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GAINS FROM RESEARCH AND DEVELOPMENT MANAGEMENT MODEL FOR A GREEN UNIVERSITY

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ABSTRACT – Research opportunities on the vision statement of Catanduanes State University (CatSU), a "green university", is unlimited and requires clearer definition among the students, faculty, staff, administration and local communities. Using Q-squared approaches, narrative inquiry, action research and participatory research processes, management and control systems, linkages and some aspects of organizational management and support service model was developed. This model consists of the qualifiers on the phrases: "student-focused learning", "teaching-research link", "bridging research to a Green University" and "integrated undergraduate-graduate research" training program in the university. A complex meaning of research activities in knowledge generation, theory building, innovation, discoveries, technology, incubation, and creative scholarship is recognized here. Clustering (Alpha, Beta and Gamma) intellectual exchange of ideas and research publishing through regular meetings, dialogues, discussions and mentoring sessions that integrate student research with faculty and staff are carried-out from 2013 to 2016 (known as the informal years) embedded in externally-funded research programs following a home-grown research mentoring program scheme; and finally from 2017 to the present (the formal years) with PhP8 million funding from the Commission on Higher Education (CHED) K to 12 Transition Period Institutional Development and Innovation Grant (IDIG). Tackling the issues on low research productivity and disinterest in publishing was central to the university's R&D management program and found to be due to individual, institutional and societal factors affecting students and faculty members. Regarding faculty members, the issues on policies, funding, lack of a workable research agenda and capabilities, and IT infrastructural and library facilities were addressed. The student-faculty designed research and publishing initiatives for capability building are being sustained, with CHED IDIG funding. Detailed activities for Increased scholarly publications, high quality articles of faculty members for high impact journals, better quality articles appearing in CHED-JAS accredited and ISI/Thomson listed journals, and an Increased number of submissions from programs with a low number of publications were the cornerstones of IDIG within SF2TR Model Student-Focused Teaching – Research Management Model. The 12-month CHED-IDIG funded program that includes round table discussion, designing of training programs, regional, national and international conference, research skills workshops, research retreats, IT skills training, colloquia, academic discussions, research mentoring sessions and publishing clinics were carried out to address issues on producing high quality articles of faculty members appearing in high impact journals and submission of the academic publication, Asia Pacific Journal of Island Sustainability in the Journal Incentive Program (JIP) of the CHED.

Keywords: research publishing, program, innovation, teaching-research

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INTRODUCTION

Expansion of higher education in the world occurred not only because of a growing individual demand but also due to national goals to achieve and enhance competitiveness in a global economy (Johnstone, 2004). This is within the notion that over the last decades, higher education around the world has generally expanded from serving the elite (under 15% of the college age group participating in postsecondary education) to the masses (20-30%) (Yang & McCall, 2013). In the Philippines, state universities are created with the prime purpose of providing Instruction, Research, Extension and Production (IREP) through a typology of colleges and universities based on research capabilities and corporate business operations (CBO). A young university known as Catanduanes State University (CatSU) in the remote island province of Catanduanes located between 13.50-14.70 N and 124.10-125.50 E on the coast of the North Philippine Sea (see Figure 1) was established by virtue of Republic Act No. 10229 on October 19, 2012. Like any other island-based university in the Philippine archipelago, this university has been exploring opportunities for its IREP considering the geographical limitation, meteorological or climatic conditions that resulted to unique island biodiversity, bio-geo-resources and bio-island culture.

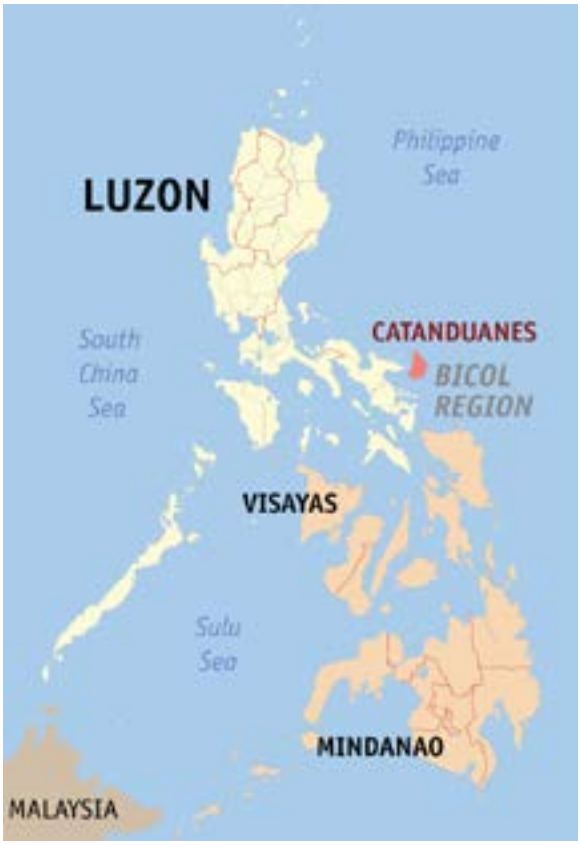

Figure 1. Catanduanes island, with respect to the Philippine archipelago. (from Google)

