine comprising of a frame member having a flywheel rotatively mounted thereof, a spindle being made such that it is capable of rotational movement with respect to the movement of the flywheel, a stripping head assembly attached to said frame and disposed adjacent the spindle, said stripping head assembly consisting of upper and lower bars, a jaw clutch secured on said lower bar, a clutch pedal and retainer bolt secured to said pedal, a stripper blade provided on said retainer bolt, an adjusting handle disposed on a mounting frame member adapted to adjust said stripper blade, a fixed stripping bar also provided on said mounting frame member and a spindle provided on one end of said elongated shaft.

8. **Rotary Press for Flattening Handwoven Abaca Fabric** *(Patent No. 22006000392; Application No.: 22006000392; Filing Date: 09/14/2006; Date Issued: 06/04/2007; First Publication Date : 06/04/2007; Second Publication Date: 10/01/2007).*

Inventors of this machine are Charito P. Cauton, Amado R. Jabrica, Thelma M. Sipin and Rogelio R. Valenteros. The invention was assigned to the PHILIPPINE TEXTILE RESEARCH INSTITUTE (PTRI) of TAGUIG CITY (PH) METALS INDUSTRY RESEARCH AND DEVELOPMENT CENTER of TAGUIG CITY (PH).

This utility model is described as a rotary press used as an apparatus for flattening handwoven abaca fabric is disclosed having a generally rectangular body comprising a pair of elevated supporting post being defined by a pair of upright parallel trapezoidal shaped side metal plates. The rotary press is designed to be more effective, efficient and sturdy in flattening abaca handwoven fabric.

9. **Dismountable Portable Abaca Spindle Stripping Machine** *(Pending Application; Application No. 22005000396; Filing Date: 09/12/2005; First Publication Date: 04/27/2009)*

`

This invention with pending application refers to a dismountable portable abaca stripping machine, which is a portable machine for extracting abaca fiber by pulling the abaca leaf sheaths clamped between a stripping knife and a cushioned table by a rotating wooden spindle. The machine adapts single shaft usually applied in spindle stripping that housed both the flywheel and the wooden spindle. Flywheel of the machine is fabricated from used motorcycle tire filled with concrete materials.

Authors of this invention are Dr. Roberto C. Guarte (Dean of the College of Engineering and Agri-Industries of Leyte State University), Werner Muhlbauer (Germany) and Feliciano G. Sinon (Leyte State University).

10. **A Method and Apparatus for removing sheets of fibers from banana plants for the production of paper products** (United States Patent Application 20090120597; Application Number: 11/662498; Publication Date: 05/14/2009; Filing Date:09/15/2005)

This invention relates to a method and apparatus for producing sheets from the pseudostems of, banana plants in the family Musaceae, each pseudostem having a longitudinal axis. The method includes the steps of feeding a pseudostem into a workstation, supporting the pseudostem for rotation thereof about its longitudinal axis within the workstation, and contacting the rotating pseudostem along substantially its entire length with a fibre-separating device, whereby a continuous sheet of fiber is removed from the pseudostem by the fiber-separating device during rotation. Raw paper may also be made by laminating two or more of these sheets together such that the direction of the generally parallel fibers in at least two adjacent sheets is not aligned and then curing the sheets to form raw paper. The inventor is Ramy Abraham Azer (South Australia, Australia).

LITERATURE CITED

FIDA.2004. Improvement of Fiber Extraction and Identification of Higher Yielding Varieties Final Technical Report CFC/FIGHF/09 Activities in the Philippines. *Fiber Industry Development Authority of the Philippines*, 1998-2004.

Guarte RC.2000. Utilization of abaca (*Musa textilis* Nee) fiber in the automotive industry: The case of PPP Abaca project in the Philippines. Leyte State University. Powerpoint presentation. (Unpublished).

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 69–72 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

BIODIVERSITY AND CONSERVATION

Diagnostic features of the freshwater crab, *Sundathelphusa philippina* from Catanduanes, Philippines*

Jimmy T. Masagca[1]

[1]*University Professor 3, De La Salle University-Dasmarinas (DLSU-D), Cavite 4116, Philippines; Pacific Tech Institute SVM-Center for Biodiversity, Island Ecology and Climate Studies (BIOCLIMES), Constantino St., Virac 4800, Catanduanes, Philippines*

Abstract An adult female specimen of *Sundathelphusa philippina* (von Martens, 1868) [*Thelphusa*] is reported and described here. The collection was made in abaca planted areas in San Miguel, Catanduanes island, Luzon, Philippines.

Key words Freshwater crab, *Sundathelphusa philippina*, Catanduanes, brachyurans

Given the paramount importance of the biodiversity in freshwater systems of the Southern Tagalog Region (STARE) and the Bicol Region (BICORE) in Luzon, Philippines to generate more information on the poorly known freshwater crabs of the country, this report on the endemic potamid crabs is being published. This short paper is a portion of an output of a research project under a program on the *Patterns of Biodiversity in Aquatic Ecosystems* funded by the University Faculty Research Office (UFRO) of De La Salle University-Dasmariñas.

Reports indicate that invertebrate biodiversity in Asian rivers has not been studied thoroughly (Dudgeon 2000). Among the freshwater forms, the true crabs (Malacostraca: Brachyura) are astonishingly diverse, comprising 6 families with more than 80 genera in Asia (see reports of the National University of Singapore or NUS Raffles Museum for Biodiversity Research). In China alone, Dai et al. (1986) and Dai & Young (1991) described 228 species and subspecies in 35 genera from the Parathelphusidae ALCOCK, 1910 (*sensu* Ng 1988) and Potamidae ORTMANN, 1896 (Ng 2000).

Studies on the freshwater crabs of the Philippines are scanty compared to the marine dwelling forms, such as that of Atienza & Filipina (1972) that described the macrurous and brachyuran decapods crustaceans from Dagat-dagatan, Laguna and Manuel (1995) on the decapods stomatopod crustaceans of Aklan. The work of Ryan & Choy (1991) reported the mass upstream migration of the megalopae of *Varuna literata* FABRICIUS 1798 (Grapsidae). Cabrera (1984) reported the freshwater crab, *Sundathelphusa philippina* as the host of the lung parasite, *Paragonimus*. Another compilation (a volume) on the swimming crabs of the Philippines was published by Cariaso & Cabrera in 1986. The more recent

**Portion of a Terminal Report submitted to the University Faculty Research Office (UFRO), DLSU-D for a University-funded research on the Freshwater Crabs of Luzon, Philippines.*

`

papers of Ng & Takeda (1992) described the members of the families Parathelphusidae ALCOCK, 1910 (*sensu* Ng, 1988), Potamidae ORTMANN, 1896 and Grapsidae MCLEAY, 1838 (partim). According to Ng & Takeda (1992) the potamid genera in the Philippines are represented by *Ovitamon*, *Isolapotamon*, *Insulanon*, and *Mindoron*. They established three new genera of freshwater crab of Family Potamidae ORTMANN, 1896 from this country on the basis of the 2-month field collections. As a result, 5 new species were described, namely: *Ovitamon arcanum*, *O. tomaculum*, *Insulamon unicorn*, *Mindoron pala* and *Isolapotamon spatha*.

Other recent works on Philippine freshwater crabs include that of Freitag & Yeo (2004) on two new species in the genus *Parathelphusa* H. Milne Edwards, 1853 from Palawan island. The works are funded by the UFRO of DLSU-D carried out by the first two authors (JTM and CZC). This paper is a result of the previous written reports about freshwater crabs from Cavite and Catanduanes island, Luzon.