In today's knowledge-based and sustainable bio-economic based society influencing a rapidly growing island state university, enhancing the management of research and publishing through various initiatives will be imperative by capitalizing on these limitations as opportunities to achieve excellence in teaching and research. Following human capital theory, all of these conditions can be best attained with capacity building through seminars, conferences, skills training, and clustered discussions on research skills and publishing with support opportunities. Faculty and student attendees are exposed to global perspectives, international collaboration and linkages. These initiatives are being sustained at CatSU through an integrated and holistic manner by starting with the students considering that the research agenda of the university is essential with the infrastructural support systems. The agenda clearly stipulates that research

and publishing capability building includes the students and coupled with improving research infrastructure, development and are continually pursued with management systems after ISO certification of the university in 2017 (Management System ISO 9001: 2008 ID 910B633846). This paper presents the gains from developing a research and development management model in tackling the low research productivity and lack of interest of faculty and students. The university through the Office of the Director for Research and Development Services (R&DS) has embarked on vigorous research culture development efforts that seek to ensure the vitality, relevance and effectiveness of its educational mission as a green university, supporting the integrity of island sustainability.

OBJECTIVES

The intent of this paper was to document how an island state university developed a model on improving research and publishing among faculty and students through a home- grown research mentoring scheme embedded in externally funded research projects/programs awarded to the university. Specifically, the paper:
Provided a profile of the faculty and classified as to start-up, early career and late career in research and according to disciplines as Alpha, Beta and Gamma disciplines;
Described the qualifiers of a research management model developed from the informal years to the formal years when CHED awarded the university with IDIG funding; and
Discussed the gains of using the research management model to enhance research and publishing in the university.

METHODOLOGY

The paper followed that of what Glass et al. (2013) emphasized in the need to integrate many different disciplinary perspectives when translating sustainability principles for application in the "real world" that is emblematic of a shift towards interdisciplinary research approaches (Reed et al., 2009; Pohl et al., 2010). In support of the urgent need to have a multi-method that can truly reveal the complexity and multidimensionality of research different methods were employed in gathering numerous datasets to develop a model that could be of use in enhancing research productivity in the university. Yin (2004, cited in Masagca, Xunxiang & Asagca, 2009) stressed that the use of multi-methods not only provides a more in-depth data set but also allows the researcher to validate findings and thus increase the reliability of the findings.

Study Context

The study took place in an island state university in Bicol Region (Region V) research classes representing the three colleges – Arts & Sciences (CAS), Agriculture & Fisheries (CAF) and Health Sciences (CHS). The Thesis Writing/Research Methods (a 3-unit course) classes in graduate studies provided opportunities for students to identify and solve existing problems in the field or discipline of their study by applying qualitative, quantitative, or mixed methodologies. In the three colleges, hands-on research experience for undergraduate and graduate students is a requirement. Students conducted research either individually or by a team and selected their respective research adviser. Two of the research advisers advised almost all the teams in their respective research classes. At the end of the semester, the written research output in the form of a publishable format (see Appendix A) was submitted to the research teacher and defended in a forum within the college. At Arts & Sciences, BS Biology students attend the 26-year old BIOFORUM, while the other colleges had their own college-base thesis defence in public.

Participants

Undergraduate students

The participants of the study were Senior BS Biology, BS Agriculture and BS Environmental Science students who were randomly selected from seven undergraduate classes. Each research team consisted of 3-5 members, except in the case of Bachelor of Arts and Letters where each student had to work individually on a topic. Only two members from each of the randomly selected teams were interviewed using a semi-structured interview guide. Four focus groups representing four curricular programs freely responded to interviews. A total of 27 female and 8 male Filipino students with an average age of 20 years participated in the study.

Faculty members

A total of 218 faculty members of CatSU were covered in this report consisting of 83 males and 123 female faculty members. Out of the 206 faculty participants, only 58 or 51.4% were involved in the Research Retreat I and II sessions that considered the finalization of the publishable format of their previously conducted research studies, funded, personally funded and some are from their master's theses and doctoral dissertations. In a study on needs assessment for R&D at CatSU, only 20 faculty members (Male=6; female=14) were the respondents.

Q-Squared approach

The Q-squared approach (see Morales, Masagca & Araojo, 2017) was used in this initiative. There have been a number of initiatives to promote a more systematic integration of quantitative and qualitative approach known as "Q-Squared" originally applicable to poverty analysis (Shaffer, 2013), but used in the analysis of research productivity and on how to improve low performance in research and publications. This approach was used in studying the three factors in improving the university's R&D management program at the individual, institutional and societal aspects affecting students and faculty members.

Narrative inquiry

A narrative inquiry was used here as a qualitative research method for gathering information through storytelling, which according to Connelly & Clandinin (1990) is normally done by people who are storytelling (see Masagca & Londerio, 2008) organisms who lead storied lives. In this paper, stories of such lives shall be told by the study's participants (Senior students and faculty members), and narratives of the experiences were organized.