Acquisition of Crab Specimens. Fieldwork was carried out from Cavite and Catanduanes for the collection of FWCs by handpicking and using locally constructed crab traps, called "*panukot*" or "*bintol*" (Philippine local dialect). Collected live specimens were either brought to the laboratory using improvised boxes made from banana (*Musa*) and rattan (*Calanus*). Dead specimens were immediately fixed with 10% formalin or with 70% ethanol.

Measurements. Some quantitative and qualitative data of the 2 potamid crabs are described in the paper. Measurements or morphometric data and ratios are computed. The abbreviations of G1 and G2 are used for the male first and second pleopods, respectively. The report essentially follows the terms used by Ng (1988, 1992). Measurements of the different body parts (e.g. carapace, maxillipeds, abdominal segments, ambulatory legs or periopods are in mm.

A single female specimen of a freshwater crab or semi-terrestrial collection was collected and identified under the family Parathelphusidae (syn: Sundathelphusidae). The specimen was identified as *Sundathelphusa philippina* (von Martens, 1868) [Thelphusa] or *?Sundathelphusa philippina* (Burger, 1894) [Telphusa] [replacement name needed if this taxon is confirmed to be congeneric with *Thelphusa philippina* von Martens, 1868] (Ng et al. 2008). Figure 1 shows the dorsal and ventral views of the new find in Catanduanes island, considered to be the first report. Moreover, this report confirms the identity of the new collection previously reported by Masagca (2006) published in Transactions of the National Academy of Science and Technology (Philippines), Vol. 28 No. 1: 70 (2006).

Figure 1. Female *Sundathelphusa philippina* from Solong Falls in San Miguel, Catanduanes Island, Bicol Region, Luzon, Philippines. (Live photo).

Material examined. One female (38.3 x 31.5 mm (DLSU–D BSD Reference Collection), Solong Falls, San Miguel Catanduanes, Bicol Region, Luzon; coll. A. Diesmos, Brandy Vargas & JT Masagca, 10 vi. 2004. Specimen No. 0079.

Morphometric data. Abdominal segments: s-7=8.1; s-6=8.3 mm; s-5=6.4 mm; s-4=4.2 mm; s-3=3.8 mm s-2=2.5 mm; s-1=1.4; maxilliped exopod=9.8 mm, flagellum= 5.2 mm.

Diagnosis. Carapace ovoid, broader than long, cervical and mid grooves wide, deep and distinct; external orbital angle slightly

`

triangular, epibranchial tooth very low and blunt; epigastric cristae fairly distinct. Third maxilliped exopod with well developed flagellum. Female abdominal segments 6 and 7 almost equal size and larger than segments 4 and 5; lateral margins of abdominal segments with hairs.

Outer surface of chelipeds smooth; carpus with one dominant distal spine and one sharp basal granule; outer margin of merus serrated, fingers almost equal in size with the palm; second ambulatory leg, longest); 4^{th} ambulatory leg (5^{th} periopod), shortest.

ACKNOWLEDGMENT

The author expresses thanks to DLSU-D for the research funding. Appreciation is given Dr. Arvin C. Diesmos and Ms. Marivene Manuel from the Philippine National Museum (PNM); Atty. Jose V. Mapa; Ryan Barlao during photography; Cynthia Naca for the chemicals/laboratory equipment; Sonny Gatdula and Manuel Lanillo; Bong Alberto and Brandy Vargas for assistance on fieldwork in San Miguel, Catanduanes; Mr. Rafael and Mrs. Maritess Vargas, for the assistance provided during the evening collections; Prof. ET Tribiana, Director for Research at Catanduanes State Colleges & PhD student at DLSU-Manila; and my cousin Froilan Tevar.

LITERATURE CITED

Atienza-Filipina R. 1972. *The macrurous and brachyurous decapod crustacean from Dagat-dagatan Luzon, Malabon, Rizal*. (Photocopy material).

Cabrera BD. 1984. Paragonimiasis in the Philippines: Current status. *Arzneimittelforschung*, 34(9B):1188-1192.