Action research

This paper has been developed together with the units under consideration, and this phenomenon is sometimes referred to as action research. The development of action research has sprung from the idea that one needs to take into consideration the power relations that exist between the researcher and the people that are the main subject under study (Bryman & Bell, 2003). Action research plays a particular role in bridging the gap between researchers and participants, since the output of research evolves through involvement with members of the academic community or the faculty under study. Action research enables the subjects under study to play a more active part in the design and output of study, and intend to contribute both to the academic theory as well as to the organization. The Coghlan (2007) states that "issues of organizational concerns such as system improvements, organizational learning, and the management of change are suitable subjects for participant research since they provide opportunities for both effective action and learning". Since the intention of this paper was to contribute both to theory and to the improvement of R&D in the university and the unit under study, it was important to work together and develop solutions with the faculty of CatSU and the students of the different colleges.

Participatory research processes
A participatory research process was followed here that includes a series of field work, interviews, focus group discussions (FGD), general assemblies and council meetings for some practices on research management and control system (MCS), organizational Management (OM) strategies; and to some extent external linkages and support services for research activities.

Documentary analysis
Appraised extant literature and gathered official documents from government units, conference reports, unpublished or under review papers and news clippings about R & D and decision-making processes in the university as documentary analyses. Documentary data were organized from the materials on relevant university policies and the Research Manual related to research and publishing and institutional collaboration.

Data Analysis
Transcripts of the interviews were organized, synthesized, and searched for common and significant patterns of behavior and ways of thinking. The data were then sorted according to categories and themes. Categories were evaluated on the basis of their homogeneity, which according to Patton (1990), is the extent to which the information belongs to a category and the extent the categories differ and/or are unique. In this study, the participants' feelings, attitudes, and behaviors were categorized based on similarities and differences.
The documentation of the Informal years to Formal years in developing the SF2TR model for an island state university was carried-out in order to (1) review the previous externally-funded CSTIFDP and CIRDEP; (2) develop a Research Mentoring Scheme of faculty-student; discuss the qualifiers of the model.

DISCUSSION

Faculty profile and faculty classification for developing research culture

Assessment of the individual characteristics of CatSU faculty to facilitate research productivity, profiling were conducted. A total of 218 faculty members covering both the Main Campus in Virac and Panganiban campus were involved in filling-up forms during the launching of the CHED Funded IDIG-BCPRO, 160 submitted 102 female and 58 male, 36 with doctorate degree, 39 faculty members with units in the doctorate, 113 faculty members with a master's degree, 28 with units in masters and 19 faculty without master's units.

Qualifiers of a research management model developed from the informal years to the formal years when CHED awarded the university with IDIG funding

Documentation of the different practices during the informal years (2013 to 2016) and the formal years from 2017 to 2018 within the Institutional Development and Innovation Grant (IDIG) of K to 12 Transition Program of CHED known as Building a Culture of Publishing Research Output (BCPRO). Eight million pesos funded a program aimed to enhance research productivity by building a research publishing culture among faculty members and students. An integrated Research Training Program (RTP) includes activities on training and support for research capability building, research publishing planning congress, national biodiversity, scientific meetings, and an academic and postgraduate symposium, among others. The project along with the efforts on enhancing capabilities of faculty and students in this university is anchored on an over-arching principle of total holistic approach, i.e., to develop and sustain quality faculty committed to the maintenance of the integrity of sustainable islands in the Philippines.

Qualifiers of the phrases in the model: (1) "student-focused learning", (2) "teaching-research link", (3)"bridging research to a Green University" and (3) "integrated undergraduate-graduate research" were discussed clearly among faculty members involved in the CHED IDIG BCPRO training program in the university.

Student-focused learning considers the students weaknesses in doing research activities as the basis for faculty-student tandem research and mentoring sessions culminating in the regular Food Security Research Seminars and In-house Review Sessions for funded programs. The "student-focused learning" concept was shown in the strategy of letting the student choose a faculty adviser for the proposed thesis project and the use of local dialect in the undergraduate classes during research problem formulation and thesis proposal defense only, but in the final defense the English language will be used in preparation for participation in external paper presentations.

The teaching-research link

The nexus of teaching and research was clearly recognized in this research culture enhancement of CatSU. Zubrick et al. (2001) indicates that the analyses reveal ways in which it is possible to work to strengthen the connections between teaching and research, and highlight that it is valid and important for universities to address the nexus through measures consistent with their mission, goals and objectives. Since universities differ, it is appropriate that the means also differ" (Zubrick et al., 2001). It is just fitting to include such a link so that the model developed for CatSU could ultimately address the issue of low research productivity as shown by a lower number of faculty members involved in research and have published papers about their studies in their field of specialization. Universally, it is recognized that research and teaching are essential and intertwined characteristics of a university. In this model, this can be pursued from two perspectives: that of the students acquiring a 'higher education' studies, and (2) that of the work of faculty members employed at CatSU.

Bridging research to a green university

A green university globally engaged in island research and innovations for societal advancement, a vision statement of CatSU, that requires an urgent need to develop the workable models for developing a research culture in an island university is clearly recognized as the CatSU embarks in implementing initiatives within the ASEAN integration framework, CatSU has to be unlimited and requires a clearer definition among the students, faculty staff and the rest of the stakeholders.

Integrated undergraduate-graduate research

This model for R&D at CatSU recognizes that graduate education is just an appendage of undergraduate education. This means that it is but prudent to develop a research training program for research culture enhancement that integrates curricular practices of the Bachelor and Graduate programs of the university.

Research publishing best practices of the university to address the problems and issues on low research publishing output

Integrated Research Training Program

Initially carried-out in 2015, the training is a support initiative starting from the Writing of Scientific Papers course (3 units) and during the senior level of the BS in Biology program

study. This scheme can facilitate the transition to the labor market as a Student Assistant (SA) in research and as Research Aide and then as a Research Assistant in the university's R&D Services. The program includes specialist subjects/courses, transferable skills training on writing, literature review and retrieval of digital documents for research. Prior to the Thesis Defense in a Panel or within the academic year (s) after enrolment at the end of the senior level. Included in the CHED IDIG BCPRO program is the allotment for the undergraduate, masteral and doctorate bursary, research funding, dissertation grants and research assistance available for mentoring as incentives.

The Integrated structure of the RTP at the College of Arts & Sciences BS in Biology Program as Case Example

The BS Biology and a BS in Agriculture programs were the first two programs covered in the integrated Research Training Program (RTP) of the university during the informal years from 2013-2016. Details of this research enhancement initiative is fully discussed in a poster paper for presentation during 2018 PHILARM's conference in Cebu City. The RTP structure developed begins with the enrolment in the Writing of Scientific Papers (WSP) for BS Biology or English 3A (3 credit units), continued to BIO 20A (Undergraduate Thesis I) with Topic and Thesis Proposal Defense (UBT Form 1) during the College of Arts and Sciences (CAS) Faculty-Student Research Mentoring Series on Food Security, Wednesday Workshops on Retrieval of Digital Documents during Literature Review and Literature Essay Writing Proposal Defense (UBT Form 2). The student finally enrolls in BIO20B (Undergraduate Thesis II with Seminar, a 3-unit credit subject in the final year, terminating in the Annual BIOFORUM and finally joining the university-wide Annual PISOG Award (Undergraduate Research Award). Submission of Research Diaries/Logs/Journals, CAS Joint Faculty–Student Research Mentoring Series II to III and the CAS Research Seminars with the refereed journal CatSU CAS Journal of Research (see Google Scholar). In addition, Classroom Defense (Oral and Poster) in the local language and attendance in National Biodiversity Meeting (BIOME) as well as other national research students conferences, e.g. National Students Research Conference in Baguio City to meet Scientists, Researchers, Specialists, Science Administrators, and other students (see Figure 2). One special feature is the program volume of a thesis and reduced number of pages for UBT (see Figure 3) and a new format following the pre-print or publishable format of a thesis. The RTP follows the governance notion of co-responsibility with the UBT Research Supervisor/ Adviser + BS student (Figures 2 and 3).

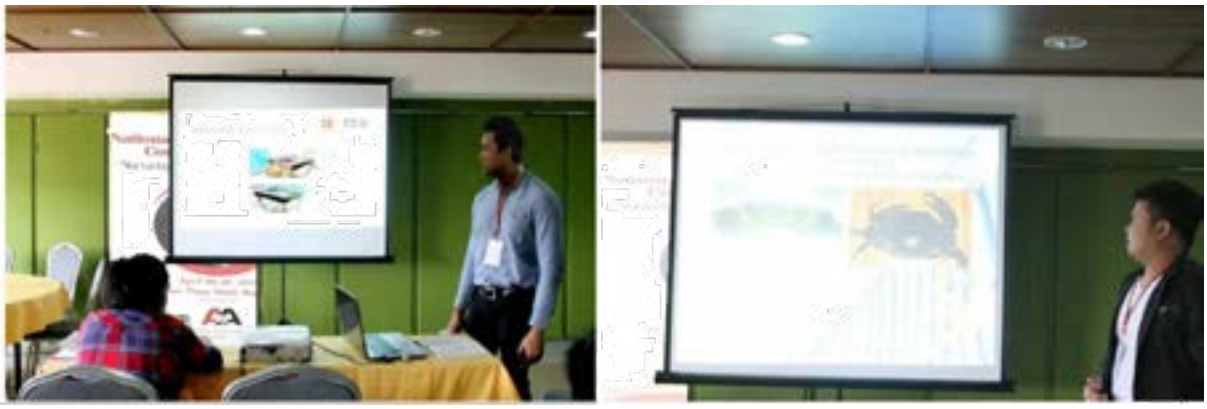

Figure 2 A & B. Undergraduate students (H. Sabeniano and M.L. Trinidad) of CatSU presenting research papers during the National Student Research Conference in Baguio City (2017) included in the integrated Research Training Program of the university.