Cariaso BL, RG Garcia. 1986. *Guide to Philippine Flora and Fauna: Philippine swimming crabs*. VII. Pp. 167-253. Natural Resources Management Center, Ministry of Natural Resources and University of the Philippines. JMC Press, Inc.: Quezon City.

Cuevas CZ. 2002. Biometry of the Freshwater Crab, *Ovitamon* sp. from Mts. Palaypalay/Mataas na Gulod National Park. *Master's Thesis*, De La Salle University-Dasmariñas, Cavite.

Dai A-Y. 1999. *Fauna Sinica. Crustacea: Parethelphusidae, Potamidae*. Science Press: Beijing, People's Republic of China. (In Chinese with English Abstract).

Dudgeon D. 2000. The ecology of tropical Asian rivers and streams in relation to biodiversity conservation. *Annual Review of Ecology and Systematics*, 31:239.

Dudgeon D. 1999. Tropical Asian streams: Zoobenthos, *Ecology and Conservation*.

Freitag H, Yeo DCJ. 2004. Two species of *Parathelphusa* H. Milne Edwards, 1853, from the Philippines (Crustacea: Decapoda: Brachyura: Parathelphusidae). *The Raffles Bulletin of Zoology*, 52(1):227-237.

Masagca JT. 2006. The freshwater and semi terrestrial brachyurans of selected areas in Luzon island, Philippines. *Trans. Nat. Acad. Sci. Tech. (Philippines)*, Vol. 28 (No.1): 70. Abstract only.

Masagca JT. 2004. A research update on the Freshwater Crabs of Southern Luzon Biogeographic Province. *GSEAS Graduate Journal*, 9(2): 146-148.

Ng PKL, Guinot D, Davie PJF.2008. Systema Brachyurum: Part I. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bulletin of Zoology*, 17 (1-286).

Ng PKL. 2000. Reviews. Crustaceana, 73(2):249-251.

Ng PKL. 1992. Crabs of the *Stoliczia stoliczkana* (Wood Mason, 1871) species complex (Crustacea: Decapoda: Brachyura: Potamidae). *Malaysian Journal of Science*, 14:1-25.

Ng PKL.1991. On two new species of *Archipelothelphusa* BOTT, 1969 (Crustacea: Decapoda: Brachyura: Sundathelphusidae) from Luzon, Philippines, one of which is new. *Zoologische Mededelingen, Leiden, Netherlands*, 65(2):13-24.

Ng PKL. 1989. *Geithusa pulcher*, new genus and species (Crustacea: Decapoda: Brachyura: Parathelphusidae) from Pulau Redang, Trengganu, Peninsular Malaysia. *Raffles Museum of Zoology, Singapore*, 37(1 & 2):31-36.

Ng PKL. 1988. *The Freshwater Crabs of Peninsular Malaysia and Singapore*. Singapore: Department of Zoology. National University of Singapore, Shinglee Press, Singapore, pp. I-viii, 1-156 pp.

Ng PKL, Sket B. 1996. The freshwater crab fauna (Crustacea: Brachyura) of the Philippines. IV. On a collection of Parathelphusidae from Bohol. *Proceedings of the Biological Society of Washington, Washington D.C., USA*., 109(4):695-706.

Ng PKL, Takeda M. 1992. The freshwater crab fauna (Crustacea, Brachyura) of the Philippines. I. The family Potamidae Ortmann, 1896. *Bulletin of the National Science Museum, Tokyo, Series A*, 18(4):149-166.

Ng PKL, Takeda M. 1993. The freshwater crab fauna (Crustacea, Brachyura) of the Philippines. III. The identity of *Telphusa cumingii* MIERS, 1884, and its placement in the genus *Ovitamon* Ng et Takeda, 1992). *Bull. Natn. Sci. Mus. Tokyo. Ser. A*. 19(3): 111-116.

`

Ng PKL, Yang CM. 1989. On some species of *Demania* Laurie, 1906 (Crustacea: Decapoda: Brachyura: Xanthidae) from Malaysia, Singapore and the Philippines, with a key for the genus. *Raffles Bulletin of Zoology, Singapore*, 37(1 & 2):37-50.

Ryan P, Choy J. 1991. The mass upstream migration of megalopae of *Varuna literata* (Brachyura: Grapsidae). *Phil. J. Sci.*, 14:127-130.

Takeda M, Ng PKL. 2001. The freshwater crab fauna (Crustacea, Brachyura) of the Philippines. VI. A new cavernacolous crab from Mindanao. *Zoological Science,* 18(8):1123-1127.

Takeda M, Manuel MR. 2000. Taxonomic accounts of some rare crabs new to the Philippines. *Natn. Sci. Mus. Monogr., Tokyo,* (18):149-162.

Takeda M, Hashimoto J, Ohta S. 2000. A new species of the family Bythograeidae (Crustacea, Decapoda, Brachyura) from the hydrothermal vents along volcanic front of the Philippines Sea Plate. Bull. Natn. Sci. Mus., Tokyo, Ser. A., 26:159-172.

Tan SH, Ng PKL. 1998. The freshwater crab fauna (Crustacea: Brachyura) of the Philippines. V. On a new genus and species of Potamid crab from Palawan island, Philippines. *Hydrobiologia*, Berlin, Germany, 379:93-96.

Dr JT Masagca was a recipient of the Long Term Research Fellowship program for young scientists at the SEAMEO BIOTROP, Indonesia and Expatriate Teacher of Biology at the Ministry of Education/Asmara University, State of Eritrea, North East Africa. His works on fish chromosomes and mangroves appeared in the Southeast Asian Journal of Tropical Biology (BIOTROPIA) in Bogor, Indonesia; Asian International Journal of Life Sciences; and the Revistas de Educacion en Sciencias (Journal of Science Education) in Bogota, Colombia.

`

The Journal of Pedagogy, Technology and Synergy (2009) **1**(1): 73– 74 ISSBN 2094-2524 (PRINT) ISSBN 2094–2532 (ONLINE)
Published by Pacific Island Institute for Pedagogy, Technology, Arts & Sciences, Inc. (Pacifictech)
Constantino St., Virac 4800, Catanduanes, Philippines

Frog diversity in abaca-dominated farms of San Miguel, Catanduanes, Philippines*

BR Vargas[1], ET Tribiana[2] and JT Masagca[3]

[1]*BS Biology Program, Natural Sciences Department Catanduanes State Colleges & currently with the Specialized Medical Center Hospital, Riyadh, Saudi Arabia*
[2]*Professor & Director of Research, Catanduanes State Colleges, Philippines*
[3]*De La Salle University-Dasmarinas, Cavite 4116, Philippines and Pacific Tech Institute, Virac 4800, Philippines*
*Portion of an undergraduate thesis submitted at the Catanduanes State Colleges, Virac, Catanduanes, Philippines

Abstract This report presents the different frog species found in the municipality of Bato and San Miguel, Catanduanes (Bicol Region) as to its distribution and relative abundance. A discussion on the over-all habitats of the species identified is also presented focusing on the endemic frog species, *Kaloula kokacii.*
Key words Frogs, Catanduanes, diversity, abaca areas, endemic frog species, *Kaloula kokacii*.

The significance of frogs as bio-indicators of pollution, their economic importance, as well as their threatening status in the Philippine archipelago motivated the researchers to carry out this study on the diversity of frogs in San Miguel, Catanduanes Island, Luzon. Considering the rate by which natural habitats are destroyed giving way to the expansion of human civilizations, the need to discover and protect wildlife populations becomes more important.

Human activities aggravated by natural phenomena have rendered wildlife species with limited population size vulnerable to extinction. Scientists and researchers claim that despite the current success of enhancing environmental awareness, there are lots of organisms that need to be surveyed, identified, and properly documented to assess their condition and to determine to what extent they are affected by human induced problems. As stated in many herpetological books and manuals, the monitoring of frog population is essential to understand population behavior and other ecological considerations.