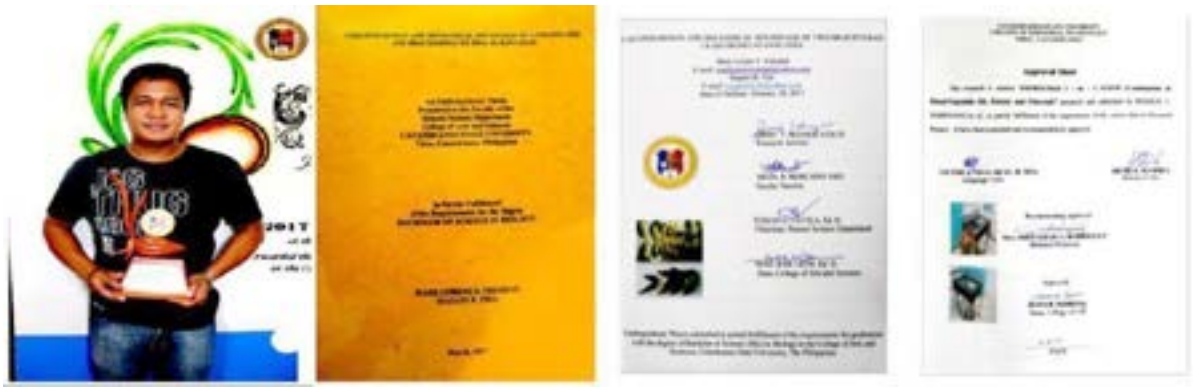

Figure 3 a, b, c & d. CatSU undergraduate student (a), BS Bio thesis, in reduced pages (b & c), and BS Industrial Technology (d).

Research Retreat (RR)

Research retreat provided a refuge for faculty researchers at CatSU needing privacy and safety; and a period of group withdrawal for study or instruction under a leader researcher or director. Participants were provided with food and overnight accommodation located away from the university. Each participant was free to work for the improvement and/or finalization of his/her research report within given dates either to work as a group or choose to work in isolation. The objectives of RR I and II at CatSU under the CHED IDIG program were: (1) to finalize research output and publishable articles for submission and publication in different refereed journals; (2) to collate publishable papers that are for submission in digital and hard copy formats; and (3) to ensure the acceptance of submitted research notes in scientific paper format and assist to develop it into a full-blown research paper. The participants presented individual output and submit the paper before adjourning on the second day of the activities.

Research Retreat (RR) I and II were conducted to address the need for more research output and publications from CatSU faculty members. Topics included were preparing proposals for funding; preparing concept notes and full blown proposals; implementing and carrying out a research project; submitting terminal reports; preparing the research budget; preparing the publishable version of a terminal report and Submitting to journals for publication. Out of 82 participants, 34 were male and 48 female participants, and only 17 research papers submitted and for the final review for publication.

In order to continually address the need for research output, a two-day seminar workshops on Research Skills were held in 2018 in both Main and Panganiban campuses, wherein a total of 36 faculty members on start-up and early career (composed of 15 male and 21 female faculty researchers. Mentoring sessions for researchers are done regularly at the Research and Development Services Directors Office from 2017-2018.

Another need assessment was conducted following the method of Zoellner et al. (2015). Faculty research and Publication Practices, 20 researchers who submitted their research papers from RR I and II including co-authors were surveyed on the challenges conducting their research, where they normally obtained their literature references, accessibility to different journals and publication. Most of them did not rely much of the library services on research data management. They relied on their own internet access and did not have access in the university. There was low reliance on the university as to Literature access, because of this, CHED IDIG BCPRO program comes in with its currently implemented e-Resources for faculty researchers.

The Director of Research & Development Services of the university was the leader of the Research Retreat I, held last December 1-2, 2017. It was attended by a total of 46 faculty members and staff (19 males and 27 females) from Main and Panganiban Campuses. The topics covered were on finalizing research proposals for funding, preparing research concept notes and full blown proposals; implementing and carrying out a project; preparing the research budget; submitting terminal reports and starting to prepare publishable versions of terminal reports.

Research Retreat II was held last February 9-10, 2018 with 36 faculty attendees (15 males and 21 females). This retreat covered the following topics: publishing with Asia Pac J Island Sustainability of CatSU; assigning DOIs and Open Journal System (OJS); copy editing and proofreading concerns of Asia Pac J Island Sustainability; DOAJ Concerns, Journal TOCs and RSS Feeds; Refereeing, Archiving and Indexing Journals World Wide; and obtaining a List of Refereed Journals Worldwide. Moreover, topics of Author/Contributors Guidelines; Aims and Scope of Asia Pac J Island Sustainability; Types of Articles acceptable; General Text Instructions and Submission; Review Process and other Journals; Manuscript Preparation and Submission; preparing Cited References; Copyrights; Steps in writing the Articles; and presentations of output in Research Retreat II for critiquing during the oral Presentation of the finished article.

Evaluation by the participants of the attendees of Research Retreat I conducted last December 1 and 2, 2017, with a scale of 1 (lowest) to 10 (highest). On the effectiveness of the speakers, attendees rated as 9.7, the effectiveness of the topics was rated as 9.82, food quality was rated the lowest at 8.0 and venue at 9.5. Research Retreat II evaluation on the effectiveness of the speakers had a rating of 9.5, the effectiveness of the topic with 9.4, and the quality of food at 9.2 and venue at 9.4 mean responses.

The low mean turnout of the venue was due to internet connection, which was required during the Research Retreat (RR) I, also during RR II, there was an electrical interruption and generator was not readily available. In addition, during RR I, the food was not readily available on the second day. Research retreats should be done outside of the work area and researchers need to stay overnight so that mentoring and step-by-step sequencing of topics and presentations of output of the researcher with critiquing during Oral Presentation at the closing of the said retreat, also to be considered is the availability of internet connection to the venue for reference and literature review.