In our on-going investigation, the distribution, relative abundance and assessment of the over-all habitat of the frog species were determined. Ten quadrats were made on the 10 square kilometer-study site in San Marcos, San Miguel, Catanduanes each representing a particular type of habitat about 400 square meters and with an interval of 500 m from each quadrat. Collections and actual counting were carried with an average of 12 hours per sampling day.

Based on the 8-month survey in 2002 and another 2 months survey last 2005, there were 6 species that were identified and

`

another 2 unidentified collections were noted. These frog species were: *Rana erythreae* (Ranidae), *R. limnocaris* (Ranidae), *Racophorus pardalis* (Racophoridae), *Polypedates leocomystax*, *Occidozyga laevis* and *Kaloula kokacci* (Microhylidae). The other unidentified collections belong to the genera, *Racophorus* and *Kaloula*. *K. kokacii* is an endemic species of the island while *R. pardalis* was found to be rare. Data show that *R. limnocharis*, *K. kokacii* and *P. leucomystax* were found to be abundant in the study site. *O. laevis* was seen on a specific habitat only in the abaca areas, while *R. pardalis* was hard to find. However, the dominance index value of 1.001 shows that no particular species gained advantage over the others.

This was further supported by the evenness index value at 0.9029 which stated that there is an even distribution of species in the study area. Moreover, the computed Shannon index value of 0.7026 shows that frog species diversity is high in San Marcos, San Miguel. ANOVA of the frequency distribution of frog species present in the study site during the months of April and December obtained a computed value of 1.61 that is relatively lower than the tabular value of F at α=5.05 level of significance. This indicates that there is no significant difference in the distribution and diversity of frogs during the wet and dry months of the year.

Several follow-up field studies are now being carried out by undergraduate and graduate biology students so that the identity of two unconfirmed frog species will be completed well as further investigation on the endemic microhylid *K. kokacci* as to its habitat and other ecological characteristics. These collections and taxonomic identities need to be confirmed by research scientists like Dr. Rafe Brown of Kansas University, Dr. Angel Alcala of Silliman University and Dr. Arvin Diesmos of the Philippine National Museum. Of recent, Masagca et al. (2009, unpublished) noted the decline of this endemic frog and other vanishing species of the Gray's Monitor lizard, *V. olivaceous* in the environs of Solong Falls in the town of San Miguel due to various industrial activities and road construction. Ω

LITERATURE CITED

Masagca JT, LF Talan, ET Tribiana. 2009. Listing of frogs and lizards of Catanduanes Island, Luzon. Preliminary Report. *Pacific Tech Institute - Sylvina Valeza Masagca Study Center for Biodiversity, Island Ecology and Climate Studies (BIOCLIMES*), Virac, Catanduanes, Philippines. Unpublished Report.

Guidelines in Manuscript Preparation

Papers are accepted only in English. In extreme cases, papers written in the Filipino and other languages will be accepted. Articles should not normally exceed 5,000 words in length (excluding Abstracts and cited references. Authors should include a word count with their manuscript.

Manuscripts should be prepared in the following order:
Title page
Abstract
Key words
Main text
- **Introduction**
- **Materials and Methods**
- **Results & Discussion** (or Results separate from Discussion)
- **Acknowledgments**
- **Literature Cited**

Table(s) with caption(s) (on individual pages)
Figure caption(s) (as a list).

Abstracts of 100–200 words are required for all papers submitted.

Each paper should have five or six keywords.

All the authors of a paper should include their full names, affiliations, postal addresses, telephone and fax numbers and email addresses on the cover page of the manuscript. One author should be identified as the Corresponding Author.

Style Guidelines

The following guidelines are available upon request.

- Description of the JPTS article style
- Description of the JPTS reference styles.
- Guide to using mathematical symbols and equations