Developing a research Management Control System for CatSU

A management control system (MCS) is a business tool that can give an indication of how well an organization is performing in accordance with its objectives. A management control system is a way managers can document their organization's objectives. It is a way managers can (1) document their organizational strategies or policies; (2) assess the performance of internal corporate processes; (3) show performance in relation to declare objectives and policies

While carrying out the externally-funded research programs of CatSU, namely the CSTIFDP and CIRDEP, the need to consider a faculty member's talent is imperative. While talent is typically rooted in the human resource management literature, it is important in the implementation of these programs for completion noting a performance management and control perspective. The model devised for CatSU considers management control as a function ensuring that the researchers and the students involved in the program will behave in desirable ways to increase the likelihood of achieving research goals and in a larger context, the university goals in

research. Referring to the management control literature, the identification of "talent" and development of employees is characterized as staff controls (Mechant & Van der Stede 2012).

In carrying-out externally-funded research, staff controls were ever present as ensured by the project leaders of CSTIFDP and CIRDEP, and every knowledge generating activity of CatSU R&DS rely on them. For example, with the hiring of research assistant interviews to assess the candidates fit with the field work requirements, in-house training to share knowledge within the funded program or the evaluation of increasing research assistant rates were practiced within CatSU's RDS funded programs (e.g. giving of the basic rate of 378.00/day and the 628.00/day rate as incentives for good performing RAs. These types of controls lay the ground for "organizational performance" in the research management model at CatSU by selecting the right individuals (who may not possess the high GPAs but with the correct attitude and commitment and providing them with the resources (e.g. laptops, desktops, research spaces or offices) to perform their job adequately. Therefore, it is highly regarded in this R&DS model at CatSU that staff controls contribute to the achievement of research goals of the funded programs by creating a highly motivated and well performing workforce.

Subsequently, more rigid controls to direct research staff or employee behavior in the funded programs at CatSU and decision-making can complement staff controls, if considered necessary during the conduct of fieldwork such as that of the NAFES SURMABIOCON Program. Although being so common and building the foundation of the control system followed at CatSU R&DS funded programs, we found that as of the date the research management control literature on the effectiveness of staff controls is still limited. In other business organizations, the works of Abernethy et al. (2015) and that of Campbell (2012) tackle on the staff control effectiveness. In an earlier work of Malmi & Brown (2008), it notes that there has been very little explicit theoretical and empirical research on the concept of management control systems (MCS) as a package despite the existence of the idea in management accounting literature for decades.

The earlier work of Otley (1999) proposed a framework for analyzing the operation of management control systems structure applicable for CatSU around five issues on objectives, strategies and plans for their attainment, target-setting, incentive and reward structures. These issues have been dealt with during planning sessions of the university's college research coordinators. Organizational management (OM) concepts have been integrated in CatSU's Research Manual approved and implemented in July, 2016. The integration of various MCS, OM and organizational support concepts provided the R&DS office with the knowledge needed to take decisions and corrective actions pertaining to the management of internally and externally-funded programs. These decisions and actions translate to a management control system being developed during the informal and formal years in research culture enhancement.

Clustering as an approach on research management

Clustering as an approach to research management was started at the end of the Informal Years (in SY 2017-2018). The use of clustering in marine space utilization was stressed in the book of Myles (2017) that currently emphasized that the concept of clustering has become a central idea for analyzing the competitiveness of nations, industries and firms. It was shown that cluster concept can be usefully applied to the study of marine activities. It is in this book that one of the papers cited is the work of Masagca, Morales, Araojo & Sapico (2017) on clustering eco-tourism in Catanduanes presented during a Phuket, Thailand forum (see Morales, Masagca, Araojo & Sapico, 2016). One of the most robust approaches in land use development is the so-called "clustered development" which is popular in some parts of the

world. Recognizing the great benefits of clustering land use in agricultural development, the university started its RDE Clustering scheme with the project "Clustered Land Use towards Sustainability, Equity and Resiliency".

Clustering was also applied in the research areas or disciplines in the university such that Alpha research cluster includes Humanities, Social and Behavioral Sciences (Arts and Philosophy, Public Administration & Public Policy, Economics, Business Administration & Accounting, Psychology and Educational Sciences, Political and Social Sciences, Industrial & Technical Education, Agricultural Education and Extension). The Beta research cluster includes exact and applied sciences (Mathematics, Biology, Chemistry, Physics, Engineering, Computing & Information Sciences, Industrial Technology, Agriculture and Fisheries Sciences. Finally, the Gamma research cluster Areas that include the health sciences, biomedical and medical Sciences Nursing, Midwifery, Nutrition and Dietetics, Pharmaceutical Sciences, Human Ecology, Biodiversity & Health, Sustainable Development & Health.

Management and control system, linkages, and some aspects of organizational management and support services in the model development

A home-grown mentoring scheme at CatSU was employed in this study following the scheme trialled in two programs of the university, CSTIFDP on an inland fisheries technology, infusion and CIRDEP for an indigenous rice development program funded by the Department of Agriculture (for completion by December 31, 2016). As a general rule, mutual respect and trust, time and consultation are keys to successful mentoring. The personal relationship where both concerned parties value each other's abilities and dedication will be central to this project involving MAT Biology, Chemistry and Mathematics students as well as the BS Biology and BS Environmental Science. In the present CHED funded program under the National Agriculture and Fisheries Extension System (NAFES) – SURMABIOCON (Sustainable Use of Marine Resources and Community – Based Mangrove Biodiversity Conservation), a seven-million funded program, the university implements a student-faculty research tandem scheme. In addition to this, a mentoring scheme was extended to students of teacher education programs during training of Community Science Teachers under the SURMABIOCON.

Gains from using the R&D Management Model: Policy implications for a green university

Findings during informal years (2013-2016 and formal years 2017-2018) with CHED IDIG funding indicated that there was a subsequent increase in the number of externally-funded research programs and percentage of participation of faculty members in research and publishing initiatives as shown in the number of proposals submitted and papers passing through TEC evaluation or internally funded projects. Although the number of funded projects increased but the number of publications in ISI/Thomson listed journals and CHED accredited remains the same.

Table 1. Completed research and publications in ISI/Thomson listed journals

Research Activities	2013	2014	2015	2016	2017	2018	2019
Completed Research	16	18	34	12	21	21	23
Number of Research Publications	2	4	5	11*	16*	17**	21**

Note: * Includes papers from CatSU Research Digest
** Includes papers from Asia-Pacific Journal for Island Sustainability

The informal years from 2013-2016 totalled to 80 completed research studies with an annual average of 20 completed studies. In 2017, a total of 21 studies were completed by faculty members from the university. Research publications in refereed journals or ISI/Thomson listed journals showed a gradual increasing trend from two in 2013, four in 2014, then five in 2015 and 11* in 2016 (includes paper for CatSU Research Digest), and 16* in 2017 including papers published in the Asia Pacific Journal for Island Sustainability (considered as a refereed journal).

With this scenario on research and publishing in the university, the use of the model in carrying out research culture enhancement and productivity, CatSU could sustain quality research and publications in high impact journals in pursuit of its vision to be globally engaged in island research and innovation for societal advancement. This model combined with the needed research management control strategies on incentive designs, talent and creativity requirements for hiring new faculty members and organizational behavior in research undertakings could help achieve the objectives of the CHED IDIG BCPRO program.

CONCLUSION

Gains from developing a model from the informal years until formal years on research culture development contributed to the enhancement of research and publication practices of faculty members from different colleges as shown in the increasing number of proposals submitted, and number of faculty proponents. The faculty members classified as mandated professors conducted funded research but the completion rate was low and those who attended retreats with writing sessions were not able to complete publishable forms of their terminal reports. A similar trend occurs among start-up, early career and late career faculty members who participated in this RR I & II on publishing research output are active researchers and teachers who find sources for their projects through their own active searching protocols in their homes not relying on library resources, possibly due to the lack of links between faculty researchers and library resources. Looking into the management control system (MCS) and organizational management behaviour of faculty members, the need to look into risk-taking, decision-making aspects, talent and reactive skills with incentive designs including penalty are gray areas that need to be addressed in the coming years to professional affiliations and publication practices. They did not have frequent use of library resources and services, and often relied on their own literature services at home. Faculty members depended mostly on e-resources from the outside and as a result, many have changed their minds of participating and publishing research output or not taking the risks of spending much despite design incentives in the Research Manual of the university and faculty promotions through NBC 461.

The policies on research and publishing at CatSU, as initiated by this CHED IDIG BCPRO, need to be bolstered by stressing e-faculty resources, funding, benefits and bonuses and not so much with penalties and faculty sanctions for mandated professors and other measures and strategies to erase the notion that research is only an ‘additional’ function of the faculty rather than a function of a separate group of faculty members as Research Faculty who will be hired as researchers with no or little teaching and extension function to focus only of research publication of the university. The initiatives from informal to formal years of CatSU have contributed to research productivity as shown from an increased number of research projects by faculty members themselves. However, it is hoped that they come up with redirection to publish in high impact journals supported by MCS on individual decision-making, risk-taking and incentive designs with adequate research funding and library support services with regards to data management.

RECOMMENDATIONS

Institutionalizing the Integrated Research Training Program (RTP) at CatSU for undergraduate and graduate students

In institutionalizing the RTP, a publication preprint or draft for the BS in Biology student to be published in any CatSU journals, CatSU -CJR (CAS Journal of Research), the Research Digest and now the Asia-Pacific Journal for Island Sustainability (Figure 4). A pre-print is submitted to the Editor by the faculty member involved. Specific style sheets for a thesis in Alpha, Beta and Gamma research areas or programs must be in place.

Table 2. New flexible RTP features for 2019-2020

New flexible RTP Features	**Suggested Number of Units/ Hrs.**	**Additional certificates to be received by the student**
Seminar sessions in	108 h	3 Certificates of Attendance
Mentoring sessions	54 h	No. of hours
Reduced cost with the reduced number of pages and a lower cost for printing	From 100 to 300 h	None
Exposure to national/ regional events	8 h to 36 h	Certificate of Participation and Recognition if co-author of the faculty member
Submission of a draft of publishable form paper based from the Thesis with the Research Adviser as co-author	Completion of the Undergraduate and Graduate Thesis	Certificate of Publishing in the Asia Pacific Journal of Island Sustainability, formerly Research Digest (see Figure 4)
Employable Skills	Add transferable skills while attending RTP activities	Possibly TESDA Certification on NC for Scientific Writing, Journal Writing and other research skills for national assessment

Creating the data management support system CatSU

Research Data Management is not a single issue, it presents many challenges and raises many questions throughout the research lifecycle, from the moment an idea forms to the completion of research, publication, and subsequent use of findings to inform sharing of ideas and stimulate new research. Research data management concerns the organization of data, from its entry to the research cycle through to the dissemination and archiving of valuable results. Research data management aims to make the research process as efficient as possible, and must meet the expectations and requirements of the university and funding institutions.

The developing management control system for research management

There is a need to continue re-defining the definition of “internal consistency” in research and development management, and how CatSU can use in its on-going analysis to conceptualize MC systems for R&DS, thereby giving emphasis on contingency theory as a necessary ingredient to continue with the analysis of cases for CatSU faculty researchers and research staff. Moreover, Grabner & Moers (2013) states that despite the trend in investigating combinations

of management control practices that form packages or systems, there is ambiguity about what is meant by a “control package” or “control system”. This work became important in trying to decide if the systems approach to contingency theory and the need to clearly define its most fundamental concept, i.e., “internal consistency”.

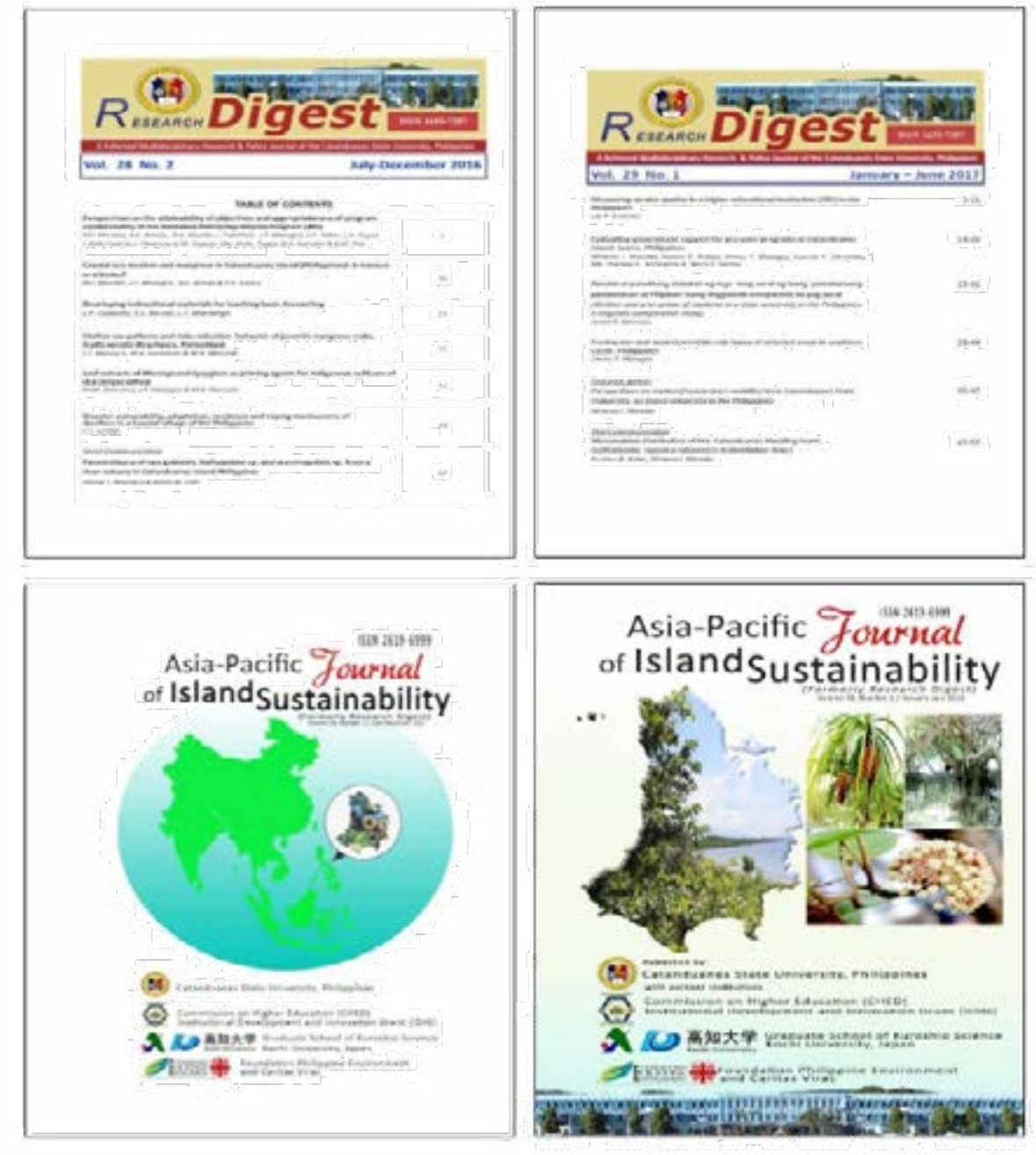

Figure 4. Academic Journals of Catanduanes State University

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